Introduction
to Management Accounting

MO001 FOR
MAC1501
Semesters 1 and 2

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IMPORTANT INFORMATION:

This tutorial letter contains the content of the learning units on myUnisa. Please activate your myUnisa and myLife e-mail addresses and make sure that you have regular access to the myUnisa module site MAC1501-17-S1 (semester 1) or MAC1501-17-S2 (semester 2) as well as your e-tutor group site.

Note: This is an online module, which is therefore available on myUnisa. However, in order to support you in your learning process, you will also receive some study material in printed format.

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INTRODUCTION

(a) Welcome

Welcome to the online module MAC1501, Introduction to Management Accounting. This module is offered by the Department of Management Accounting. We know that you will find this module stimulating and rewarding. The knowledge that you obtain by studying this module will benefit you in your career as well as in your personal life.

It is important that you read this introduction section carefully before you proceed to page 1.

(b) Purpose of this module

The purpose of the learning outcomes of this module is to equip you with the knowledge of the basic concepts and principles of management accounting and financial management. This knowledge is required as foundation for the development of your knowledge and skills in the field of accounting sciences and quantitative management.

(c) Assumed knowledge and skills

This module assumes that you already possess a certain level of proficiency in English and mathematics. If English is not your first language, we advise you to keep a good bilingual dictionary of your first language and English handy as you work through these learning units; when you come across a word that you do not understand, look it up in the dictionary and write its meaning in your study material. This way you will ensure that you understand the study material while improving your language proficiency.

(d) Module outcomes

As you know, this module forms an integral part of the higher certificate and diploma in accounting sciences. Therefore, both the purpose of and the learning outcomes for this module are aimed at developing your knowledge and skills in the field of accounting sciences. Upon completion of this module, you should be able to do the following:

- describe the basic cost concepts and classify costs
- define the different terms and concepts in respect of purchased inventory and record the accounting entries for the purchasing and issuing of inventory
- valuate purchased inventory
- define the different terms and concepts in respect of payroll-related costs and record the accounting entries for labour costs
- allocate production overheads by means of predetermined rates
- calculate the cost of manufactured goods sold in a traditional absorption costing system
- draft the operational budget of a manufacturing and retail company
- describe the different facets of working capital management
- compute ratios for the management of working capital
- prepare a cash flow budget
- discuss the concepts of strategy, stakeholders and business risks

(e) Learning package for this module

There is *no prescribed book* for this module. Because we want you to be successful in this online module, we also provide you with some of the material in printed format. This will allow you to read the study material even if you are not online. The printed package for this module consists of the following:

- MO001 (learning units)
- Tutorial Letter 101, which contains very important information regarding the study programme and assignments for the semester
- Apart from Tutorial Letter 101, you will also receive Tutorial Letter 102 (examination guidelines), 201 and 202 (feedback on assignments), during the year.

(f) Approach to teaching and learning

You will require at least 120 hours of studying during the semester to master the outcomes for the module. There are only 15 weeks available for studying in a semester, which means you will have to allocate at least eight hours per week to studying the material for this module.

Approaching your studies

After reading this introduction to the learning units, you should read *Tutorial Letter 101* very carefully. (If you have already read Tutorial Letter 101, we suggest that you read it again.) This tutorial letter contains valuable guidelines and a suggested study programme for mastering the learning outcomes for this module.

The learning units provide you with all the information that you need to master the learning outcomes. It is vital that you work through all the learning units and understand every section of the work. You must work diligently through all the examples, activities and self-assessment exercises.

We include a number of activities in the learning units. You must complete each of these activities as you are working through each learning unit and compare your answers with the feedback provided. This will allow you to immediately go back to any section that you may not have fully grasped.

At the end of each learning unit, there are a number of self-assessment questions based on the work covered in that learning unit. Approach these questions as follows:

- Answer each question as if you were writing an examination, in other words without referring to the suggested solution.
- Use the suggested solutions provided at the end of the learning unit to mark your answer. Remember to pay special attention to the steps, calculations and layout of the answer. Also, use this opportunity to check your spelling and grammar.
- If you have made any errors, it is important that you go back to the specific learning unit and make sure that you understand where you have gone wrong.
- Make sure that you fully understand all the calculations. Also, note how you should disclose your calculations in your answers.
- Attempt the question again under examination conditions to ensure that you now fully understand the work.

Sometimes, you will find that questions contain more information than what is required to answer the question. We do this intentionally. In practice, the management accountant is frequently confronted with an enormous amount of information. It is important for you to learn how to distinguish between information that is relevant and information that is irrelevant in the given situation early in your career.

Like financial accounting and mathematics, management accounting and financial management are practical subjects. We advise you to work through as many examples and questions as possible. The self-assessment questions can assist you to assess your readiness to attempt compulsory assignment questions and to prepare for the final examination.

The learning units also contain highlighted information boxes that are not directly related to the subject matter but will contribute to your cross-field learning and understanding of the module.

Abbreviations used in your study material

The following abbreviations will be used throughout all the learning units, and you should make sure that you know the meaning of each:

e.g. which stands for the Latin *exempli gratia* and means **for example**

etc. which stands for the Latin *etcetera* and means **and so forth**

i.e. which stands for the Latin *id est* and means **that is**

Compulsory assignments

You have to submit two compulsory assignments for MAC1501 for marking. We use your assignment marks to calculate your year mark and a combination of your year mark and examination mark to calculate your final mark. The final mark determines whether you pass the module. Tutorial Letter 101 contains details on the calculation of the year mark and the final mark as well as the due dates for assignments.

In addition to contributing towards your year mark and final mark, the completion of the assignments will assist you in achieving the learning outcomes for this module. The assignment questions provide an opportunity for you to apply your knowledge to practical situations. An added advantage is that they will give you an idea of the kind of questions that you can expect in the examination.

It should be obvious (and indeed past analyses have confirmed) that students who work diligently through the learning units, examples, activities, self-assessment questions and assignments are far better prepared for the examination than those students who don't.

(g) A note on decimals

In South Africa, we use a comma (,) to indicate decimals, but in many other parts of the world people use a point (.). Excel spread sheets and most calculators use a point for decimals. In these learning units, we use the comma, except where we give instructions for you to follow on your calculator. When we say decimals out loud, we say "two comma seven five" (for 2,75) and not "two comma seventy five;" we say "five comma two nine" (for 5,29) and not "five comma twenty nine", etc.

(h) Conclusion

We would like to express our sincere gratitude to Ms JE Kleynhans, external writer, who compiled the fourteen (14) learning units of this study guide. We also would like to thank Ms L Kamanja, Unisa education consultant, for her professional advice and helping us put together the learning units for online presentation. We know that you will enjoy your studies in the exciting field of managerial accounting and finance and are looking forward to being your partners along the way.

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LEARNING UNIT 1: INTRODUCTION TO MANAGEMENT ACCOUNTING

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit you should be able to do the following:

- describe the role of the management accountant
- describe the purpose of a management accounting system

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- describe the difference between management accounting information and financial accounting information
- describe the functions of a management accounting system

OVERVIEW

This learning unit is divided into the following sections:

1.1 Introduction
1.2 Management accounting and financial accounting
1.3 Functions of a management accounting system

1.1 INTRODUCTION

The purpose of this learning unit is to introduce you to the field of management accounting, to describe the functions of a management accounting system and to explain how management accounting differs from financial accounting.

When you enrolled for your studies at Unisa this year, you had a certain goal in mind. That goal was likely to increase your knowledge, pass the examination and improve your chances of securing a successful career. To achieve this goal, you would have to make sure that you dedicate enough time to your studies to master the learning outcomes. In order to ensure that you dedicate sufficient time to each module that you have enrolled for, you would have prepared a study programme (plan) to indicate by when you should have mastered each section of the material in each module. Your daily plan will contain a list of the sections of the modules you would study on any specific day. (Of course, when preparing your study plan, you will have to consider your other responsibilities as well, such as the responsibilities you have towards your family and your employer.) Throughout the year, you will check (*monitor*) your progress through your planned studies on a regular basis (e.g. weekly or monthly) and adjust the plan (*control*) where necessary to ensure that you will achieve your goal.

The preceding paragraph indicates that you have to plan, monitor and control in order to achieve your goals.

The concepts *planning*, *monitoring* and *control* are central to business studies.

In your Business Management module, you will learn that every successful organisation will prepare a strategic plan. This plan will ultimately assist every employee of that organisation to focus on achieving the goals and objectives of the organisation. The strategic plan of an organisation will typically include the following:

- its mission (i.e. a declaration of what it is that the organisation wishes to accomplish)
- its vision (i.e. what the organisation wishes to pursue in order to accomplish its mission)
- its goals and objectives (i.e. the "things" the organisation wishes to achieve by a future date, and the steps that it will take in each period leading up to that date to ensure success)
- its value statement(i.e. a declaration of the organisation's core beliefs)

The strategic planning process entails envisioning what the future of the organisation should be in the long term, ensuring this vision is aligned to the mission of the organisation, translating the vision into broadly defined goals to be achieved in the medium term and formulating the goals into more detailed and measureable objectives to be achieved in the short term.

The goals and more detailed objectives are disseminated into operational plans for each unit (e.g. the accounting department, the production department, etc) indicated in the organigram (a graphical representation of the structure of the organisation). The operational plan for each unit is then developed into individual performance plans for each employee. Operational and performance plans are *monitored* and *controlled* regularly to ensure that the goals will be achieved.

Management accounting plays an important role in the planning, monitoring, controlling and decision-making processes in the organisation.

Note that we write its vision, its mission, etc., and **not** it's vision, it's mission, etc.

The general rule is that, when you omit a letter in a word, you must write an apostrophe (') in its place. It's means "it is"; we indicate the missing letter **i** in **is** with an apostrophe.

Another rule is that **'s** indicates possession, as in This is Thabo's book.', meaning the book belongs to Thabo. The apostrophe is **never** used to indicate possession in personal pronouns; we **always** write hers, ours, its, etc. That is why we write its vision, its mission, etc.

The apostrophe is also **never** used to indicate the plural of a word; we write books and **not** book's when we wish to indicate more than one book. Book's means "book is".

Activity 1.1

1 What is the purpose of strategic planning?

2 Why is it necessary to develop the strategic plan into operational plans per department?

Feedback on activity 1.1

1 The purpose of strategic planning is to ensure that

- the vision of the organisation is aligned to its mission
- the vision is broken down into goals that must be achieved within the medium or long term
- the goals are stated into measureable objectives to be achieved in the short term

2 It is necessary to translate the strategic plan into operational plans so that each operational manager will know what is expected of her/him.

1.2 MANAGEMENT AND FINANCIAL ACCOUNTING

We often hear people describing themselves as accountants. Does that mean that they all do the same kind of work? The answer to this question is "No"! In the engineering profession, we find civil engineers, electrical engineers, structural engineers, etc. Likewise, the accounting profession lends itself to specialisation. Accountants may therefore work as financial accountants, management accountants, tax accountants, etc. Depending on the size of organisation, one may also find cost accountants, financial managers, etc.

In this module, we introduce you to the world of the management accountant and financial manager. In practice, one person is often responsible for both the management accounting and financial management functions in an organisation.

1.2.1 Financial accounting

In your studies of financial accounting, you will find that in essence, financial accounting entails the following:

- recording the business transactions in the accounting records of an entity
- reporting the financial results of the operations and the financial position and cash flows of the entity in accordance with the prescriptions of applicable legislation and reporting standards

Recording of business transactions

We initially record business transactions in journals (e.g. the purchases/creditors journal, sales/debtors journal, cash receipts journal, cash payments journal, petty cash journal, salaries and wages journal and the general journal). We post these journals in summary form to

accounts in the general ledger. We extract a trial balance containing the balances of all the accounts from the general ledger from time to time.

Financial reporting

The trial balance serves as basis for the preparation of the following financial statements: the statement of profit or loss and other comprehensive income, the statement of financial position, the statement of changes in equity, the statement of cash flows and the notes to the financial statements. These financial statements are often included in a printed book called the *annual report* of that entity.

The financial statements of *companies* must comply with the requirements of, amongst others, the Companies Act and International Financial Reporting Standards (IFRS). The financial statements of *government departments* and *public entities* must comply with the requirements of, amongst others, the Public Finance Management Act and Generally Recognised Accounting Principles (GRAP)

All public companies, government departments and public entities must submit their financial statements to external auditors for audit. Companies appoint external auditors (firms like Ernst & Young) at the annual general meeting of the company. The Auditor-General of South Africa audits government departments and public entities.

The purpose of the external audit is to establish if the financial statements of (1) *an organisation*, which were prepared for the (2) *past financial year* are a (3) *true and fair* reflection of the organisation's affairs, profit or loss, cash flows and financial position and were prepared (4) *in compliance* with the *applicable laws and prescribed reporting standards*. The audited financial statements are presented to various (5) *stakeholders* of the organisation. For example, a company would submit its audited financial statements to its shareholders, the South African Revenue Service (SARS), banks, etc. Government departments must submit their audited financial statements to parliament and its various committees.

The focus of financial accounting is clearly

(1) on the *whole organisation* (i.e. not only a section thereof)
(2) on the *past* and not the future
(3) on *accuracy*, as the auditors must be able to verify that the financial statements are true and fair
(4) in *compliance* with *legislation and prescribed standards*
(5) *external*, meaning that information is presented to parties *outside* the organisation (i.e. parties *not* on the payroll of the organisation)

In your financial accounting courses, you will study the detail of the recording and reporting of financial transactions.

SARS is the abbreviation for the South African Revenue **Service** and **not** Service**s**. Likewise, SAPS is the abbreviation for the South African Police **Service** and **not** Service**s**. There is only one revenue service and only one police service.

1.2.2 Management accounting

While financial accounting focuses on the preparation of information and reports for use by parties external to the organisation, management accounting is concerned with providing information to managers *internal* to the organisation (i.e. people inside and *on* the payroll of) the organisation.

In your business management studies, you will learn that the functions of management are planning, decision-making, monitoring and control. Management accounting provides information that assists with the following:

- planning, for example, by using historical data to make future projections that will help management with medium and long-term planning and budgeting
- decision-making, for example, by preparing reports on the expected cash flows of two or more projects so that the relevant manager can use this information when deciding which project to embark upon
- monitoring and control, for example, by preparing reports of actual expenditure compared to budgeted expenditure

It should be clear that management accounting focuses

- on the whole organisation as well as sections (e.g. departments) thereof
- more on the future than on the past
- on timely and relevant information used in decision-making rather than accurate and verifiable information
- internally (i.e. present reports to parties *internal* to the organisation)

Unlike financial accounting, there are no prescripts for the preparation of management accounting reports. In management accounting, managers can decide on the most appropriate format and content of the internal reports for the execution of their duties. However, they must always be aware that the cost of preparing the reports should not outweigh the benefits of the information contained in the reports.

Ethical issues facing management accountants

Management accountants must always act with great integrity when faced with ethical dilemmas. The following are a few examples of ethical issues:

Management accountants must be competent to prepare and present relevant information to management for decision-making. Some management decisions may have far-reaching consequences for other people. For example, management may decide to shut down part of the operations of the company based on a report prepared by the management accountant; this may result in some employees being retrenched, and some of those retrenched may not be skilled enough to find alternative employment.

Managers may put pressure on management accountants to manipulate reports for the board of directors. Management accountants must maintain their credibility and do all their reports without bias.

Management accountants will also have access to sensitive and confidential information about the company. They must keep this information confidential and should never be tempted to use it for personal gain.

1.2.3 A brief history of management accounting

In economics, one learns about different economic systems. Mercantilism (the regulation of international trade by the state) was one of these systems and dominated in Europe before the 19th century. According to mercantilism, national prosperity is achieved by ensuring that exports

exceed imports by as wide a margin as possible. The Industrial Revolution was one of the factors that led to mercantilism's appearance in history books. During the Industrial Revolution in the 19th century, most businesses were owner managed. Therefore, there were no shareholders and owners personally had to provide security for any debt of the business. *In this type of business, management accounting was far more important than financial reporting*. It is only with the burgeoning of publicly-owned companies in the 20th century that the need for audited financial statements became essential for raising capital and calculating and paying taxes, leading to a shift in focus from management accounting to financial accounting.

In the first part of the 20th century, management accounting aimed only to ensure that financial accounting requirements were met. Indeed, in these early years the discipline was referred to as *cost accounting*, and its purpose was merely to determine the cost of products, services, projects, etc., so that the correct amounts could be reported in the financial statements.

As companies became more complex, it became clear that management accounting should also be more inward focussed and forward looking to supply managers with relevant information for decision-making.

Activity 1.2

1. What are the two main objectives of financial accounting?
2. What is management accounting concerned with?
3. What are some of the ethical dilemmas that management accountants may have to face?
4. Distinguish between the focus of financial accounting and management accounting by completing the following table:

Focus	**Financial accounting**	**Management accounting**
Users		
Time		
Verifiability/Relevance		
Accuracy/Timeliness		
Whole organisation/Segments		
Legal compliance requirements		

Feedback on activity 1.2

1. The two main objectives of financial accounting are the recording of financial transactions and the preparation of financial statements.
2. Management accounting is concerned with providing timely and useful information to managers *internal* to the organisation.
3. Management accountants must be competent to report and make recommendations to management and must understand the consequences of their recommendations.

   They must not allow themselves to be pressured into manipulating and falsifying their reports.

   They must not be tempted to use confidential information about their employer for personal gain.

4. The difference in focus between financial accounting and management accounting:

Focus	**Financial accounting**	**Management accounting**
Users	External users	Internal users
Time	Past	Past and future
Verifiability/Relevance	Verifiable for accuracy	Relevant for decision-making
Accuracy/Timeliness	Accuracy more important than time of reporting within prescribed deadlines	Timely information more important than absolute accuracy
Whole organisation/Segments	Whole organisation	Whole organisation and segments
Legal compliance requirements	Relevant laws and standards	None

1.3 FUNCTIONS OF A MANAGEMENT ACCOUNTING SYSTEM

Up to now, we have referred to *organisations* and *entities* rather than *companies*. The reason is that we wanted you to understand that management accounting is important for any organisation, regardless of whether that organisation is a company, government department, public entity, university or non-profit organisation. The purpose of this section is to introduce you to the functions of a management accounting system in a business environment, and therefore we will mostly refer to companies.

Many practising management accountants are members of the international body, the Chartered Institute of Management Accountants (CIMA). CIMA (www.cimaglobal) defines management accounting as follows:

Management accounting may be defined as the process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of information (both financial and operating) used by management to plan, evaluate and control within an organisation and to assure the responsible use of and accountability for its resources.

Management accounting, therefore, is an integral part of the management process. It provides information essential for

- controlling the current activities of an organisation
- planning its future strategies, tactics and operations
- optimising the use of its resources
- measuring and evaluating performance
- reducing subjectivity in the decision-making process
- improving internal and external communication

By now, you will understand that the objective of management accounting is to assist management in the planning, monitoring, control and decision-making processes of the company by making useful information available timely. A properly designed management accounting information system (of which the cost accounting system is a sub-system) will provide timely and relevant information required by managers for the efficient execution of their duties and responsibilities.

The functions of the management accounting system are to

- collect and store data
- modify and process the data into useful information
- analyse and interpret data and information

and then to

- communicate useful information to management

in order to assist management in their

- planning and strategic decision-making responsibilities and
- monitoring and control responsibilities

Data can include numbers, text, graphics, video, etc. or any combination of these. Information is data that has been processed and converted into a format that is meaningful to managers.

Collection and storage of data

We collect data about issues that could affect the organisation from various sources, such as the financial accounting system, the cost accounting system, economic forecasts, newspapers and business journals, which is then stored until required.

Modification and processing of data

The data collected from the various sources is not necessarily in a format that management can understand easily. This is because individuals forming part of management will have different backgrounds and therefore different knowledge levels. For example, the technical manager will not have the same level of understanding of the financial statements as the financial manager. We therefore have to modify data and present it as information in a format that management can use in decision-making. For example, the financial statements may contain a single figure representing the sales of the organisation. Management accounting can use the data on sales that was collected from various sources to indicate the make-up of sales per product, geographical area, etc. and to present this information in graphic format to the management of the organisation.

Analysis and interpretation

By analysing and interpreting data and information, management accounting can assist management in strategic decision-making. Let's use a manufacturing company that is manufacturing three products. By analysing and interpreting data, management accounting can establish which sales mix is best for the company. The management accountant then presents this information to management for a final decision. (Sales mix refers to the combination in which products are manufactured and sold, for example, 100 units of product A, 170 units of product B and 80 units of product C per month.)

Communication

Reporting is a very important function of the management accounting system. Management accounting must prepare different types of reports periodically for dissemination to various departments and management. These reports often contain graphs, diagrams and other graphics to make them easily to understand. It is essential for the success of the organisation

that individuals who have to act on these reports understand them clearly. The following are examples of the reports typically prepared by the management accounting system:

- margin analysis reports to determine the profit (and ultimately the cash) that is generated per product, geographical area, etc.
- breakeven analysis reports to indicate the level of sales mix at which the company breaks even (i.e. where it makes neither a profit nor a loss)
- trend analysis reports to identify unusual variances over a period so that these variances could be investigated and reported to management
- capital budgeting reports to determine if long-term assets are required and, if so, what the best option for financing the acquisition would be

Monitoring and control

As indicated earlier, management accounting plays an important role in providing managers with the required information to monitor and control performance within their sections. It is essential that deviations from plans are reported in a timely manner to allow for corrective action. Note that management accounting is *not responsible* for control in an organisation; it is merely responsible to provide timely and relevant information to managers so that managers can monitor and control to ensure that they achieve their goals as efficiently as possible.

Strategic decision-making

Management is often required to make complicated decisions, for example whether to manufacture a product or to buy it from another company. By employing a range of analyses and appraisal methods, management accounting can prepare useful reports to assist management in making their decision.

As mentioned earlier, the cost accounting system is a sub-system of the management accounting system. We discuss the cost accounting system in learning unit 3.

Activity 1.3

Briefly explain each of the following functions of a management accounting system:

- collection and storage of data
- modification and processing of data
- analysis and interpretation
- communication
- monitoring and control
- strategic decision-making

Feedback on activity 1.3

Collection and storage of data. Data is collected from various sources and stored until required.

Modification and processing of data. The collected data is modified and presented as information in a format that management can understand and use in decision-making.

Analysis and interpretation. By analysing and interpreting data and information, management accounting can assist management in strategic decision-making.

Communication. Management accounting must prepare different types of reports periodically for dissemination to various departments and management. These reports often contain graphs, diagrams and other graphics to make them easy to understand. It is essential for the success of the organisation that individuals who need to act on these reports understand them clearly.

Monitoring and control. It is essential that deviations from plans are reported in a timely manner to allow for corrective actions.

Strategic decision-making. By employing a range of analyses and appraisal methods, management accounting can prepare useful reports to assist management in their decision-making responsibilities.

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1.4 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Consider the following statements carefully and indicate whether they are *true (t)* or *false (f)*:

1.1 The strategic plan is the short-term operational plan of an organisation.

1.2 Management accounting does not concern itself with monitoring and control in the organisation.

1.3 Government departments must prepare their financial statement in compliance with GRAP.

1.4 It is essential that management accounting reports are prepared in compliance with the requirements of IFRS.

1.5 The statement of financial position is an important report prepared by management accountants.

1.6 The focus of management accountants is internal; therefore, they do not face ethical issues similar to those that financial accountants face.

QUESTION 2

For each of the following questions, carefully read the information provided and select only the most correct option as your answer.

2.1 Carefully consider the four statements below.

A The management accountant always reports to the financial accountant of the organisation.

B The management accountant must ensure that the annual financial statements comply with IFRS.

C Management accountants provide information that managers need for planning.

D The management accountant is responsible for controlling expenses in the organisation.

Select the correct alternative:

(a) Only statements A and B are correct.
(b) Only statement B is correct.
(c) Only statement C is correct.
(d) Only statements C and D are correct.

2.2 Select the correct alternative to complete the sentence below:

_____ statements are prepared for external users, while management reports are prepared for _____ users.

(a) wage; internal
(b) financial; internal
(c) budget; internal
(d) financial; external

QUESTION 3

With reference to the functions of a good management accounting system, briefly explain by means of an example how the system can assist the management of a manufacturing company in its planning and control responsibilities.

QUESTION 4

Describe the differences between management accounting and financial accounting.

---oOo---

1.5 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 F The strategic plan is the *long-term plan* of an organisation.

1.2 F Management accounting is concerned with providing management with relevant and timely information to management to assist them in their planning, decision-making, monitoring and control responsibilities.

1.3 T

1.4 F The annual financial statements of a company must be prepared in compliance with the requirements of IFRS. Management accounting reports may be prepared in any format that is useful to the users of the reports.

1.5 F The statement of financial position is prepared by the *financial* accountant.

1.6 F Management accountants are often faced by ethical issues, for example pressure from management to manipulate reports.

QUESTION 2

2.1 (c)

2.2 (b)

QUESTION 3

The functions of the management accounting system are the following:

- collecting and storing of data
- modifying and processing of data for supplying useful information for decision-making
- analysing and interpreting data and information
- communicating useful information to management
- monitoring and control
- strategic decision-making

The objective of a management accounting system is to provide management at all levels with information they can use for sound *decision-making*. The information that can be obtained to prepare the production plan for a company is an example of how a good management accounting system can assist the factory management with their planning and control responsibility.

A good management accounting system *collects* and *stores* data that is reliable for planning, forecasting and *decision-making*. The system *collects* data from a variety of sources and *stores* the data until required. Although the main source of data is the financial accounting system, the management accounting system is not restricted to the use of monetary data (i.e. data relating to money) only.

For example, while preparing the company's annual budget, the management accounting system will use past data of products sold from the stores records and classify it according to product, quality and time taken to produce. This data is *analysed* with other *collected* data and *stored*, for example data obtained from consumer surveys and economic forecasts. The *analysis*

is then *interpreted* and an opinion about various alternative courses of action is communicated to senior management for a decision.

Although senior management makes broad policy decisions, the day-to-day decisions are left to lower levels of management. Senior management will *decide on* the product line and sales mix target, but the management of the production department must prepare a production schedule of *when* to produce *what* and in *what quantities* in order to achieve the targets. Management accounting can assist these managers by using inventory strategy models to determine how many orders they should place for materials purchases and in what quantities.

The management accounting system will also *monitor* the performance of all departments. Any deviations from the approved plans are presented in reports. The reports are then *communicated* to the relevant managers in a format that they can easily understand so that they can control their performance by adjusting plans timeously. This *control* aims to efficiently facilitate the accomplishment of plans. A variance analysis for the production department is an example of a report generated through the *control* function. A variance analysis will indicate, amongst other things, the planned production quantities compared to the actual production quantities and the actual quantities of materials used compared to the quantities planned for. Factory management can then use these reports to investigate the variances and take corrective action as required.

QUESTION 4

Financial accounting prepares the annual financial statements of the entity in compliance with relevant prescriptions (e.g. applicable laws and reporting standards) and for parties external to the entity. Financial statements are based on the past performance of the entity as a whole and are subject to external audit. Therefore, financial statements rather focus on fair presentation than timely presentation.

Management accounting prepares a variety of reports for the internal management of the entity to assist them in the execution of their responsibilities. These internal reports are not subject to legislation and reporting standards. Management reports contain information on past performance (e.g. a comparison of actual expenses and budgets), scenario planning for the future as well as project comparisons for the present and can be intended for the whole entity or only segments thereof. Internal management reports are not subject to external audit. Internal reports rather focus on timely presentation than complete accuracy.

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LEARNING UNIT 2: BASIC CONCEPTS OF COST ACCOUNTING

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- describe the basic cost concepts
- perform cost classification

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- classify costs as
  - fixed, variable or mixed costs
  - product or period costs
  - direct costs or overheads
- describe the flow of costs in a manufacturing company

OVERVIEW

This learning unit is divided into the following sections:

2.1 Introduction
2.2 Types of business organisations
2.3 Costing terminology
2.4 The flow of costs in a manufacturing environment

2.1 INTRODUCTION

In learning unit 1, we mentioned that the cost accounting system is an important sub-system of the management accounting system. In learning unit 3, we will take a closer look at how a cost accounting system is built. The purpose of this learning unit is to introduce you to a number of cost concepts used in a manufacturing environment. There are many cost concepts, and you may well feel somewhat overwhelmed by the end of this learning unit. However, as you progress through the learning units, these concepts and the need for distinguishing between them will become a lot clearer.

What does cost mean? Simply put, cost refers to the amount of money paid in order to obtain something. For example, one would say that the *cost* of a loaf of bread is R13,00; the shop would require you to pay an amount of R13,00 in order for you to obtain the bread.

In a business environment, *cost* means the total of all the costs incurred by the company. At the outset it is important to understand how cost is established and for what purposes. Both financial accounting and management accounting are concerned with costs.

Financial accounting

The objective of financial accounting is to ensure that all costs incurred by the company during a specific period are recorded in the accounting records for that period and are disclosed accurately in either the statement of profit or loss and other comprehensive income or the statement of financial position. (For the sake of brevity, we will refer to the first mentioned statement as the *statement of profit or loss* in the remainder of these learning units, although the correct name – as you will learn in financial accounting – is the *statement of profit or loss and other comprehensive income*.)

In your financial accounting studies, you will learn that costs can be classified as either assets or expenses. For example, the cost of a building is accounted for as an asset, and that asset is reported in the statement of financial position. On the other hand, telephone cost is accounted for as an expense, and that expense is reported in the statement of profit or loss.

Management accounting

The objective of management accounting is, amongst others, to ensure that its cost accounting system accurately identifies and fairly assigns all costs incurred in the manufacturing process to the cost of the products manufactured.

2.2 TYPES OF BUSINESS ORGANISATIONS

There are three basic types of business organisations: manufacturers, merchandisers and service organisations.

Manufacturers

Manufacturers purchase materials and use labour and other resources to convert the material into finished goods that can be sold for a profit. Tiger Brands is one of the largest manufacturers of food products in South Africa. Wheat is an example of a material that is converted in the production of flour. The costs assigned to finished goods (e.g. flour) that have not been sold yet are shown in an *inventory of finished goods account* in the general ledger of the manufacturer.

Merchandisers

Merchandisers purchase finished goods that they then resell for a profit. Checkers is an example of a merchandiser. One of the finished goods that Checkers buys to resell is the flour produced by Tiger Brands. The cost of goods purchased that have not been resold yet is shown in an *inventory of merchandise account* in the general ledger of the merchandiser.

Service organisations

Service organisations provide services rather than goods. Some service providers, like auditors and lawyers, sell services for a profit, while other service providers, like charities and government departments, may provide services at no cost or very little cost to the users of those services. Service organisations do not have inventory accounts.

2.3 COSTING TERMINOLOGY

2.3.1 Cost concepts

In the discussion that follows, we will look at cost concepts and the costs incurred in the *manufacturing process*. Costs incurred for the acquisition of long-term assets such as buildings, vehicles and machinery fall beyond the scope of this discussion.

Cost objects

One of the purposes of cost accounting is to establish the cost of *things.* These *things* are called *cost objects*. In a manufacturing environment, the goods being produced will be cost objects. Anything for which you wish to determine the cost separately is a cost object. An artist may wish to know the cost of a painting she has made; the painting is a cost object. If you wish to determine the cost of the reports produced by the management accounting system, each report will be a cost object. In certain companies, certain departments may be classified as cost objects. Therefore, not only manufacturing companies use costing principles to establish the cost of their manufactured products; any type of organisation can use costing principles to establish the cost of the products or services they provide.

Cost drivers

Cost drivers are the activities that cause the cost of something to change. For example, one of the drivers of the cost of electricity in your home is the activity *number of hours the lights are on*.

Product costs

In a manufacturing company, we distinguish between *product* and *period costs*. Product costs are those costs that are incurred for the purposes of manufacturing something. Product costs consist of material, labour and factory overheads that are assigned to the goods being manufactured so that the cost of finished goods is accurately disclosed in the financial statements – either as an asset called *inventory* (where the goods are not yet sold) or as an expense called *cost of sales* (where the goods have been sold).

Period costs

Expenses that are not incurred in the manufacturing process and are therefore not classified as product costs are *period costs* (meaning they were incurred *for that period*) and must be accounted for in the statement of profit or loss *for that period*. (You will remember from your financial accounting studies that the heading of the statement of profit or loss ends with the words *for the year ended* The year referred to in the heading is the *period* we are talking about.) Examples of period costs are advertising costs, audit fees, depreciation of office furniture, etc. Period costs are often categorised as administrative expenses and selling and distribution expenses.

You will recall that costs are classified as either assets or expenses for the purposes of financial accounting. Period costs that are reported in the statement of profit or loss are said to be *expensed*. All period costs are expensed in the period (year) that they are incurred. Product costs are expensed only when the products to which they were assigned are sold.

Cost assignment

All product costs are charged to the goods being manufactured (the cost objects). The process of charging the product costs to the cost objects is referred to as *cost assignment*. Some costs can be traced directly to cost objects, while other costs must be allocated or apportioned to cost objects. The accumulated costs of the goods that have been completed are shown in an inventory account and disclosed as an asset in the statement of financial position until the goods have been sold.

Example 2.1

In year 1, Thabo builds a car at a cost of R80 000. In year 2, he sells the car for R100 000. It is clear that Thabo makes a profit of R20 000 (revenue of R100 000 minus cost of R80 000 = R20 000).

The matching principle says that in year 1, the R80 000 is shown as inventory (an asset) in the statement of financial position. In year 2, when the sale takes place, the R100 000 is shown as revenue in the statement of profit or loss and the R80 000 is transferred from inventory and *expensed* as cost of sales in the statement of profit or loss.

Revenue and its related cost have now been matched in the same period (i.e. year 2).

Historical cost

Historical cost means the original price paid for goods and services at the time of the transaction. Purchases of merchandise are recorded at historical cost. Because of inflation, the *historical cost* of an item held in inventory will usually be less than the *current cost* at which the item could be replaced (*replacement cost*). You will learn more about historical cost in your financial accounting studies.

Inflation refers to the price increases of goods and services over time, resulting in a weaker purchasing power. Consider what the cost of a loaf of bread was one, two and three years ago. Two years ago, you may have been able to buy a loaf of bread for R10 or less. Today it costs more than R10. The purchasing power of your R10 has therefore weakened to the level where you are no longer able to buy a loaf of bread with R10.

2.3.2 Cost classification

In these learning units, we focus on cost determination in a manufacturing environment. We have already determined that a manufacturing company is one that converts materials into finished goods and then sells the finished goods. Cost accounting deals with accounting for the costs associated with the acquisition of materials and the costs of converting the materials into finished goods. These costs are referred to as product costs.

A word on classification

Classification means the grouping of objects according to characteristics they have in common, for example the students registered for MAC1501 at Unisa this semester. We can classify them according to gender, age, occupation and many other characteristics. A single student, for example, Lerato Molefe, may fall into more than one category (e.g. the category *female*, the

category *20–30 years of age* and the category *full-time student*). Although we have mentioned three categories, they concerned only one student. You will see that the same cost can also fall into more than one category.

In our discussion of cost classification in a manufacturing environment, we will use the example of a furniture manufacturer to illustrate the different concepts. We will refer back to this example frequently throughout the learning units.

Example 2.2

Woodpecker (Pty) Limited is a furniture manufacturer. The company rents factory and office space in Industria, Johannesburg. The materials required for manufacturing the furniture are oregon pine (wood), metal, fabric (e.g. cotton and linen), glue, staples and varnish. In addition, Woodpecker also needs oil and grease to keep the manufacturing equipment in running order. Furthermore, Woodpecker buys light bulbs to keep the factory well lighted and cleaning materials for the factory and equipment.

Woodpecker uses the following equipment in the manufacturing process: panel dividing saws, beam saws, circular saws, spindle moulders, surface planers, thickness planers, band saws, edge banding machines, processing and finishing machines. A large generator running on diesel powers the equipment.

The furniture rotates between three production departments: the preparing department, the assembly department and the finishing department.

The factory employs the following staff members:

1 factory manager
1 personal assistant to the factory manager
3 supervisors: one for each of the three production departments
3 quality controllers: one for each of the three production departments
2 maintenance staff members to maintain and repair the manufacturing equipment
2 cleaners to clean the factory, stores, etc.
2 store managers: one in the materials store, and one in the finished goods store
6 stores assistants: two in the materials store, and four in the finished goods store
6 security guards who work shifts to provide security 24 hours per day
1 factory canteen manager
3 factory canteen staff
20 technicians in the production departments: nine in the preparing department, seven in the assembly department and four in the finishing department

Woodpecker (Pty) Limited also employs four salespersons and two drivers in its sales and distribution department as well as 10 employees to take care of the accounting and other administrative functions of the company. The only other employees are the managing director, Mr Woody, and his personal assistant.

The words *(Pty) Limited* in the name Woodpecker (Pty) Limited indicate that Woodpecker is a private company. Pty is the abbreviation for *Proprietary*. If Woodpecker was a public company, its name would have been Woodpecker *Limited*. The abbreviation for Limited is *Ltd*. You will learn about the different types of companies in your Commercial Law module.

Classification of product costs according to *type*

We mentioned earlier that the three types of cost associated with the manufacturing process are material, labour and factory overheads. These costs are called product costs.

Material cost

Material cost is the cost of the physical items used to manufacture products that will be sold. Woodpecker buys the following materials for use in its manufacturing process: wood, metal, fabric, glue, staples and varnish as well as diesel, oil, grease, light bulbs and cleaning materials. (Physical items refer to things you can see and touch.)

Labour cost

Labour cost consists of the cost of salaries, wages and benefits paid to the people employed in the manufacturing section of the company. Only the cost of the remuneration paid to the factory manager and the personal assistant to the factory manager, technicians, supervisors, security staff, maintenance staff, quality controllers, stores personnel, cleaners and canteen staff of Woodpecker (Pty) Limited will be considered as the cost of labour in the manufacturing process. The sales and administrative employees as well as Mr Woody and his assistant are not associated with the manufacturing process; therefore, their remuneration costs are not regarded as product costs but treated as period costs that are expensed directly in the statement of profit or loss.

Factory overheads

Factory overheads refers to those other costs necessarily incurred to operate the factory. Such costs include the cost of electricity used for lighting the factory, the depreciation of the manufacturing equipment, rent of the factory building, factory insurance, etc.

Classification of product costs according to *traceability*

Earlier, we said that costs are assigned to cost objects (the goods being manufactured). We also said that we can assign costs through direct tracing, allocation or apportionment.

We classify product costs (material costs, labour costs and factory overheads) further according to their traceability to the goods being manufactured. We refer to costs that we can trace directly to the finished product as direct costs. If we cannot classify a cost as a direct cost, we classify it as an indirect cost. A cost is a direct cost if it is both possible and practical to trace it to the finished product. A cost is an indirect cost when it is either impractical or impossible to trace it to the manufactured product.

Material costs

We classify material costs as either direct or indirect material costs. *Direct material costs* are those costs that we can easily trace to the products manufactured, while *indirect material costs* are all the material costs that are not direct material costs.

In the example of Woodpecker (Pty) Limited, *direct material costs* include the cost of the wood, metal and fabric. These materials become an integral part of the manufactured product, as we can easily trace them to the finished products: we can physically see the wood, the metal and the fabric in the final product. Because of the quantities of the wood, metal and fabric used in the manufacturing process, it would also be practical and possible to trace the cost thereof. For example, if one metre of fabric is required in the production of one chair, it would be easy to trace the cost of one metre of fabric directly to each chair manufactured.

Glue, staples and varnish also form an integral part of the manufactured products, as we can see them in the finished product; however, their cost would be considered as *indirect material cost*, because it would be *impractical* to trace their cost to the manufactured product. You would agree that it would be difficult, if not impossible, to trace the cost on a can of varnish to the various chairs, tables and cabinets that were painted using the can of varnish.

Oil, grease, light bulbs, diesel and cleaning materials do not form part of the furniture manufactured, but they are consumed (used up) in the manufacturing process. We refer to this type of material as consumables. Consumables are incidental to the manufacturing process. We classify the cost of consumables used in the manufacturing process as *indirect material costs* as it would be *impossible* to trace their costs to the manufactured products.

Raw materials

Some publications refer to all the materials used in the manufacturing process as raw materials. Others consider only direct materials and indirect materials that become an integral part of the manufactured goods (e.g. furniture) as raw materials. Others still consider only direct materials as raw materials. In economic terms, raw materials generally refer to natural resources such as iron ore, coal, wood, etc. In these learning units, we will use the terms direct *materials*, *indirect materials* and *consumables* only.

Labour costs

We also classify labour costs as either direct or indirect labour costs. In the Woodpecker example, *direct labour cost* would consist of the labour cost of the technicians, whose labour can be traced directly to the manufactured products that they are responsible for. The labour cost of the first nine technicians can be traced directly to production in the preparation department; the labour cost of the next seven technicians can be traced directly to production in the assembly department; while the labour cost of the final four technicians can be traced directly to production in the finishing department. The remuneration cost of the supervisors, quality controllers, cleaners, canteen staff, and so on are considered as *indirect labour cost*, as it cannot be traced to specific products. Some publications call direct labour "touch labour", which indicates those people who literally touch the materials being converted into finished goods.

Factory overheads

We mentioned earlier that factory overheads consist of the costs other than the cost of material and labour, which is necessary to operate the factory. These costs include, for example, electricity and the depreciation of manufacturing equipment. However, indirect material and indirect labour are also considered as overheads. Indirect material, plus indirect labour, plus factory overheads are referred to as indirect costs or production overheads. Earlier, we said that product costs consist of material, labour and factory overheads. We can now rephrase that, saying that product costs consist of direct material cost, direct labour cost and production overheads.

Production overheads are also referred to as *manufacturing overheads*, *indirect costs*, *overhead costs* or simply *overheads*.

Classification of product costs as prime costs and conversion costs

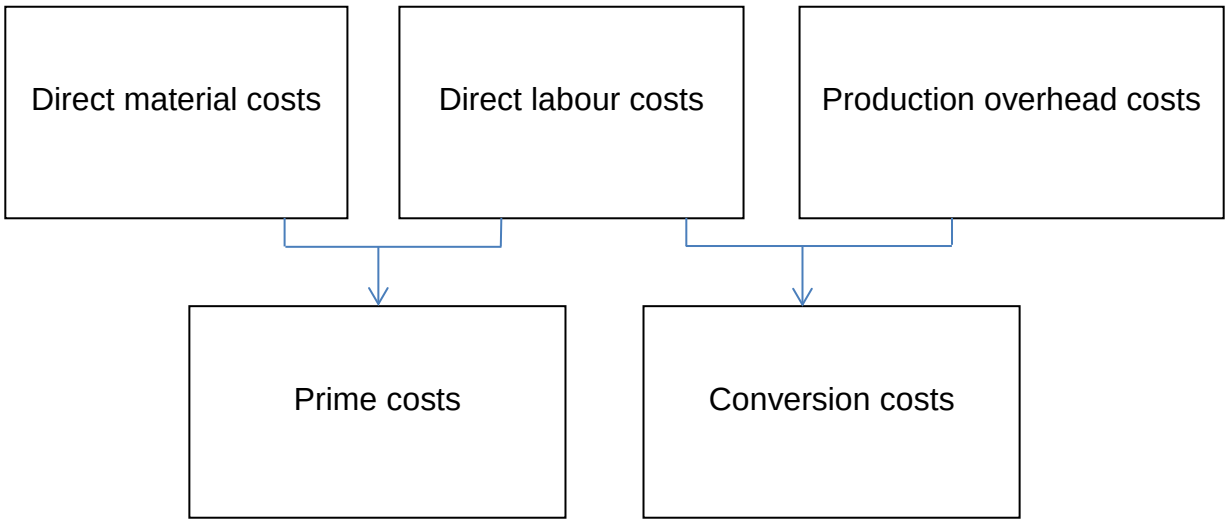
Prime costs

Prime costs are direct costs (i.e. the cost of direct material and direct labour).

Conversion costs

Conversion costs are the costs incurred to convert the direct materials into finished goods, ready for sale. The costs incurred to convert the direct materials are direct labour costs and production overheads. Figure 1.1 graphically depicts this classification of costs:

Figure 2.1



Clearly then, direct material is considered a prime cost, direct labour is considered a prime cost as well as a conversion cost and production overhead is considered a conversion cost.

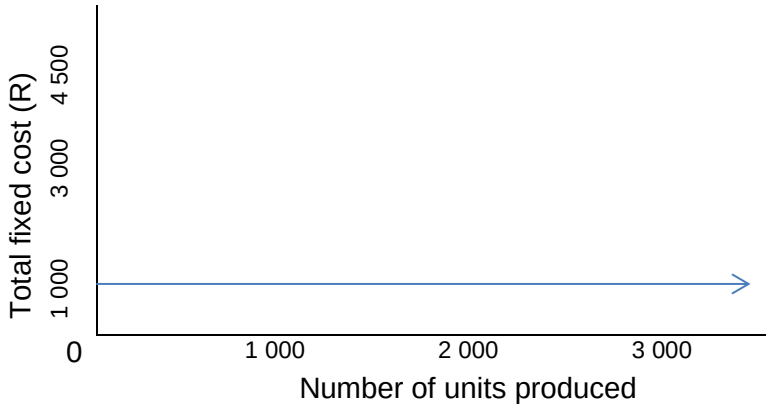
Classification of product costs according to *behaviour*

Product costs (direct material cost, direct labour cost and production overheads) can also be classified according to their behaviour. Cost behaviour refers to how a cost behaves at different volumes of activity. For example, a volume of activity is the quantities of finished goods produced or the number of hours worked. According to cost behaviour, we can classify a cost as being either a fixed, variable or mixed cost.

Fixed cost

Total fixed costs will remain unchanged regardless of the number of units produced. Factory rent and insurance are examples of fixed production overheads. The total amount paid for rent and insurance for the month will be the same whether zero pieces of furniture or 1 000 pieces of furniture were manufactured during that month. Figure 1.2 graphically depicts this behaviour of fixed costs:

Figure 2.2



Note that it does not matter whether zero, 1 000, 2 000 or 3 000 units are produced – the total fixed cost will remain constant at R1 000. However, the fixed cost *per unit* produced will decrease as more units are produced. Consider the information in a table format:

Table 2.1

Units produced	Total fixed costs	Fixed cost per unit produced	
0	R1 000	Not applicable	
1 000	R1 000	R1	(R1 000 ÷ 1 000 units)
2 000	R1 000	50c	(R1 000 ÷ 2 000 units)
3 000	R1 000	33c	(R1 000 ÷ 3 000 units)

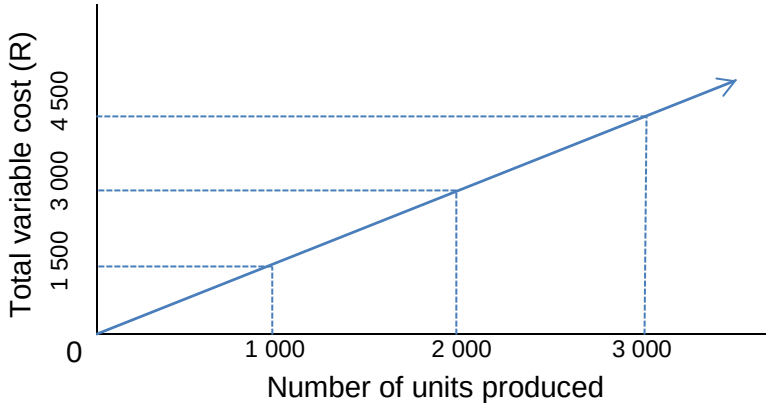
In accounting, a solidus (/) is often used in the place of the division symbol (÷). Therefore, instead of writing R1 000 ÷ 1 000 units, we can also write R1 000 / 1 000 units.

Variable cost

The total variable cost will increase as the number of units produced increases. Variable cost per unit will remain unchanged, regardless of the number of units produced. Direct material is an example of a variable manufacturing cost.

Figure 2.3 graphically depicts this behaviour of variable costs:

Figure 2.3



In this graph, you will notice that when no units are produced, the variable cost is zero. Where 1 000 units are produced, the cost is R1 500; where 2 000 units are produced, the cost is R3 000; and where 3 000 units are produced, the cost is R4 500. In our example of Woodpecker, if one metre of fabric is required for each chair produced and one metre of the fabric costs R250, then the cost of fabric per chair is R250, but the total cost for 10 chairs will be R2 500 (R250 x 10).

Total variable cost increase in proportion with the increase in the number of units produced, but the variable cost per unit will remain the same. Consider the information depicted in figure 2.3 in a table format:

Table 2.2

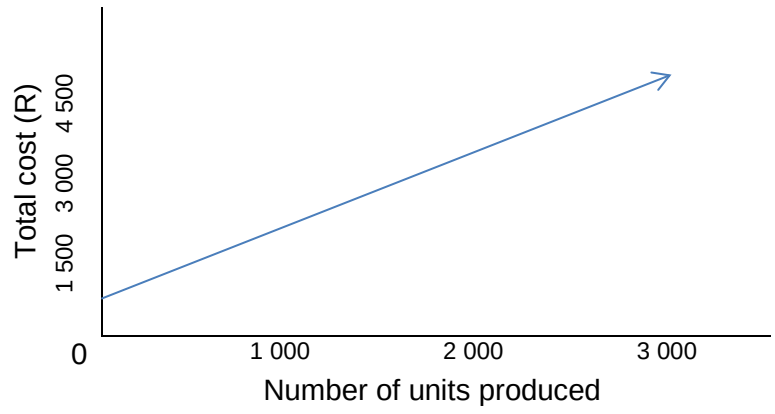
Units produced	Total variable costs	Variable cost per unit produced	
0	0	0	
1 000	R1 500	R1,50	(R1 500 ÷ 1 000 units)
2 000	R3 000	R1,50	(R3 000 ÷ 2 000 units)
3 000	R4 500	R1,50	(R4 500 ÷ 3 000 units)

Mixed costs

Some costs contain a fixed element as well as an element that varies, for example with the number of units produced. The cost of electricity typically consists of a fixed charge per month that is paid regardless of usage and a charge that varies with the amount of electricity used. The higher the level of manufacturing activity, the higher the total cost of the variable portion would be. The cost of electricity is therefore an example of a mixed production overhead. Mixed costs are also called semi-variable or semi-fixed costs.

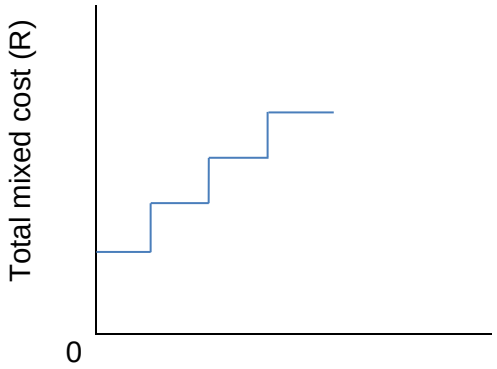
Figure 2.4 graphically depicts the cost behaviour of mixed costs. Note that in this graph, the variable costs begin at the level of the fixed cost element. That means that even if no units are produced, the fixed element of the cost (i.e. R1 000) will still be incurred.

Figure 2.4

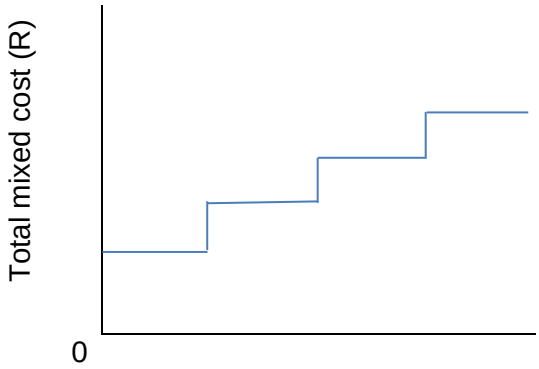


Sometimes a cost remains fixed for a range of activity level and then, at some point, jumps to a higher level of cost. The increased cost will then be constant for a further range of activity level and then jump again. This cost behaviour is called a *step variable cost* or a *step fixed cost*. Where the jumps are more frequent, or where the range or "steps" are relatively small, we refer to a step variable cost. Where the jumps are less frequent, or where the range or "steps" are larger, we refer to a step fixed cost. Figure 2.5 graphically depicts this cost behaviour:

Figure 2.5



Step variable costs (shorter steps)



Step fixed costs (longer steps)

For the purposes of analysis and budgeting, we usually classify costs as either fixed or variable. We separate mixed costs into their fixed and variable components. We will discuss the methods for separating mixed costs in learning unit 7.

Other cost concepts, like relevant, opportunity and sunk costs are important concepts in decision-making and will be introduced to you at a later stage.

For more information on the preparation of graphs, see the information box on the next page.

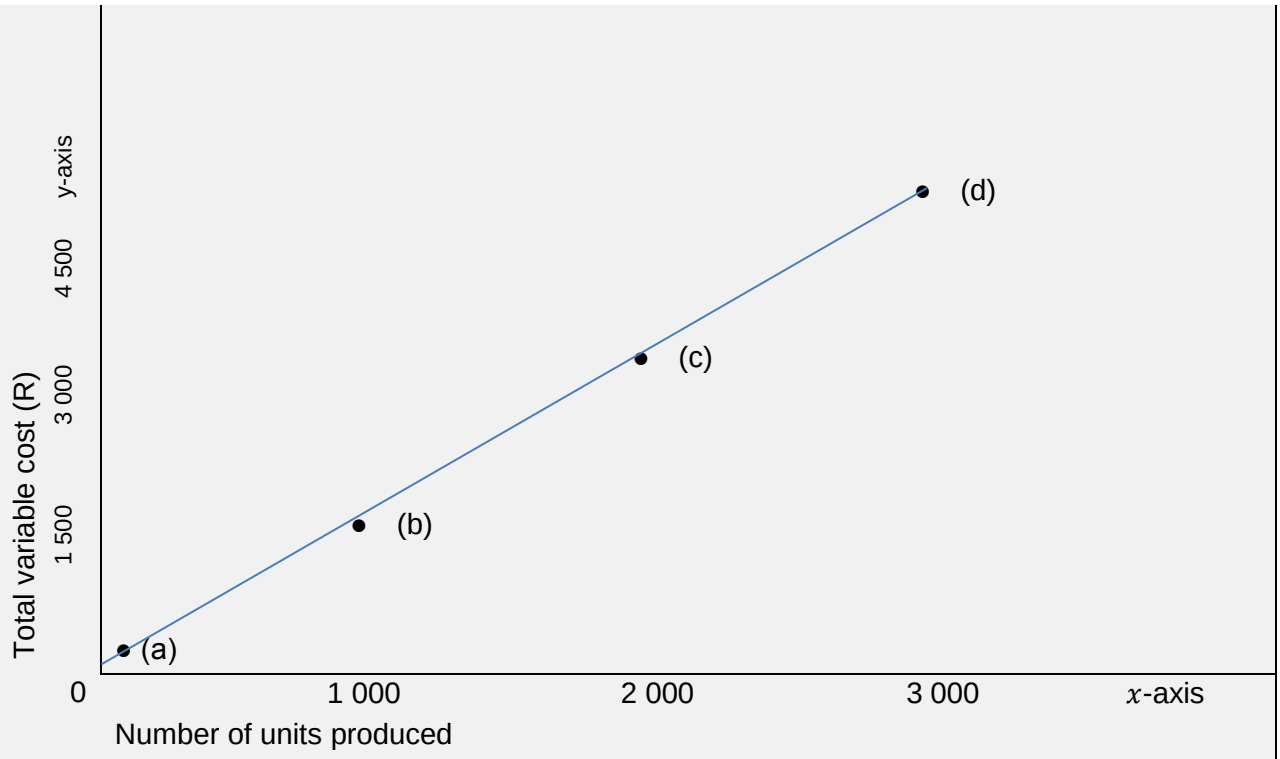
In your school mathematics, you would have learnt how to draw a graph. This information box is intended to refresh your memory.

The graphs above are called *line graphs*. A line graph visually depicts the relationship between two sets of variables where one set is generally dependent on the other. In the above graphs, the two variables are *total cost* and *production activity level*. In these graphs, the cost is dependent on the level of production (except for fixed cost). When drawing a graph, one would first draw a vertical line (a line from top to bottom) and a horizontal line (a line from left to right). The vertical line is called the *y-axis* and the horizontal line is called the *x-axis*. Independent data (production) is shown on the horizontal *x*-axis, while the dependent data (cost) is shown on the vertical *y*-axis.

Consider the following data in table format, which must be depicted in a graph for variable cost:

	Production level	Total cost
Point a	0	0
Point b	1 000	R1 500
Point c	2 000	R3 000
Point d	3 000	R4 500

Each point is plotted on the graph with dots as follows:



Note that dots are placed on the spot where, according to the table
(a) production is 0 and cost is R0, (b) production is 1 000 and cost is R1 500, etc

Finally, we complete the graph by connecting the dots with a line.

Activity 2.1

1 What does a manufacturing organisation do?
2 What are the three product costs in a manufacturing environment?
3 Indicate which product costs are prime costs and which are conversion costs.
4 Explain what conversion costs are.
5 Explain the difference between product and period costs.
6 What is meant by cost behaviour?
7 Would the cost of the wrapping around a chocolate bar be considered as direct or indirect material? (Hint: does it fit the definition of direct material?)
8 Would the cost of the wrapping around a chocolate bar be a fixed, variable or mixed cost?

The following information pertains to questions 9 to 11:

Books Galore (Pty) Limited is a publisher of academic textbooks. The company has a printing press in Cape Town and administrative offices in Cape Town, Bloemfontein, Durban and Pretoria. Consider the following costs that Books Galore incurs:

- paper on which the books are printed
- printing press manager's salary
- assessment rates paid for the Durban office

- salaries of sales personnel
- ink used in the printing of the books
- stationery used by the office staff
- rent paid for office space in Bloemfontein
- telephone cost of the Pretoria office
- glue used for binding the books
- rental for the Cape Town printing press
- insurance cost of factory equipment

9 Which of the above costs would be product costs and which would be period costs?

10 Which of the above costs would be direct material (DM), direct labour (DL), production overheads (POH) or selling and administration expenses (SAE)?

11 Which of the above costs would be fixed production cost (F), variable production cost (V), mixed production cost (M) or none of these (NA, for not applicable)?

12 Refer to the information relating to Books Galore (Pty) Limited. Indicate if the following costs will be assigned to the cost of production by means of direct tracing, cost allocation or apportionment:

- paper on which the books are printed
- factory manager's salary
- rent of factory building
- cartons into which books are placed for shipping
- amounts paid to the authors of the textbooks for the writing thereof

Feedback on activity 2.1

1 Manufacturing organisations use direct labour and other resources to convert direct materials into finished goods they can sell at a profit.

2 The three product costs in a manufacturing environment are direct material cost, direct labour cost and production overheads.

3 Direct material cost and direct labour cost are prime costs, while direct labour cost and production overheads are conversion costs.

4 Conversion costs are those costs that are incurred to convert direct materials into finished goods ready for sale.

5 Product costs are the costs of direct materials, direct labour and production overheads incurred in the production of finished goods. Product costs are assigned to inventory of finished goods and disclosed as an asset until the inventory is sold. Product costs are expensed as cost of sales only when inventory is sold. Period costs are expenses that are not product costs. Period costs are expensed in the period in which they are incurred.

6 Cost behaviour describes how a cost behaves at different volumes of activity. According to cost behaviour, we can classify a cost as being a fixed, variable or mixed cost.

7 Material is classified as either direct or indirect, depending on whether it is practical and possible to trace the cost directly to the finished product. The chocolate bars are sold with the wrapping. The wrapping is therefore an integral part of the finished goods (chocolate bars). It would be both possible and practical to trace the cost thereof to the chocolates. The cost of the wrapping is therefore a direct cost.

8 The cost of the wrapping would be a variable cost, as the total cost thereof would increase as the level of production activity increases.

	Question 9	Question 10	Question 11
Paper on which the books are printed	Product	DM	V
Printing press manager's salary	Product	POH	F
Assessment rates paid for the Durban office	Period	SAE	NA
Salaries of sales personnel	Period	SAE	NA
Ink used in the printing of the books	Product	POH	V
Stationery used by the office staff	Period	SAE	NA
Rent for office space in Bloemfontein	Period	SAE	NA
Telephone cost of the Pretoria office	Period	SAE	NA
Glue used for binding the books	Product	POH	V
Rental for the Cape Town press	Product	POH	M
Insurance cost of factory equipment	Product	POH	F

From the above, you will see that we cannot classify period costs as direct material, direct labour or manufacturing cost. We can also not classify them as fixed, variable of semi-variable. Period costs are expensed in the period that they are incurred.

12 Paper on which the books are printed → direct tracing

Factory manager's salary → cost allocation/apportionment

Rent of factory building → cost allocation apportionment

Cartons into which books are placed for shipping → direct tracing

Amounts paid to the authors of the textbooks for the writing thereof → direct tracing

2.4 THE FLOW OF COSTS IN A MANUFACTURING ENVIRONMENT

The purpose of this section is to describe the flow of product costs in a manufacturing environment. The flow of costs refers to the manner in which costs flow (move) through an organisation. In a manufacturing environment, the flow of costs is particularly relevant because the accountant must establish which costs are flowing between inventory accounts and from inventory (in the statement of financial position) to cost of sales (in the statement of profit or loss).

We already know that in a manufacturing environment, direct materials are converted into finished goods that can be sold. Conversion costs encompass the cost of direct labour and production overheads like indirect labour, indirect materials, consumables and other overheads.

When materials and consumables are purchased, their costs are recorded as inventory. The costs of direct and indirect materials are recorded in the *inventory of materials account*. The cost of consumables is recorded in the *consumables inventory account*. Materials and consumables are held in the store until required for production. You will learn more about the categories of inventory in learning unit 4.

Materials are drawn from the stores when they are required in the production process. All the direct materials transferred to production in a certain month will not necessarily be converted fully during that month. For example, on the last day of the month, some of the cabinets manufactured by Woodpecker may still require to be fitted with cradles on which to hang files. The result is that there will always be half-completed goods on the factory floor at the end of the month. These incomplete goods are called work-in-progress and they still form part of the inventory of the company. This inventory is called *inventory of work-in-progress*.

Of course, a number of goods will be completed during the month. The cost of completed goods that had not been sold yet at the end of the month is recorded in the *inventory of finished goods account*.

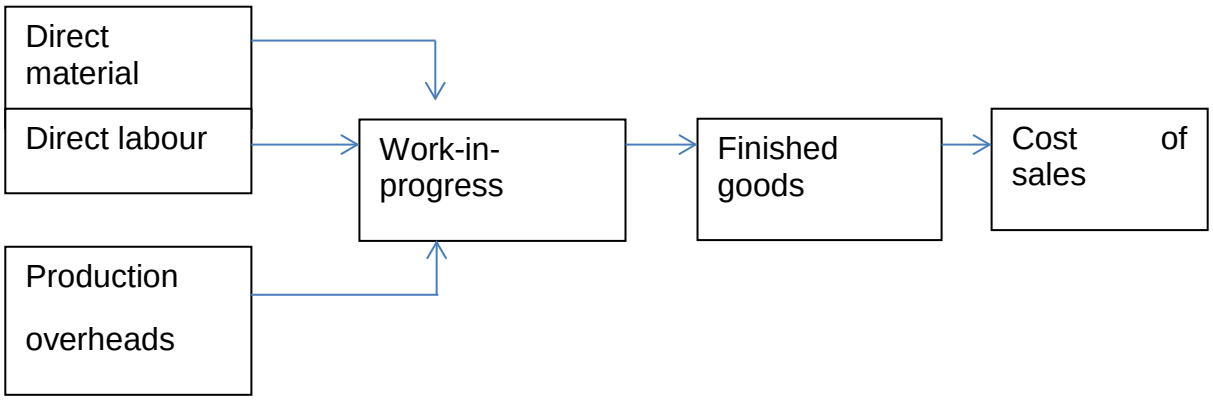
Therefore, unlike a merchandiser (e.g. Checkers), whose inventory consists only of merchandise (those goods that were bought in a form ready for resale), the inventory of a manufacturing company will consist of the following:

- materials (direct and indirect)
- consumables
- work-in-progress
- finished goods

The flow of costs in a manufacturing environment starts with the purchase of materials and ends when the manufactured goods are sold and issued from the finished goods store.

Figure 2.6 graphically illustrates this flow of costs:

Figure 2.6



We can assign costs to products throughout the manufacturing process. It would then be possible to establish the value of the different types of inventory at any point in time. The value of inventory of work-in-progress will be the total accumulated costs assigned to the products in progress at that particular time.

In example 2.3, we will look at the flow of product costs through the general ledger. For the sake of simplicity, we will treat all transactions as cash transactions. We will use only one account for wages, even though, as you will see in learning unit 6, there are several wages accounts through which costs will flow. You may feel rather confused after working through this example of the flow of costs. Don't worry! As you progress through the learning units and your financial accounting studies, you will become familiar with the recording of transactions in the general ledger, and then this section will become a lot clearer.

Example 2.3

The flow of the costs through the general ledger of a company is as follows:

A Inventory of materials (direct and indirect) is purchased for cash.
B Inventory of consumables is purchased for cash.
C Wages are paid in cash.
D Direct materials are issued to production.
E Indirect materials are issued to production.
F Consumables are issued to production.
G Direct labour is assigned to production.
H Indirect labour is assigned to overheads.
I Factory electricity account is paid in cash.
J Factory rent is paid in cash.
K Production overheads are assigned to work-in-progress
L Finished goods are transferred to inventory of finished goods at accumulated cost.
M Finished goods with an accumulated cost of R350 000 are sold for cash.

Inventory of materials

	R		R
A Bank Purchases	42 000	D Direct materials	25 000
		E Indirect materials	4 000
		Balance c/f	13 000
	42 000		42 000
Balance b/f	13 000		

Production overheads clearance account

	R		R
E Materials	4 000	K Work-in-progress	15 000
F Consumables	2 000		
H Labour	5 000		
I Electricity	1 000		
J Rent	3 000		
	15 000		15 000

Consumables inventory

	R		R
B Bank	10 000	F Consumables	2 000
		Balance c/f	8 000
	10 000		10 000
Balance b/f	8 000		

Inventory of work-in- Progress (WIP)

	R		R
D Materials	25 000	L Finished goods	50 000
G Labour	21 000		
K Production overheads	15 000	Balance c/f	11 000
	61 000		61 000
Balance b/f	11 000		

Wages

	R		R
C Bank	26 000	G Direct labour	21 000
		H Indirect labour	5 000
	26 000		26 000

Inventory of finished goods

	R		R
L WIP	50 000	M COS	35 000
		Balance c/f	15 000
	50 000		50 000
Balance b/f	15 000		

Bank

	R		R
Balance b/f	120 000	A Materials	42 000
M Sales	55 000	B Consumables	10 000
		C Wages	26 000
		I Electricity	1 000
		J Factory rent	3 000
		Balance c/f	93 000
	175 000		175 000
Balance b/f	93 000		

Cost of goods sold (COS)

	R		R
M Finished goods	35 000		

Note that direct material costs and direct labour costs are traced directly to the products and debited directly to the work-in-progress account. All production overheads are accumulated in the production overheads clearance account before being assigned to the work-in-progress account.

Activity 2.2

1 Which four categories of inventory would one find in a manufacturing environment?
2 Explain how product costs flow through the production process.
3 Complete the table by selecting the appropriate description from the list below:

- used to record product costs associated with goods that have been sold
- used to record cost of materials not yet put into production
- used to record product costs associated with completed goods that are ready to be sold
- used to record product costs associated with incomplete goods in the production process

General ledger account	Description
Materials inventory	
Work-in-progress	
Finished goods inventory	
Cost of sales	

Feedback on activity 2.2

1 The four categories of inventory that one would find in a manufacturing environment are materials, work-in-progress, finished goods and consumables.

2 The production process starts when direct materials are placed into the work-in-progress stage of the production process. Here labour and overheads are added to convert the direct material into finished goods. Goods that are completed are transferred from the work-in-progress stage to finished goods. Throughout the entire manufacturing process, costs are accumulated to the products in the work-in-progress account until they are completed and taken to the finished goods store (and recorded in the inventory of finished goods account) until they are sold.

3

Materials inventory	used to record cost of materials not yet put into production
Work-in-progress	used to record product costs associated with incomplete goods in the production process
Finished goods inventory	used to record product costs associated with goods that are completed and ready to sell
Cost of sales	used to record product costs associated with goods that have been sold

---oOo---

2.5 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Consider the following statements carefully and indicate whether they are *true (t)* or *false (f)*:

1.1 Product costs consist of the cost of direct materials, direct labour and production overheads.
1.2 Historical cost refers to the total product costs assigned to a product at its completion.
1.3 Direct material cost, direct labour cost and production overheads are all prime costs.
1.4 It is impossible for direct material cost to be a fixed cost.
1.5 Cost drivers are activities that cause a change in the cost of something.
1.6 The flow of costs in a manufacturing environment starts with materials cost and ends with the cost of goods sold.
1.7 Indirect material, such as glue, can possibly be a product cost, a production overheads, a conversion cost as well as a variable cost.
1.8 For financial accounting purposes, all costs are expensed in the statement of profit or loss in the month that the cost is incurred.

QUESTION 2

For each of the following questions, carefully read the information provided and select only the most correct option as your answer.

2.1 The audit fees paid by a manufacturing company would be considered as a(n) … .

(a) production overheads
(b) selling and distribution expense
(c) administration expense
(d) unnecessary expense

2.2 Which of the following is *not* a production overheads:

(a) rent of factory building
(b) insurance of office equipment
(c) depreciation of production equipment
(d) salary of production supervisor

2.3 When the volume of production increases, variable costs … .

(a) will increase in total
(b) per unit will also increase
(c) per unit will decrease
(d) will decrease in total

The information below pertains to questions 2.4 to 2.6.

A manufacturing company incurred the following costs during April:

Direct materials cost	R200 000
Direct labour cost	R350 000
Production overheads	R300 000
Selling and distribution expenses	R180 000
Administrative expenses	R160 000

2.4 Total prime costs for the month was … .

(a) R200 000
(b) R550 000
(c) R850 000
(d) R340 000

2.5 Total conversion costs for the month was … .

(a) R850 000
(b) R640 000
(c) R550 000
(d) R650 000

2.6 Total period costs for the month was … .

(a) R1 190 000
(b) R550 000
(c) R850 000
(d) R340 000

QUESTION 3

Briefly explain the flow of product costs in a manufacturing environment. In your answer, indicate the accounts that are used to record these costs as well as the element of the financial statements in which each of the accounts will be reported.

QUESTION 4

Happy (Pty) Limited produces a single product, Smile. There was no inventory at the beginning of April. The following information pertains to the month of April:

Number of Smiles produced and sold	10 000 units
Total direct material cost	R20 000
Total direct labour cost	R30 000
Total production overheads	R22 000
Total selling and administrative cost	R28 000
Selling price per unit of Smile	R18 each

Required

4.1 What is the conversion cost per unit?
4.2 What is the cost of sales for the month?
4.3 What was the period cost for the month?

QUESTION 5

Ubuthongo (Pty) Limited manufactures wall clocks. On 1 April, there were no inventories on hand. One wall clock uses the following direct materials:

2 casings at R15 each
1 mechanical insert at R25 each

During April, Ubuthongo (Pty) Limited purchased 23 000 casings and 11 000 inserts and completed 8 000 wall clocks.

Required

Calculate the value of the inventory of materials at the end of April.

---oOo---

2.6 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 T

1.2 F Historical cost means the original price paid for goods and services at the time of the transaction.

1.3 F Only direct material cost and direct labour cost are prime costs.

1.4 T Fixed costs are costs that are incurred even where production is zero. Direct material can be traced to the completed product. Therefore, at zero production there will be zero direct material cost.

1.5 T

1.6 T

1.7 T

1.8 F Financial accounting identifies a cost as either an asset or an expense. Only expenses are expensed in the statement of profit or loss. Assets are disclosed in the statement of financial position.

QUESTION 2

2.1 (c)

2.2 (b)

2.3 (a)

2.4 (b)

2.5 (d)

2.6 (d)

QUESTION 3

Materials are purchased and delivered to the materials store, where they are safeguarded until required in the production process. The production process starts when materials are transferred from the materials store to the work-in-progress stage of the production process. Here, the materials are combined with direct labour and production overheads to convert them into finished products. The cost of the direct materials put into production is transferred from the materials inventory account to the work-in-progress account. When wages are paid, the cost of direct labour is transferred to the work-in-progress account. When indirect materials and consumables are issued to production, their costs are transferred from their inventory accounts to the production overheads account. When wages are paid, the cost of indirect labour is transferred to the production overheads account. The cost of other production overheads is charged to the production overheads account. The accumulated cost in the production overheads account is assigned to the work-in-progress account at the end of the month. The accumulated costs of completed goods are transferred from the work-in-progress account to the finished goods inventory account. As goods are sold, the cost attached to those sold goods is transferred from the finished goods inventory account to the cost of sales account.

Finished goods inventory is an asset that consists of those physical items that are ready to be sold, and materials inventory and work-in-progress inventory are assets that will be ready for sale at a future date. Therefore, materials inventory, work-in-progress inventory and finished goods inventory is disclosed in the statement of financial position. When goods are sold, the cost

of those goods is expensed to ensure the matching of sales with the cost thereof. Cost of sales is therefore disclosed in the statement of profit or loss and other comprehensive income.

QUESTION 4

4.1 Conversion costs are the cost of direct labour and production overheads. Total conversion cost was R52 000 (R30 000 + R22 000), and total units produced were 10 000. The conversion cost per unit is therefore R52 000 / 10 000 = R5,20.

4.2 In this example, the total production cost will be the cost of sales since all the units produced were sold and there was no inventory at the beginning of the month. Cost of sales is therefore R20 000 + R30 000 + R22 000 = R72 000

4.3 R28 000; period costs are those costs that are not product costs, therefore, the selling and administrative costs.

QUESTION 5

	R	R
Balance of materials inventory at the beginning of April		0
Materials purchased during the month		
23 000 casings at R15 each	345 000	620 000
11 000 inserts at R25 each	275 000	
Materials issued to production: 8 000 clocks		
16 000 casings at R15 each (2 per clock)	240 000	(440 000)
8 000 inserts at R25 each (1 per clock)	200 000	
Balance of materials inventory at the end of April		180 000

---oOo---

LEARNING UNIT 3: COST ACCOUNTING SYSTEMS

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- describe the elements of a cost accounting system

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- explain the objectives of a cost accounting system
- distinguish between a basis of accounting and a method of accounting for product costs
- explain the elements of a cost accounting system

OVERVIEW

This learning unit is divided into the following sections:

3.1 Introduction
3.2 Elements of a cost accounting system

3.1 INTRODUCTION

The cost accounting system is a very important sub-system of the management accounting system, and a significant portion of the learning units deal with the field of cost accounting. The cost accounting system collects and analises cost information from other systems, including the financial and management accounting systems It also provides management with information about the cost of products and services. Furthermore, it provides information required for the preparation of the financial statements (e.g. the value of inventory).

The cost accounting system collects and accumulates detailed information about costs throughout the entire production process. In these learning units, we focus on determining the total cost of production as well as the cost of each unit produced in a manufacturing process. The same costing principles that apply in a manufacturing environment also apply to merchandising and service organisations.

The main objectives of a cost accounting system are product (or service) costing and inventory valuation as well as cost control. In the preceding two paragraphs, we have touched on the first two objectives, namely inventory valuation and cost of production (product costing). The third objective, cost control, is the most difficult to achieve. The most effective way to ensure cost control is to make those who incur the costs responsible for controlling the costs rather than the accountants.

Activity 3.1

1. What are the main objectives of a cost accounting system?
2. Who should take responsibility for cost control?

Feedback on activity 3.1

1. The main objectives of a cost accounting system are to determine the cost of products and services and the value of inventory and to ensure that costs are controlled.
2. Those managers responsible for incurring costs must be responsible for controlling the costs.

3.2 ELEMENTS OF A COST ACCOUNTING SYSTEM

We know that one of the main objectives of a cost accounting system is to determine the cost of products and, by extension, the value of inventory. Determining the cost of products is not as straightforward as it may seem. We already know that the cost of goods (products) produced in a manufacturing environment consists of the cost of direct materials used, the cost of direct labour used and the cost of production overheads incurred in the production of the goods. However, is the cost information always readily available when we require it for costing purposes? The total cost of production overheads will be known at the end of the financial year only, and this cost forms part of the cost of goods produced during the year. Furthermore, because of inflation, amongst other factors, the cost of direct and indirect materials is always subject to change. This means that the cost of some of the goods manufactured will be lower than the cost of other identical goods manufactured. What do we consider as the cost of the goods that are sold first? Management must consider similar questions while designing the cost accounting system. Answering the following six questions will help them with their task:

- On what basis will the elements of production costs (also called input costs) be measured?
- Which method will be used for valuing finished goods?
- Which method will be used for apportioning production overheads to production?
- Which method will be used for accumulating production costs?
- What will the cost-flow assumption be?
- How frequently will the inventory records be updated?

Basis means the foundation of something from which other things could be developed. The way in which production input costs is measured forms the foundation on which the cost accounting system is built.

A *method* refers to a specific way in which something is achieved, for example the way in which costs are accumulated.

3.2.1 Basis for measuring production input costs

The management of the company will have to decide *how they will measure* costs that will flow through the inventory accounts to the cost of sales account. The cost elements that flow into and through the finished goods account to cost of sales are direct materials cost, direct labour cost and production overheads.

We can use three alternative costing bases for assigning the costs of direct materials, direct labour and production overheads to production, namely actual costing, normal costing and standard costing.

Actual costing basis

Actual costs are those costs that have been recorded in the accounting records of the company (i.e. the historical costs). You will recall that historical cost means the original price paid for goods and services at the time of the transaction. Since only actual (or historical) costs flow through the inventory accounts, the actual costing basis is also a historical costing basis.

When we apply an actual costing basis, we use the actual costs incurred during the month (or any other accounting period) as a basis to determine cost. We can trace the actual cost of direct materials and direct labour directly to the actual number of units produced, while the actual costs of production overheads are spread across the actual number of units produced.

Example 3.1

Galjoen Limited manufactures tents. The company uses actual costing as a basis for determining the cost of manufactured goods. Assume that there was no opening inventory of tents on hand on 1 June. During June, the company started and completed 400 tents and actually incurred the following costs:

	Total cost	Units produced	Cost per unit (R)
Direct materials cost	R100 000	400	250
Direct labour cost	R120 000	400	300
Production overheads	R180 000	400	450
Total input costs	R400 000	400	1 000

Please note that using an actual cost basis will result in significant fluctuations in the unit costs from one month to the next. For example, a factory will have insurance for its factory building and equipment, and the insurance premium for the year is typically paid in a single payment. This will result in a much higher cost per unit in the month that the insurance is paid. Another example is a month in which labourers work a lot of overtime; if Galjoen's labourers work a lot of overtime during November to build up sufficient inventories for the increased demand during the festive season, the overheads of electricity and overtime will be significantly higher in November than in the other months of the year. Most companies experience a fluctuation in production activity from the one month to the next resulting in a variation in overheads from month to month.

To summarise, an actual costing basis spreads the actual costs incurred across the actual activity levels (e.g. actual number of units produced) during that month. Although this is a simple and uncomplicated costing basis to apply during the financial year, it may require a lot of time at year-end to determine the value of closing inventory because the overheads element of the closing inventory must reflect the overheads for the entire year.

Normal costing basis

Whereas an actual costing basis charges the actual (historical) costs of direct materials, direct labour and production overheads to the cost of production, normal costing uses the actual costs of only direct materials and direct labour. The cost of overheads is charged by applying a predetermined rate to an actual activity level. Activity levels can be direct labour hours, machine hours, units of production, etc. Under normal costing, the total amount charged for production overheads is determined by multiplying the predetermined rate by the actual activity level. The predetermined rate is determined at the beginning of the year.

Example 3.2

Galjoen Limited manufactures tents. The company uses normal costing as a basis for determining the cost of manufactured goods. Overheads are assigned to production at a predetermined rate of R430 per tent (unit) manufactured. Assume that there was no opening inventory of tents on hand on 1 June. During June, the company started and completed 400 tents and actually incurred the following costs:

Direct materials cost	R100 000
Direct labour cost	R120 000
Production overheads	R180 000
Total input costs	R400 000

Using normal costing, the costs assigned to production will be as follows:

Direct materials cost	R100 000	
Direct labour cost	R120 000	
Production overheads	R172 000	(400 units x R430)
Total input costs	R392 000	

Example 3.3

Galjoen Limited manufactures tents. The company uses normal costing as a basis for determining the cost of manufactured goods. Overheads are assigned to production at a predetermined rate of R310 *per direct labour hour*. During June, labourers worked a total of 600 direct labour hours (actual hours). Assume that there was no opening inventory of tents on hand

on 1 June. During June, the company started and completed 400 tents and actually incurred the following costs:

Direct materials cost	R100 000
Direct labour cost	R120 000
Production overheads	R180 000
Total input costs	R400 000

It is very important that you understand that the R310 is the overheads rate *per labour hour* and *not* the rate *per unit of production*. In order to determine the overheads rate per unit, we first need to establish the total overheads assigned to production:

Total labour hours x predetermined rate = 600 hours x R310 = R186 000. The overheads rate per unit is then determined as follows: R186 000 ÷ 400 units = R465. Therefore, the total cost assigned to production for the month is as follows:

Direct materials cost	R100 000
Direct labour cost	R120 000
Production overheads	R186 000
Total input costs	R406 000

You will notice that in applying the normal costing basis, there is a difference between the total overhead assigned to production and the actual total overheads incurred. In example 3.3, the total amount of overheads assigned to production was R186 000, which means that R6 000 more was charged to production than the R180 000 actually incurred. We call this difference of R6 000 an *over absorption* of overheads; we absorbed more costs into the cost of production than was actually incurred. In example 3.2, the amount of overheads assigned to production was R172 000, which is R8 000 less than the actual overheads of R180 000. We call this difference of R8 000 an *under absorption* of overheads; we absorbed less costs into the cost of production than was actually incurred. (We also refer to these differences as over and under recovery of overheads, over and under applied overheads or over and under allocation of overheads.)

We must also account for the accumulated amount of over absorption or under absorption of overheads at the end of the financial. If the amount is not significant, we will usually charge it to the cost of goods sold; however, if it is significant, we will charge it on a pro-rata basis to cost of sales, work-in-progress inventory and finished goods inventory.

This basis will enable us to apply a more uniform and realistic overhead rate to all the units manufactured during the entire year, thereby avoiding the sudden cost spikes that might occur if the actual overheads rate is used.

Standard costing basis

Standard costing differs from normal costing in that standard costing uses predetermined rates for all the elements of manufacturing cost and not for production overheads only. Furthermore, whereas a normal costing basis uses actual quantities and activity levels, standard costing uses predetermined standard quantities and activity levels. We could say that under standard costing, we apply standard costs based on standard quantities to actual production outputs.

Example 3.4

Galjoen Limited manufactures tents. The company uses standard costing as a basis for determining the cost of goods manufactured. Assume that there was no opening inventory of tents on hand on 1 June. The following standard costs are applied for the production of one tent (unit):

Direct materials cost:	R
Sides: 10 metres of fabric at R15 per metre	150
Floor: 2 metres of fabric at R7 per metre	14
Frame poles: one set at R85 per set	85
Total direct materials cost per unit	249
Direct labour cost: 1½ hours at R190 per hour	285
Variable overheads per unit	180
Total standard variable cost per tent	714

The standard production output for a month is 380 tents. Total fixed overheads is set at R114 000 and is charged to production per direct labour hour.

During June, the company actually started and completed 400 tents, and a total of 600 labour hours were actually worked. The following costs were actually incurred:

Direct materials cost	R100 000
Direct labour cost	R120 000
Variable production overheads	R75 000
Fixed production overheads	R105 000
Total input costs	R400 000

Let's determine the standard costs that were charged to production during June:

	Standard unit cost	Total standard input cost	
	R	R	
Direct materials cost	249	99 600	R249 x 400 actual units
Direct labour cost	285	114 000	R285 x 400 actual units
Variable overheads	180	72 000	R180 x 400 actual units
Fixed overheads	200	120 000	R200 x 600 actual direct labour hours*
		405 600	

*The fixed overheads rate charged to production is based on direct labour hours (DLH). The fixed overheads per unit is determined as follows:

Total standard units for the month	380 tents	
Standard labour hours required	570 hours	(380 tents x 1,5 hours per tent)
Total standard fixed costs	R114 000	
Standard fixed cost per DLH	R200	(R114 000 / 570 hours)

You will notice that there is a difference of R5 600 between the total actual costs incurred and the total standard costs charged to production. This difference is called a *variance*. In this instance, the actual cost was less than the standard cost, and therefore we will refer to it as a favourable variance; it is favourable, because we spent less money than anticipated. Had the actual cost been higher than the standard cost, we would have called it an unfavourable variance; it would have been unfavourable, because we spent more money than anticipated. (Some publications refer to unfavourable variances as *adverse variances*.)

We can use standard costing as a management tool for planning and controlling costs. When we set standards, we assume that operating conditions are efficient. The standard costs per unit can be used to prepare a flexible budget – a budget that can be adjusted for changes in the level of activity (e.g. number of units sold, number of units produced, etc). The following is a flexible budget for Galjoen at production levels of 300, 400 and 500 tents:

Units of production	300	400	500
Variable cost at R714	214 200	285 600	357 000
Fixed cost (R)	114 000	114 000	114 000
Total production cost (R)	328 200	399 600	471 000
Production cost per unit	R1 094,00	R999,00	R942,00
Fixed overheads per unit	R380,00	R285,00	R228,00
Variable cost per unit	R714,00	R714,00	R714,00

The preparation of a flexible budget requires the separation of overheads into its fixed and variable components.

For control purposes, we will investigate the variances between actual and standard costs per component of the production cost to determine whether the variances were the result of inefficiencies or price fluctuations:

	Standard cost	Actual cost	Variance	
Direct material cost	99 600	100 000	(400)	unfavourable
Direct labour cost	114 000	120 000	(6 000)	unfavourable
Variable overheads	72 000	75 000	(3 000)	unfavourable
Fixed overheads	120 000	105 000	15 000	favourable
Total	405 000	400 000	5 600	favourable

The direct materials variance, for example, will be broken down into the following:

- a direct materials price variance, comparing the standard cost of the materials with the actual price paid for the materials
- a direct materials quantity variance, comparing the actual quantities used with the standard quantities allowed to produce 400 tents

Reasons for the unfavourable variance in direct materials may be the result of a price variance, an efficiency variance or both. For example, there may have been an unexpected increase in the price of some or all of the materials, or the quantities of materials may have been more than the standard quantities allowed. The price variance may be favourable, while the quantity variance may be unfavourable, or vice versa.

The direct labour variance will be broken down into the following:

- a direct labour rate variance, comparing the standard labour rate per hour with the actual labour rate per hour paid
- a direct labour efficiency variance, comparing the actual labour hours used with the standard labour hours allowed to produce 400 tents

Let's take a closer look at labour. Why did we spend R6 000 more than anticipated? At an output level of 400 tents (actual output) the direct labour hours should have been 400 x 1,5 = 600 hours. The actual hours worked were 600 hours, therefore there was no efficiency variance. 600 hours were actually worked at a total cost of R120 000. Therefore, the actual rate per hour was R120 000 ÷ 600 hours = R200. Consequently, the actual rate per hour (R200) is R10 more than the standard rate per hour (R190). Actual hours worked were 600 hours: 600 x R10 = R6 000 unfavourable variance.

The variable overheads variance will be broken down into the following:

- a spending variance, comparing the actual units produced times the actual rate per unit with the actual units produced times the standard rate per unit
- an efficiency variance, comparing the actual units produced times the standard rate per unit with the standard quantity produced times the standard rate per unit

  (In this example, the actual units equal the standard units.)

The fixed overheads variance will be broken down into the following:

- a spending variance, comparing total actual fixed overheads (R400 000) with total standard fixed overheads (R405 000)
- a volume variance, comparing total standard fixed overheads (R405 000) with total fixed overheads absorbed (at a rate of R200 per direct labour hour)

We charge insignificant variances to cost of sales, while we may have to apportion significant variances between cost of sales, work-in-progress inventory and finished goods inventory.

Activity 3.2

Factory Limited manufactures blankets. The information below pertains to June:

	Standard cost per blanket	Actual cost per blanket
Direct materials cost	R40	R38
Direct labour cost	R30	R41
Variable overheads	R33	R29
Fixed overheads	R42	R44
Total cost per blanket	R145	R152

The budget of Factory Limited made provision for total variable production overheads of R279 000 and total fixed overheads of R387 000, based on the production of 9 000 blankets.

During June, the company actually produced only 8 000 blankets.

There was no inventory of finished goods at the beginning of June, and no sales occurred during June.

Required

Determine the value of inventory of finished goods at the end of June by applying the following:

- an actual costing basis
- a standard costing basis
- a normal costing basis, where fixed overheads are apportioned based on units manufactured

Feedback on activity 3.2

Actual costing basis

On the actual costing basis, we apply actual costs to actual output activity. The actual cost per blanket was R152, and 8 000 blankets were actually produced. Therefore, the value of inventory of finished goods will be R152 x 8 000 blankets = R1 216 000.

Standard costing basis

On the standard costing basis, we apply standard costs to actual output activity. The standard cost per blanket was R145, and 8 000 blankets were actually produced. Therefore, the value of inventory of finished goods will be R145 x 8 000 blankets = R1 160 000.

Normal costing basis

On the normal costing basis, we apply actual costs of direct materials and direct labour to actual output activity, but we apply a predetermined budgeted rate for overheads to actual output activity. We calculate the budgeted predetermined overhead rate as follows: total budgeted cost ÷ total budgeted production. Therefore, the predetermined variable overheads rate will be R279 000 / 9 000 = R31, and the predetermined fixed overheads rate will be R387 000 / 9 000 = R43. Therefore, the total normal cost per blanket is R38 + R41 + R31 + R43 = R153. The value of inventory of finished goods will be R153 x 8 000 = R1 224 000.

In this module, we generally apply costs on a normal costing basis.

3.2.2 Methods for the valuation of finished goods

Management accountants can use two methods to determine the cost of goods manufactured and, by extension, the amounts that will be disclosed as finished goods inventory and cost of sales: the absorption costing method and the marginal costing method.

Absorption costing

The absorption costing method is also known as the full costing method. This method treats all manufacturing costs (i.e. direct materials, direct labour as well as fixed and variable overheads) as product costs.

Marginal costing

The marginal costing method is also known as the variable costing method, the direct costing method or the contribution margin approach. This method treats only variable costs as product costs. Fixed production overheads are treated as period costs.

You must not confuse the basis of costing with methods of costing. For example, we can use the absorption costing method on an actual, normal or standard costing basis; likewise, we can use the marginal costing method on an actual, normal or standard costing basis.

Example 3.5

The following is an extract from the accounting records of King Protea Limited for the financial year ended 28 February:

	R
Sales	8 000 000
Sales and distribution expenses	1 000 000
Administration expenses	1 400 000
Direct materials issued to production	600 000
Direct labour cost	800 000
Fixed production overheads	3 120 000
Variable production overheads	280 000

Assuming that there is no opening or closing inventory of finished goods and work-in-progress, we will determine the gross profit according to the two methods as follows:

	Absorption	**Marginal**
	R	**R**
Sales	8 000 000	8 000 000
Cost of sales	4 800 000	1 680 000
Direct materials cost	600 000	600 000
Direct labour cost	800 000	800 000
Fixed production overheads	3 120 000	-
Variable production overheads	280 000	280 000
Gross profit	3 200 000	6 320 000

We will determine the net profit according to the two methods as follows:

	Absorption	**Marginal**
	R	**R**
Gross profit	3 200 000	6 320 000
Period costs	2 400 000	5 520 000
Sales and distribution expenses	1 000 000	1 000 000
Administration expenses	1 400 000	1 400 000
Fixed production overheads	-	3 120 000
Net profit	800 000	800 000

In this example, the net profit according to the two methods is the same, because there was no opening or closing inventory. Let's expand example 3.5 further to see what happens to net profit and the cost of finished goods when there is inventory of finished goods.

Example 3.6

The same information for King Protea applies as in example 3.5, except for the following:

- There was no inventory of finished goods at the beginning of the year.
- The company started and completed 100 000 units during the year.

- At the end of the year, there were 1 000 units of finished goods in inventory.
- There was no work-in-progress at the beginning or at the end of the year.

Assume an actual costing basis and determine the net profit for the period according to the absorption costing method and the marginal costing method.

We must first determine the cost of each unit produced so that we can calculate the value of the closing inventory. We do this by spreading the total cost of each element of the production cost over the 100 000 units started and completed during the year.

	Absorption costing	**Marginal costing**
	R	**R**
Direct materials cost (600 000 / 100 000)	6,00	6,00
Direct labour cost (800 000 / 100 000)	8,00	8,00
Variable overheads (280 000 / 100 000)	2,80	2,80
Fixed overheads (3 120 000 / 100 000)	31,20	-
Total manufacturing cost per unit	48,00	16,80

From this information, we can determine the value of the closing inventory of 1 000 units as well as the cost of sales of the 99 000 units that were sold (100 000 units produced minus 1 000 units in closing inventory = 99 000 units sold). The net profit for the period according to the two methods will now be as follows:

	Absorption costing	**Marginal costing**
	R	**R**
Sales	8 000 000	8 000 000
Cost of sales		
99 000 x R48,00	4 752 000	
99 000 x R16,80		1 663 200
Gross profit	3 248 000	6 336 800
Period costs	2 400 000	5 520 000
Sales and distribution expenses	1 000 000	1 000 000
Administration expenses	1 400 000	1 400 000
Fixed production overheads	-	3 120 000
Net profit reported for the period	848 000	816 800
Value of closing inventory		
1 000 x R48,00	48 000	
1 000 x R16,80		16 800

The differences in reported net profit and the value of closing inventory are as follows:

	Net profit	Closing inventory
Absorption costing	848 000	48 000
Marginal costing	816 800	16 800
Difference	31 200	31 200

The difference of R31 200 is ascribed to the fixed cost element of the 1 000 unsold units: fixed cost of R31,20 x 1 000 units = R31 200

- Absorption costing includes fixed costs in its cost of inventory; therefore, the cost of closing inventory under absorption costing is higher than under marginal costing.
- Marginal costing includes fixed costs in its period costs; therefore, the net profit under marginal costing is lower that under absorption costing.

IFRS

In learning unit 1, we mentioned that the financial statements of companies must be prepared in compliance with IFRS. You will learn about these standards in detail in your financial accounting studies. The reporting standard that deals with the disclosure of inventories is IAS 2. (IAS is the abbreviation for International Accounting Standard.) The following extracts from IAS 2 are important for the valuation of inventories:

IAS 2.8: *Inventories encompass … finished goods produced.*

IAS 2.10: *The cost of inventories shall comprise all costs of purchase, costs of conversion …*

IAS 2.12: *The costs of conversion … include a systematic allocation of fixed and variable production overheads that are incurred in converting materials into finished goods.*

The ellipse (the three dots …) above indicates that words have been omitted from the extract. The reason for omitting these words is that they are irrelevant for our discussion.

From the above extracts, it is clear that the goods produced by a manufacturing company (finished goods) are classified as inventory. It is also clear that the cost of finished goods must include fixed and variable overheads.

IASs prescribe the *absorption costing method* for determining of the value of inventory. Therefore, the costing system must assign direct costs as well as fixed and variable indirect costs (overheads) to the units of production.

However, most companies will use both methods to determine the cost of goods. They will use the absorption costing method for financial reporting purposes to determine the value of the closing inventory and cost of sales to be disclosed in the statement of financial position and the statement of profit or loss respectively. They will use the marginal costing method for internal planning purposes (e.g. for preparing a flexible budget).

Activity 3.3

Use the information in activity 3.2.

- Determine if, based on normal costing, there was an over or under absorption of overheads in June.
- Determine the marginal cost per blanket, based on standard costing.

Feedback on activity 3.3

Over absorption or under absorption of overheads

Overheads absorbed under normal costing		592 000
Variable overheads: R31 x 8 000 units	248 000	
Fixed overheads: R43 x 8 000 units	344 000	
Actual overheads		584 000
Variable overheads: R29 x 8 000 units	232 000	
Fixed overheads: R44 x 8 000 units	352 000	
Over absorption of overheads		R8 000

Marginal standard cost per blanket

Under the marginal costing method, only variable costs are treated as product cost. Therefore, based on standard costing, the marginal cost per blanket will be as follows:

Direct materials cost	R40
Direct labour cost	R30
Variable overheads	R33
	R103

Please note that the scope of this module is only limited to absorption costing.

3.2.3 Methods for assigning overheads to production

Fixed overheads are fixed, regardless of the number of units being produced. This poses a slight challenge where the company use the absorption costing method to value inventory: if fixed overheads do not change with production, how do we know how much overheads to assign to each unit produced? For example, how much overheads do we assign to each unit of canned peaches, pickled fish, corned beef, etc. manufactured at a food processing plant? An overhead rate is applied for assigning overheads costs to production, but the question is, how do we determine that rate? This is another important decision management must consider when designing a cost accounting system.

In learning unit 2, we defined cost drivers as activities that cause a change in the cost of something else. For example, the *number of units produced* is an output activity that will drive the total cost of both direct material and direct labour: the more units the company produce, the higher the total cost of direct materials and direct labour will be. The driver of the cost of renting factory space will be the size of the space rented; if more space is rented, the cost of rent will increase.

When the management accountant prepares the budget of the company, it is important that he/she bears in mind the drivers of the different costs. Information such as historical data, agreements with suppliers, agreements with trade unions and economic forecasts will assist the accountant in budgeting for the direct material and direct labour cost per unit for the coming year. The accountant must also realise that the total number of units produced drives the cost of both direct materials and direct labour. He/She must also identify the drivers of overheads . Once these drivers are known, he/she can determine rates for assigning the overheads to production

We can use either of two methods to determine allocation and apportionment rates for overheads, namely the traditional costing method and the activity-based costing method.

Traditional costing

With traditional costing, all the production overheads are pooled together – either for the factory as a whole, or per production department. We then select the most suitable cost driver to determine the apportionment rate and determine the rate by using either a volume-based or a cost-based driver. We then apportion the overheads to the cost objects (units produced) by applying the rate to the selected activity level. Examples of volume-based cost drivers are the number of units produced, the number of direct labour hours and the number of machine hours. Examples of cost-based cost drivers are direct labour cost, direct materials cost and prime costs. Where only a single rate is determined for the entire production department, we talk of a plant-wide rate.

Example 3.7

Blue Crane Limited has two production departments. The budgeted fixed overheads and volume of activity for the two departments are as follows:

	Fixed overheads	Volume of activity
Machining department	R400 000	400 machine hours
Packing department	R35 000	700 direct labour hours
Total	R435 000	

Normal production is 1 000 units.

Machines mainly convert direct materials in the machining department, while employees are responsible for packing. Therefore, the most suitable cost drivers have been identified as machine hours for the machining department and direct labour hours for the packing department.

Assume we want to determine fixed overhead absorption rates as follows:

- per production department
- plant-wide, using units of production as volume of activity

Fixed overhead rate per production department:

Machining: R400 000 ÷ 400 machine hours = R1 000 per machine hour

Packing: R35 000 ÷ 700 direct labour hours = R50 per direct labour hour

Plant-wide fixed overhead rate: R435 000 ÷ 1 000 units = R435 per unit manufactured

Activity-based costing

With activity-based costing (also referred to as ABC), we group production overheads into several activity-based cost pools; the cost driver is the activity that causes a change in the cost of that activity. The following are examples of activity cost pools and the driver that will cause a change in the costs in the cost pool:

	Activity cost pool	Cost driver
i	Setting up machines in the factory	Number of setups
ii	Ordering of materials	Number of orders
iii	Inspecting for quality control purposes	Number of inspections

i Every machine setup will cause a change in the cost of the activity *setting up machines.*

ii Every order will cause a change in the cost of the activity *ordering of materials.*

iii Every inspection will cause a change in the cost of the activity *inspecting for quality*.

The costs collected in the cost pools are assigned to units of production based on the volume of activity of the cost driver.

Example 3.8

Real Yellowwood Limited manufactures three products: product K, product L and product M. During the month, 24 quality control inspections were carried out on product K, 22 on product L and 34 on product M. The total overheads for February collected in the activity cost pool *inspecting for quality control purposes* was R80 000 for the month.

Based on actual costing, we calculate the overhead apportionment rate for the cost pool as follows:

R80 000 ÷ 80 inspections (24 + 22 + 34) = R1 000 per inspection. The apportionment of overheads is:

K: R1 000 x 24 =	R24 000
L: R1 000 x 22 =	R22 000
M: R1 000 x 34 =	R34 000
	R80 000

The apportionment rate for overheads collected in other activity cost pools will be determined in similar fashion and apportioned to products K, L and M.

Activity 3.4

Both the traditional and activity-based costing methods apply a predetermined rate to apportion overheads to production. Would these predetermined rates be the same?

Feedback on activity 3.4

No, the rates would not be the same. The traditional method identifies output volumes as cost drivers, whereas the ABC (activity-based) method identifies activities as cost drivers.

In this module, we use the traditional method, which is still more widely used than ABC. We will discuss the traditional method in more detail in learning unit 7.

3.2.4 Methods of cost accumulation

So far, we have seen that we must select a basis for measuring production costs (actual, normal or standard costing), we must decide if all overheads will be included in the cost of production (absorption or marginal costing) and if we select absorption costing, we must decide how to determine the overhead apportionment rates (traditional or ABC methods). However, we still do not know how we are going to accumulate the assigned costs until the goods are completed and ready for sale. The two most widely used methods of cost accumulation are job costing and process costing.

Job costing

Job costing (also called job-order costing) is most appropriate where goods are made according to customer specifications (e.g. where a tender had been accepted). It is also suited for contexts where goods are produced in batches. Therefore, a "job" can consist of a single product, a batch of similar products or a special order. In job costing, we assign and determine product costs per job and not per period. We can only assign costs per job if the goods manufactured differ markedly from one another. Examples of manufacturers that may apply job costing would be aircraft manufacturers and manufacturers of custom designed furniture. Job costing is also used for special orders, for example, a printing company may assign the costs of printing the annual report of a company as a separate job. Each job represents a separate work-in-progress account until the job is completed and the goods manufactured in that job are transferred to finished goods.

Process costing

With process costing, production costs are assigned to processes or departments rather than individual jobs. Process costing is used when identical goods are mass produced on a continuous basis and for a long time. A manufacturer of fast-moving consumer goods such as canned foods and blankets, is likely to apply a process costing system.

Process costing accumulates costs in departments (processes) for a specific period (e.g. a month). A separate work-in-progress account is opened for each department, for example the cutting department, the stitching department, the packing department, etc. The cost of direct materials, direct labour and production overheads are accumulated and assigned to departments first. The costs of the departments are then assigned to the cost of the goods manufactured. Direct materials are expected to be added in the first department; you cannot add labour and overheads, unless the labour and overheads have materials to convert. More direct materials may be added in subsequent departments.

Activity 3.5

Indicate whether job costing or process costing would be more appropriate for the production of chocolates, films, academic textbooks and paint.

Feedback on activity 3.5

Chocolates: process costing. It is a single product that will be worked on for a longer period, undergoing different processes.

Films: job costing. It is a single product that differs markedly from other products.

Academic textbooks: job costing. Production (printing) occurs in batches that differ markedly from other batches.

Paint: process costing. Paint is a single product that will be worked on for a longer period, undergoing different processes.

We will discuss job costing and process costing in greater detail in the learning unit 8.

3.2.5 Cost-flow assumptions

Cost-flow assumptions involve when costs flow through the inventory accounts.

Example 3.9

Springbok (Pty) Limited manufactures televisions. There are 314 televisions in inventory of finished goods. These televisions were received from the production department as follows:

Date	Number of units	Unit cost (R)	Total cost (R)
28 February	14	3 000	42 000
4 March	180	3 100	558 000
10 March	120	3 305	396 600
Total	314		996 600

If 10 televisions are sold on 11 March, what amount will be transferred from inventory of finished goods to cost of sales? If we say that R30 000 (10 x 3 000) must be transferred, we assume that the cost that flowed into finished goods first will flow out of finished goods first.

IFRS allows only two cost-flow assumptions: the first-in-first-out (FIFO) method, which assumes that first costs flow first, and the weighted average method, which assumes that costs are averaged.

Under the FIFO method, we will assume the cost of sales of the 10 televisions sold to be R30 000 (10 x R3 000). Under the weighted average method, we will assume the cost of sales of the 10 televisions sold to be R31 738,85 (R996 600 / 314 x 10).

Activity 3.6

Which two cost-flow assumptions are recognised in IFRS?

Feedback on activity 3.6

The two cost-flow assumptions recognised in IFRS are the first-in-first-out (FIFO) method and the weighted average method of recording cost flows.

We will discuss cost-flow assumptions in detail in learning unit 5.

3.2.6 Currency of inventory system information

When designing a cost accounting system, management's last decision relates to how often inventory records will be up-dated. Inventory records can be maintained according to the perpetual system or the periodic system. A perpetual inventory system maintains a continuous record of the quantities and cost of inventory on hand (i.e. the information is always current and up-to-date). The periodic inventory system requires a physical inventory count to determine the quantities on hand in order to calculate the value of inventory.

Activity 3.7

The value of inventory can be reported based on one of two inventory systems. Name these systems.

Feedback on activity 3.7

Inventory records can be maintained in a perpetual inventory system or a periodic inventory system.

We will discuss inventory systems in detail in learning unit 4.

3.2.7 Conclusion

We have now discussed all the elements of a cost accounting system. You will understand that a company must make the following choices:

- *how* (i.e. on what basis) to cost its products – will it apply actual, normal or standard costing as a basis to measure input costs?
- *which* input costs to include in the cost of production – will it include all costs or only variable costs? (i.e. absorption costing or marginal costing)
- *how* to determine overhead apportionment rates – will it apply the traditional predetermined rates per volume of production activity or activity-based rates per activity?
- *where* to accumulate costs – will it record work-in-progress in jobs or in departments?
- *when* inventory costs will flow – will it apply the FIFO or the weighted average method?
- *what* reporting capability the inventory system should have – will it use a perpetual or a periodic inventory system?

---oOo---

Did you notice something about the names used for the companies in the examples in this learning unit? They are the names of the national symbols of South Africa:

- The Galjoen is our national fish.
- The King Protea is our national flower.
- The Blue Crane is our national bird.
- The Real Yellowwood is our national tree.
- The Springbok is our national animal.

3.3 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Consider the following statements carefully and indicate whether they are *true (t)* or *false (f)*:

1.1 An actual costing basis is also called a historical cost basis.

1.2 Under normal costing, the total amount charged for factory overheads is determined by multiplying the predetermined rate by a predetermined activity level.

1.3 Where absorption costing is applied, more costs may be apportioned to production than are actually incurred.

1.4 The differences between standard costs and actual costs are referred to as variances.

1.5 Where the marginal costing method is applied, only direct materials and direct labour costs are regarded as input costs.

1.6 Under activity-based costing production, overheads are grouped in activity-based cost pools.

1.7 In job costing, costs are accumulated per job.

1.8 In process costing, a separate work-in-progress account is opened for each production department.

1.9 In order to ensure compliance with IFRS, marketing and distribution costs should be apportioned to the cost of goods manufactured.

QUESTION 2

For each of the following questions, read carefully through the information provided and select only the most correct option as your answer.

2.1 In absorption costing, input costs typically consist of … .

(a) direct materials, direct labour and production overheads
(b) direct materials, direct labour and administrative costs
(c) direct materials, direct labour and marketing costs
(d) direct materials, direct labour administrative costs and marketing costs

2.2 If the cost of one unit is R25, the cost of 10 units is R250 and the cost of 100 units is R2 500, we are looking at a … cost.

(a) fixed
(b) variable
(c) mixed
(d) step

2.3 Mpule incurred the following costs in manufacturing 40 000 mood rings:

	R		R
Direct materials cost	300 000	Direct labour	190 000
Rent of factory	12 000	Depreciation manufacturing equipment	8 000
Administration cost	15 000	Rent of stall at crafts market	12 000

Under absorption costing, the cost per ring is … .

(a) R13,43
(b) R13,23
(c) R12,75
(d) R12,56

QUESTION 3

3.1 Distinguish between a *basis* of accounting and a *method* of accounting for product costs. 3.2 Explain the elements of a cost accounting system.

QUESTION 4

Maluti Limited manufactures three different products, namely K, L and M. The company has adopted a normal costing basis and uses traditional absorption costing to determine the cost of production.

Consider the following budgeted information for next year:

Unit cost	Product K	Product L	Product M
	R	R	R
Direct materials cost	15	28	41
Direct labour cost	6	12	20
Production overheads	40	44	36
Total number of units	3 800	1 500	2 000

A plant-wide rate is used to apportion production overheads. Total production overheads is R290 000.

Required

4.1 How would a management decision to discontinue product L affect the cost of product K and product M?
4.2 Calculate the unit cost of product K and product M on the assumption that product L will be discontinued.

---oOo---

3.4 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 T

1.2 F Under normal costing, the total amount charged for factory overheads is determined by multiplying the predetermined rate by the *actual* activity level.

1.3 T If absorbed cost is more than actual cost, we say there was an over absorption of overheads; where absorbed cost is less than actual cost, we say there was an under absorption of overheads.

1.4 T

1.5 F Under marginal costing, all variable costs (i.e. direct materials, direct labour and variable overheads) are regarded as input costs.

1.6 T

1.7 T

1.8 T

1.9 F Marketing and distribution costs must be treated as period costs and expensed in the period in which the costs are incurred.

QUESTION 2

2.1 (a)

2.2 (b)

2.3 (c) Only costs related to the manufacturing process are product costs.
(300 000 + 190 000 + 12 000 + 8 000) / 40 000 = R12,75

QUESTION 3

3.1 *Basis* means the foundation on which the cost accounting system is built. The foundation will determine how production input costs is measured (e.g. by using actual, normal or standard costing). *Method* refers to the specific way in which costs will be determined: what is included in the cost, how costs are accumulated, how costs flow, how costs are reported, etc.

3.2
- the basis for measuring input costs – will the company use actual, normal or standard costing as the basis for measuring input costs?
- the method for valuing finished goods – which input costs it include in the cost of production (all costs or only variable costs); will it apply absorption costing of marginal costing?
- if the company selects absorption costing, will it determine overhead apportionment rates according to the traditional costing method or the activity-based costing method?
- the method of cost accumulation the company will use (i.e. where costs will be accumulated) – will it record work-in-progress in jobs or in departments?
- the assumption that will apply for the flow of costs (i.e. when inventory costs will flow) – will the company apply the FIFO method or the weighted average method?
- the reporting capability the company requires of the inventory system – will it use a perpetual or a periodic inventory system?

QUESTION 4

4.1 The production overheads currently absorbed by product L will have to be apportioned to product K and product M, resulting in an increase in the cost of product K and product M.

4.2 We first have to determine the total overheads apportioned to each product and then re-apportion the overheads of product L to products K and M:

		Product K	Product L	Product M
		R	R	R
Overheads per unit	a	40	44	36
Total number of units	b	3 800	1 500	2 000
Total overheads	a x b	152 000	66 000	72 000
Re-apportionment of L	*	44 786	(66 000)	21 214
Total re-apportioned overheads		196 786	-	93 214
Total units		3 800		2 000
Re-apportioned overheads per unit (rounded)		52		47

* Re-apportionment ratio is 152:72; therefore 152 / (152 + 72) x R66 000 to K and
72 / (152 + 72) x R66 000 to M

We can now determine the new costs per unit for product P and product R:

	Product K	**Product M**
	R	**R**
Direct materials cost	15	41
Direct labour cost	6	20
Production overheads	52	47
Total cost per unit	73	108

Question 4.2 is a challenging question. We will not expect you to answer questions this difficult in the examination.

---oOo---

LEARNING UNIT 4: ACCOUNTING FOR PURCHASED INVENTORIES

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- define the terms and concepts relating to purchased inventory
- record the accounting entries for purchases and issues

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- define and differentiate between different categories of inventory
- differentiate between direct and indirect materials
- describe the recording procedure for inventory purchases and issues
- record all accounting entries in respect of inventory purchases and issues

OVERVIEW

This learning unit is divided into the following sections:

4.1 INTRODUCTION

In this learning unit, we will introduce you further to the requirements of IFRS as they relate to inventories. This will include establishing the *total* cost of inventory as well as the differentiation between the categories of inventory. In learning unit 5, we will explore the *unit* cost of inventory further.

This learning unit will look at the purchasing and sales of merchandise as well as the purchasing and issuing of materials and consumables. The purchasing and issuing of materials and consumables will integrate with the cost accounting system in a manufacturing environment.

The general ledger of the financial accounting system contains a control account for every type of inventory. The separate, detailed record of the different items of inventory is maintained in a subsidiary ledger. The total cost of all the individual inventory items on hand in the subsidiary ledger must be the same as the balance of the control account in the general ledger.

Control accounts are accounts in the general ledger of an organisation. A control account contains a summary of the details that appear in the individual accounts of a subsidiary ledger.

The following are examples of control accounts:

- *debtors control account* that will contain a summary of the detail transactions recorded in the debtors subsidiary ledger
- *creditors control account* that will contain a summary of the detail transactions recorded in the creditors subsidiary ledger
- *inventory control account* that will contain a summary of the detail transactions recorded in the inventory subsidiary ledger (i.e. the stores' inventory cards)

4.2 CATEGORIES OF INVENTORY

Inventory can be purchased or manufactured. Inventory is categorised according to the purpose for which it is held.

4.2.1 IAS 2 – inventory

We have already indicated earlier that IAS 2 is the reporting standard that deals with the disclosure of inventories. The following extracts from IAS 2 are important in this learning unit:

IAS 2.6 Inventories are assets:

(a) held for sale in the ordinary course of business;

(b) in the process of production for such sale;

(c) in the form of materials or supplies to be consumed in the production process …

IAS 2.8 Inventories encompass goods purchased and held for resale including, for example merchandise purchased by a retailer and held for resale … Inventories also encompass finished goods produced, or work-in-progress being produced … and include materials and supplies awaiting use in the production process.

From the above extracts, we can identify four broad categories of inventory:

- *merchandise* – assets bought and held for sale in the ordinary course of business
- *finished goods* – assets manufactured and held for sale in the ordinary course of business
- *work-in-progress* – assets in the process of being manufactured to be sold in the ordinary course of business
- *materials and supplies* – assets to be consumed in the production process (e.g. direct materials, indirect materials and consumables)

In terms of IAS 1, all inventories are classified as current assets.

4.2.2 Merchandise

Merchandise is inventory that was purchased with the intention to sell it again in unaltered form. In learning unit 2, we said a merchandiser buys goods and then sells these goods in unaltered form (e.g. Checkers). Checkers is not only a merchandiser, but also a retailer. A retailer is a business that sells its goods directly to consumers. However, not only retailers buy merchandise with the intention of selling it. Distributors and wholesalers also buy merchandise with the purpose of reselling it. Before we look at the difference between a distributor, wholesaler and retailer, it is important to remember that most merchandise was manufactured at some stage. Someone made the food and cleaning materials that Checkers is selling. It is important to remember that distributors, wholesalers and retailers do not manufacture the merchandise themselves.

Distributors

Distributors are companies that have agreements with one or more manufacturer for the *distribution* of the goods that the manufacturers produce. Wholesalers and large retailers will usually buy their merchandise through distributors and not directly from the manufacturer.

Wholesalers

Wholesalers buy large quantities of goods (merchandise) directly from distributors. Because wholesalers buy large quantities, they can negotiate a considerable discount with the distributor. Wholesalers then resell the merchandise to small retailers that do not have direct access to the distributors.

Retailers

Retailers are businesses that sell goods (merchandise) directly to consumers. Consumers are the actual users of the merchandise. You and I buy food from retailers like Checkers and then eat (consume) the food; we are the consumers. There are large retailers, like Checkers, and small retailers, like the convenience stores at petrol stations, spaza shops etc. Typically, Checkers will buy its merchandise from a distributor (or sometimes directly from the manufacturer) while a small spaza shop may buy its merchandise from a wholesaler.

4.2.3 Finished goods

Inventory of finished goods is an account in the general ledger of a manufacturer. It shows the cost of the goods that were produced by the manufacturer with the intention of selling the goods, but which goods had not been sold yet. Once sold, the finished goods are transferred from the finished goods store to the customer and the cost of the sold goods flows from inventory of finished goods to *cost of sales* (refer to cost flow M in example 2.3 of learning unit 2).

4.2.4 Work-in-progress

Sometimes, work-in-progress is called work-in-process. Picture the scene at Woodpecker (Pty) Limited (refer to example 2.2 and figure 7.1): quantities of wood, metal and fabric are removed from the materials store and taken to the factory floor. Later, the completed tables, chairs and cabinets are loaded and taken from the factory floor to the finished goods store. However, at the end of the month (when the financial statements must be prepared) there are still a number of partly completed tables, chairs and cabinets on the factory floor. We refer to these unfinished units as *work-in-progress*. The production of these pieces of furniture has commenced, but they have not been finished yet.

In the flow of costs discussion in learning unit 2, we saw that costs flow from the inventory of materials account to the work-in-progress account when materials are transferred from the materials store to the production process. When completed, the finished goods are transferred from the production process to the finished goods store, and the related costs flow from the work-in-progress account to the inventory of finished goods account (refer to cost flow L in example 2.3 of learning unit 2).

4.2.5 Materials

Materials are those physical resources that a manufacturer requires to produce finished goods to sell. Materials can be natural resources or items that have already been produced or semi-produced by another manufacturer. What one company classifies as materials, another may classify as finished goods or merchandise.

The materials that Woodpecker (Pty) Limited uses in its manufacturing process are wood, metal and fabric as well as glue, staples and varnish. Wood is a natural resource, but the fabric and staples have already undergone a manufacturing process at another company. Suppose Woodpecker buys the staples from a hardware store, and the hardware store buys the staples from a manufacturer like Astor-Berning. For Astor-Berning, the staples are finished goods; for the hardware store, the staples are merchandise; for Woodpecker, the staples are indirect materials. We always classify inventory from the perspective of the company concerned. From Woodpecker's perspective, the fabric and staples are materials and not finished goods or merchandise for the following reasons:

- Woodpecker did not manufacture them.
- Woodpecker does not intend to sell them.
- Woodpecker will use them in a conversion process to manufacture another product.

There is usually an interval between the time that materials are purchased and received by the company, and the time that the materials are issued to the factory for conversion. During this interval, the materials are held in the storeroom as inventory. The cost of materials received from the supplier is recorded in the materials inventory control account.

When *direct materials* are issued to the production process, the cost of the materials flows from the materials inventory control account to the work-in-progress account. When *indirect materials* are issued to the production process, the cost of the materials flows from the materials inventory control account to the *production overheads clearance account* (refer to cost flows D and E in example 2.3 of learning unit 2).

4.2.6 Consumables

Consumables are those supplies that do not form an integral part of the finished goods and for which we cannot trace the costs to the finished goods (e.g. cleaning materials and light bulbs). It is important to note that some consumables are not used in the manufacturing process only. The sales and administration departments also use consumables (e.g. light bulbs for their offices and stationery like pens, paper and printer cartridges.

The words statione**r**y and station**a**ry are often confused. Statione**r**y is a noun that refers to office supplies (e.g. note books, printer paper, gem clips, pens, etc). Station**a**ry means "not moving". Stationary is an adjective (i.e. it describes an attribute of a noun), for example "The car is stationary."; car is a noun, and stationary is the adjective describing the motion of the car: the car is not moving.

When consumables are transferred to the production process, the cost of the consumables flows from the *consumables inventory control account* to the production overheads clearance account (refer to cost flow **F** in example 2.3 of learning unit 2).

When consumables are issued to non-manufacturing departments like the administration department, the cost of the consumables is transferred from the consumables inventory control account to the relevant expenses account (e.g. stationery expenses). Stationery expenses are a period cost and are expensed in the statement of profit or loss in the period that the stationery was issued from the consumables store.

Activity 4.1

Clearly differentiate between inventory of merchandise and inventory of finished goods.

Feedback on activity 4.1

Both inventory of merchandise and inventory of finished goods consist of goods that are in a form ready to be sold. Merchandise inventory consists of those completed goods that the reporting entity purchased in a form ready for resale. Finished goods inventory consist of those completed goods that the reporting entity itself produced through a process of manufacture.

Activity 4.2

Premier Foods manufactures Snowflake cake flour and sells it in paper packets. YumYum Bakery buys Snowflake from Checkers and then uses the flour to bake the cakes that it sells. Assume that Checkers buys the Snowflake directly from Premier Foods. Explain how each of the following businesses will disclose their inventory of Snowflake cake flour in their statements of financial position:

- Premier Foods
- Checkers
- YumYum Bakery

Feedback on activity 4.2

Remember, when classifying inventory, you must always do so from the perspective of the entity whose inventory you are considering.

Premier Foods

Premier Foods will disclose its inventory of Snowflake in its statement of financial position under *current assets* as *inventory of finished goods*, because Premier Foods manufactured the Snowflake with the intention of selling the manufactured Snowflake.

Checkers

Checkers will disclose its inventory of Snowflake in its statement of financial position under *current assets* as *inventory of merchandise*, because Checkers purchased the Snowflake from Premier with the intention of selling the packets of flour without any alteration.

YumYum Bakery

YumYum will disclose its inventory of Snowflake in its statement of financial position under *current assets* as *inventory of materials*, because YumYum purchased the Snowflake with the intention of converting the flour into cakes. The Snowflake will be classified as direct material in the production of the cakes.

Activity 4.3

Motivate why work-in-progress is classified as a current asset.

Feedback on activity 4.3

IAS 2.6 states that inventories are assets held for sale in the ordinary course of business or that are in the *process of production* for such sale. Work-in-progress refers to products in the process of production that, once completed, will be sold in the ordinary course of business.

4.3 PURCHASED INVENTORY

In the discussion above, we identified five types of inventory: merchandise, materials, work-in-progress, finished goods and consumables. Only three of these are *purchased* inventory: merchandise, materials and consumables. Finished goods refer to inventory that had been *manufactured*, while work-in-progress refers to inventory in the *process of being manufactured*. A company purchases merchandise with the intention of selling it to its customers, while it purchases materials with the intention of using them in the manufacturing process of the factory. Consumables are consumed in both the manufacturing and administration sections of a company.

In your business management modules, you will learn about supply chain management. Supply chain refers to the sequence of all the processes that are necessary for the purchase or production of goods and the distribution of those goods.

The process of purchasing inventory is one of the "links" in the supply chain of a company. In section 4.5, we will look at the purchasing process in more detail.

In learning unit 1, we mentioned that one of the functions of financial accounting is to record business transactions in various journals before posting summaries of the journals to the accounts in the general ledger. In this learning unit we will illustrate accounting entries by means of entries in a general journal only. We do this to indicate which accounts will ultimately be debited or credited in the general ledger.

4.3.1 Cost of purchased inventory

The cost of purchased inventories is determined in accordance with the requirements of IFRS. IAS 2 states the following:

IAS 2.10 *The cost of inventories shall comprise all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition.*

IAS 2.11 *The costs of purchase of inventories comprise the purchase price, import duties and other taxes (other than those subsequently recoverable by the entity from the taxing authorities), and transport, handling and other costs directly attributable to the acquisition of finished goods, materials … Trade discounts … are deducted in determining the costs of purchase.*

We will illustrate these requirements by means of examples in the sections that follow.

4.3.2 Inventory systems

In learning unit 3, we learnt that an inventory system is one of the elements of a cost accounting system. The inventory system of a company contains information about the quantities of inventory items in the stores and the cost of those items. There are two systems of accounting for inventory and, by extension, the cost of sales of a company: the *periodic system* and the *perpetual system*. These names indicate how the accounting records are updated for each receipt and issue of inventory.

Perpetual system

According to the perpetual system, the accounting records are continuously (perpetually) updated every time that the company receives or issues inventory. Likewise, the inventory control account for finished goods or merchandise is updated and the cost of the goods sold is recorded in the cost of sales account every time finished goods or merchandise are sold. Where items of materials and consumables are issued to production, the relevant inventory is account is updated, indicating a transfer either to the work-in-progress account (when direct materials are issued) or the production overheads clearance account (when indirect materials and consumables are issued). Under this system, up-to-date and current information is available on any given day. The introduction of sophisticated computers and point-of-sale systems enable most manufacturing and retail companies to use a perpetual inventory system.

Periodic system

With the periodic system, the cost of sales account and inventory of merchandise control account (for a merchandiser) or the inventory of finished goods control account (for a manufacturer) are only periodically updated – usually at the end of the month or at the end of the financial year. This system is appropriate for retailers that sell many small items of merchandise. Under this system, all purchases of merchandise are recorded in an account called the

purchases account instead of in the inventory of merchandise control account. At the end of the month or financial year, the physical inventory in the store is counted, its value is used to establish the cost of sales for the year, and the accounting records are adjusted.

Example 4.1

Gauteng Limited uses a periodic inventory system. At the beginning of the year, Gauteng had inventory of merchandise on hand to the value of R100 000. During the year, it purchased further inventory for R600 000. At the end of the year, the inventory on hand was counted and its value was determined as R120 000.

Required

(a) Determine the cost of goods sold.
(b) Prepare a journal entry to adjust the general ledger accounts to reflect the correct balances.
(c) Show the adjusted general ledger accounts.

(a) Cost of goods sold	R
Balance of physical inventory on hand at the beginning of the year	100 000
Plus: Purchases during the year	600 000
Inventory available for sale	700 000
Less: Physical inventory on hand at the end of the year	120 000
Equals: Cost of goods sold during the year	580 000

(b) Adjusting closing journal entry	Dr (R)	Cr (R)
Cost of sales account	580 000	
Inventory of merchandise account	20 000	
Purchases account		600 000
Recording cost of goods sold during the year		

Sometimes, the inventory of merchandise account is updated by reversing the opening inventory and raising the closing inventory as two separate entries. In this case, the adjusting closing journal entry will be as follows:

(b) Adjusting closing journal entry	Dr (R)	Cr (R)
Cost of sales account	580 000	
Inventory of merchandise account (closing balance)	120 000	
Inventory of merchandise account (opening balance)		100 000
Purchases account		600 000

(c) Updated general ledger accounts

Inventory of merchandise control account

	R		R
Balance b/f	100 000	Balance c/f	120 000
Closing entry	20 000		
	120 000		120 000
Balance b/f	120 000		

Purchases

	R		R
Payables	600 000	Closing entry	600 000

Cost of sales

	R		
Closing entry	580 000		

When a manufacturing company uses a periodic inventory system, material purchases will be recorded in the *materials purchases account*. At the end of the financial period, a *manufacturing account* is used to close all the accounts that affect the cost of goods manufactured, namely the materials purchases account, the direct labour account and the production overheads clearance account. However, it is unlikely that a manufacturer will use the periodic system due to the availability of sophisticated computer systems at reasonable cost.

Activity 4.4

Explain the difference between the two inventory systems in the accounting records of merchandisers and manufacturers.

Feedback on activity 4.4

Merchandisers

With a *perpetual inventory system*, the inventory of merchandise control account is updated with every purchase and sales transaction. There is no purchases account in a perpetual inventory system. The cost of sales account is updated continuously as sales occur. In a *periodic inventory system*, the inventory of merchandise control account and cost of sales account are *not* continuously updated. All purchases are recorded in a purchases account, and no cost of sales is recorded during the financial period. At the end of the financial period, (e.g. every month, quarter or year) the physical inventory on hand is counted and the inventory of merchandise control account is adjusted to reflect the value of the actual inventory on hand. The purchases account is then closed, and the cost of goods sold is recorded in the cost of sales account.

Manufacturers

In a perpetual inventory system, purchases of materials are debited directly to the inventory of materials control account and not to a purchases account. The inventory of materials control account is credited with every issue of materials to production, and the work-in-progress control account is debited; the work-in-progress control account is credited, and the finished goods inventory control account is debited every time completed goods are transferred from the factory floor to the finished goods store. The finished goods inventory control account and the cost of sales account are updated continuously as sales occur.

In learning unit 7, we will look at the reports required when a manufacturing company uses the periodic system.

4.4 INVENTORY MANAGEMENT AND CONTROL

Inventory management and control do not refer only to the physical control of the inventories in the storerooms of the company; it also refers to the management and control of the company's investment in inventory. Money invested in inventory is not available for the other needs of the company. Inventory management therefore entails the entire process of ensuring the following:

- the availability of inventory (i.e. planning *what* inventories will be required, *where* those inventories will be required, *how much* of each type of inventory will be required and *when* they will be required)
- uninterrupted business processes
- business processes at optimal cost efficiency

Inventory management encompasses such activities as forecasting inventory needs, availability of space for storing inventory, controlling the quality of inventory, physical control of inventory and the cost of ordering and holding inventory.

4.4.1 The need for carrying (holding) inventory

Why does a company keep inventory in its store? Why does it not buy its inventory as and when it is needed? There are several reasons for having items of inventory on hand:

Lead time

Lead time refers to the time required from the initiation of a process to its completion. The lead time of ordering inventory from a supplier will be the time it takes from placing the order until the goods are delivered. New inventory must be ordered to ensure the delivery thereof will take place before existing inventory runs out.

Meeting sales demand and continuity of the manufacturing process

A merchandiser must have sufficient merchandise in store to ensure that it does not lose any sales due to an inability to supply the merchandise its customer wants to buy. A manufacturer must have sufficient materials in store to ensure that the manufacturing process does not come to a halt because of running out of one or more items of material.

Price increases

If price increases are imminent, a company may wish to stock up on inventories to avoid the price increase.

Discount

Large quantities of inventory are sometimes purchased to take advantage of a supplier's offer of a special discount.

From the above discussion, one might get the impression that it is a good idea to keep inventory levels as high as possible to avoid price increases and running out of inventory. However, there are other costs associated with inventory apart from the cost at which inventory is purchased (see section 4.3.1).

Ordering costs

Ordering costs are all the costs relating to the preparation and processing of purchasing documentation and to receiving and inspecting the purchased items (e.g. the salaries of purchasing staff, documentation cost, etc). Ordering costs increase with the number of times a company places purchasing orders. It follows that the smaller the quantities of inventory a company orders at a time, the more orders it will have to place, and the more orders it places, the higher the ordering cost will be.

Holding costs

Holding costs (also referred to as carrying costs) are costs relating to the storage of inventory. Holding costs include costs such as rent of storage space, insurance cost for the storage space, insurance cost for inventory, cost of damage to inventory and obsolescence of inventory. The higher the quantities of inventory in storage, the higher the holding cost will be; and the lower the quantities of inventory in storage, the lower the holding cost will be. However, if small quantities of inventory must be maintained in the store, then ordering will have to occur more frequently.

You probably noticed the inverse relationship between ordering costs and holding costs:

- the higher the number of orders placed (i.e. smaller quantities per order), the higher the ordering cost, but the lower the holding cost
- the fewer the number of orders placed (i.e. larger quantities per order), the lower the ordering cost, but the higher the holding cost

4.4.2 Inventory strategies

An inventory strategy will control the ordering, receiving, storing and issuing of inventory. Inventory strategies include models such as the economic order quantity (EOQ), just-in-time (JIT) and materials requirements planning (MRP). You will learn more about these models in later courses of management accounting.

4.4.3 Ordering inventory

The purchasing department (also called the procurement department) is responsible for purchasing inventory. It is a department separate from the production department and the stores department.

In your auditing modules, you will learn about the need for the segregation of duties as an element of a good system of internal control.

Depending on the structure of the company, the person in charge of the store or another department responsible for inventory management will issue a *purchase requisition*. The purchase requisition will contain full details, amongst others, of what must be purchased and in what quantity. The following is an example of a simple requisition form:

Figure 4.1

PURCHASE REQUISITION FORM

Requested by: …….. Date: …….. Authorised by: …….. Date: ……..

Delivery address: _____

Product description	Product code	Quantity	Unit price (R/c)	Total price (R/c)
			Subtotal	
			VAT	
			Total	

Department ……..
Purchase order number ……..

A purchase requisition is issued in duplicate: one copy is sent to the purchasing function, and the other is retained in the store. The purchasing department uses the purchase requisition as its authorisation to order the goods indicated. The objectives of the purchasing department in the ordering of inventory are to ensure the following:

- that inventory is purchased from suppliers that provide the best quality at the best price
- that the correct type of inventory (i.e. the exact products that were ordered) is delivered
- that accurate quantities of inventory (i.e. not more and not less than what was ordered) are delivered
- that the delivery of the ordered inventory is on time to prevent any hold-up in the business processes of the company

Upon receiving the requisition, the purchasing department will issue a *purchase order*. Usually, four copies of the purchase order are prepared: one is sent to the supplier that will be supplying the goods to the company, one is sent to the receiving department where the goods will be inspected, one is sent to the accounting department, while the purchasing department retains the last copy with the copy of the requisition. Below is an example of a simple purchase order:

The documents referred to in this learning unit may have different names in different organisations. Furthermore, documents can be either in paper or in electronic format.

Figure 4.2

PURCHASE ORDER

XYZ Company
Address: …….
Telephone number: …….
E-mail: …….

Purchase order number: ……
Date: ……
Customer account number:
……...

ABC Supplier
Address: …….
…….

Deliver to
Address: ……..
……...
Contact number: …….
Contact person: …….

Product description	Product code	Quantity	Unit price (R/c)	Total price (R/c)
			Subtotal	
			VAT	
			Total	

4.4.4 Receiving inventory

The supplier will deliver the goods ordered to the delivery address indicated on the purchase order, which will be the receiving section. Here receiving staff will inspect the goods. The purpose of the inspection is to ensure that the correct quantities of the correct products of the required quality have been delivered.

Once the inspectors are satisfied, the goods are transferred from the receiving area to the store and a goods received note is prepared. The goods received note will contain information such as the name of the supplier, the date, the purchase order number as well as the quantity and description of the goods delivered. Depending on the type of inventory, identification tags (e.g. bar codes) may be attached to the inventory before it is transferred to the store. The separation of the receiving function from the purchasing and storage functions is part of achieving the company's internal control objectives through the segregation of duties.

Four copies of the goods received note are prepared: two copies are sent to the purchasing department, one is sent to the stores and the last is retained by the receiving section.

The purchasing department will compare the goods received note with the purchase order and the supplier's invoice. Once they are satisfied that the order has been executed satisfactorily, they will keep one copy of the goods received note with the requisition and purchase order that they already have on file. They will sign the other copy of the goods received note and send it to the accounting department.

4.4.5 Storing and physical control of inventory

Inventory of purchased goods are received into a store after inspection of the goods. The stores personnel will enter the details of the goods received into the store's inventory records. From the moment the goods are received in the store until they are transferred to another department, the inventory must be controlled to ensure that no damage or theft occurs.

The storage and control of inventory include processes such as recording the movement of the goods and counting the goods to compare the physical quantities in the store with the theoretical quantities according to the records. Stores personnel often use bin cards. Bin cards are attached to the shelves, bins, cabinets, etc, in which the inventory is stored. All quantities added and removed from the inventory are recorded manually on the bin card so that all stores personnel always know how many of a specific item should be in stock.

Details of the movement of quantities of inventory are recorded on an inventory ledger card. You will learn more about this document in our discussion of cost-flow assumptions in learning unit 5.

In your auditing modules, you will learn that one of the responsibilities of the management of a company is to safeguard the assets of the company against damage, theft and unauthorised use. The management will safeguard the assets through a good system of internal control.

4.4.6 Issuing inventory

Inventory is issued from the store against appropriately approved documentation only. Materials and consumables are issued to the manufacturing process against requisitions. The requisition will indicate the types and quantities of the materials or supplies to be issued.

The following is an example of a materials requisition:

Figure 4.3

MATERIALS REQUISITION

Date: ……..
Job/Department*: ……

Number: ……..
Overhead expense account: …….

QUANTITY	DESCRIPTION	UNIT COST	TOTAL COST R	c

Approved by: ……
Issued by: ……..
Received by: ……

*In a job-costing system, a job number will be inserted; in a process costing system, the name of the department will be inserted.

When merchandise is sold, inventory is drawn from the store against an appropriately authorised document. This document contains the details of the items of merchandise to be issued, and the stores personnel use it as a picking slip.

Activity 4.5

1. List a few of the reasons for keeping inventories.
2. Explain the difference between ordering costs and holding costs.
3. What are the objectives of the ordering department?

Feedback on activity 4.5

1. Reasons why companies keep inventories include the following:

- meeting sales demand and continuity of the manufacturing process
- lead time between the ordering and delivery of inventory
- potential price increases
- discount for large orders

2. The difference between ordering costs and holding costs

Ordering costs are the costs related to the ordering and receiving of inventory. The higher the frequency of orders placed, the higher the ordering costs will be. In order to minimise ordering costs, larger quantities of inventory must be ordered at a time, resulting in larger quantities of inventory in the store.

Holding costs are the costs related to the storage of inventory. The higher the levels of inventory in the store, the higher the holding costs will be. In order to minimise holding costs, smaller quantities of inventory must be held in the store, requiring that orders are placed more frequently and for smaller quantities.

There is an inverse relationship between ordering costs and holding costs. The higher the frequency of orders placed (i.e. more orders, but for smaller quantities per order), the higher the ordering costs, but the lower the holding costs. Likewise, the lower the frequency of orders placed (i.e. fewer orders placed, but for higher quantities per order), the lower the ordering costs, but the higher the holding costs.

The ordering model used by the company, for example the EOQ, will determine the optimal number of orders to be placed.

3. Objectives of the ordering department

The objectives of the ordering department are to ensure that the correct type of inventory is ordered in the correct quantities, of the required quality, at the best price and for timely delivery to ensure uninterrupted business processes.

4.5 INVENTORY OF MERCHANDISE

The company purchases merchandise with the intention of selling it to its customers. Distributors, wholesalers and retailers buy and sell merchandise.

4.5.1 Cost of merchandise

The cost of merchandise is determined in accordance with the requirements of IAS 2.11:

The costs of purchase of inventories comprise the purchase price, import duties and other taxes (other than those subsequently recoverable by the entity from the taxing authorities), and transport, handling and other costs directly attributable to the acquisition of finished goods, materials … Trade discounts … are deducted in determining the costs of purchase.

This is best explained by means of the following example:

Example 4.2

Limpopo (Pty) Limited is a mattress retailer. The company operates several stores in shopping malls in Pretoria. The company buys mattresses from a distributor in Johannesburg. The mattresses are delivered by a transport company, Mr Speedy (Pty) Limited, to the warehouse of Limpopo in Hermanstad. The retail stores in the shopping malls hold only a few mattresses of each type on the shop floor. When mattresses are sold, customers can either collect the mattresses directly from Hermanstad or have them delivered for a delivery fee. For each delivery of mattresses to Hermanstad, Limpopo hires casual labour for the day to off-load the delivery truck and stack the mattresses in the warehouse.

On 1 April, Mr Speedy, made a delivery to the Hermanstad warehouse and left its invoice for R2 280, which includes value-added tax (VAT) of R280.

Details of the invoice from the distributor in Johannesburg are as follows:

Product description	Product code	Quantity	Unit price (R)	Total price (R)
Soft 'n Comfy	xt401p	2 000	1 200	2 400 000
Firm 'n Healthy	xt510p	1 500	1 650	2 475 000
				4 875 000
			Bulk discount	(975 000)
			Subtotal	3 900 000
			VAT	546 000
			Total	4 446 000

Limpopo paid ten casual labourers R300 each for off-loading and stacking.

The total cost of the merchandise that will be recorded in the accounting records of Limpopo will be as follows:

Purchase price	=	3 900 000	see notes 1, 2 and 3 below
Cost of delivery (transport)	=	2 000	see notes 2 and 3 below
Cost of casual labour (handling)	=	3 000	see note 3 below
Total cost	=	3 905 000	

Note 1: IAS 2.11: Trade discounts are deducted in determining the costs of purchase.

Note 2: VAT charged is not a cost to Limpopo, because it is *subsequently recoverable* (by Limpopo) *from the taxing authorities.*

Note 3: *The costs of purchase of inventories comprise the purchase price … and transport, (and) handling and other costs directly attributable to the acquisition of finished goods.*

A note on VAT: small businesses that are not required to register with SARS for VAT, will regard VAT as a cost of purchase.

4.5.2 Determining cost of sales

In questions, you will often be given only the selling price of inventory and the mark-up on the cost of inventory, leaving you to calculate the cost of the inventory. It is very important for you to know how to approach problems of this nature. We will explain this in example 4.3. Remember that according to the perpetual system, the cost of sales account and the inventory of merchandise control account are updated after each sale.

Example 4.3

On 1 April 2017 (the first day of the financial year), the inventory of merchandise account of Mpumalanga (Pty) Limited reflected a balance of R30 000. During April, total sales and total purchases amounted to R31 360 and R16 000 respectively. Mpumalanga (Pty) Limited applies a mark-up of 12% on cost.

According to the perpetual inventory system, the following balances will appear in the accounting records of Mpumalanga (Pty) Limited at the end of April 2017:

	R
Sales for the month	31 360
Cost of sales for the month (see note 1 below)	28 000
Inventory of merchandise (see note 2 below)	18 000

The gross profit for the month is therefore

	R
Sales for the month	31 360
Less: Cost of sales for the month	28 000
Gross profit for the month	3 360

Note 1 A mark-up of 12% on cost means that 12% is added to the cost price of the inventory to establish the selling price. You will recall from your school mathematics that "per cent" means "out of a hundred"; therefore, 12% means 12 out of a hundred (or $\frac{12}{100}$ or 12 ÷ 100 or 12 / 100). To establish the mark-up, we multiply the cost price by 12 / 100. If the cost price is R28 000, then the mark-up of 12% on R28 000 = 28 000 x 12 ÷ 100 = R3 360. The selling price is then the cost price plus the mark-up = R28 000 + R3 360 = R31 360.

However, how do we establish the cost price if we only know the selling price and the mark-up? The rule is that we put the cost price as 100%. We know the mark-up is 12%, therefore the selling price represents 100 + 12 = 112%. To calculate the cost (100) from the selling price (112), we must divide the selling price of 112 by 112 and multiply the answer by 100: 112 ÷ 112 = 1 x 100 = 100.

Using this principle (112 ÷ 112 = 1 x 100 = 100) as a basis and replacing the sales of 112 with the actual sales, would mean that a selling price of R31 360 represents a cost of 31 360 ÷ 112 = 280 x 100 = R28 000.

In questions where you have to determine the cost price from the sales value, you must **ALWAYS** set the cost price at 100%.

Note 2

Opening inventory at the beginning of the month	30 000
Plus: Inventory purchased during the month	16 000
Less: Inventory sold and transferred to cost of sales	(28 000)
Equals: Closing inventory at the end of the month	18 000

4.5.3 Purchases and sales of merchandise

In this section, we will look at the accounting entries for the purchases and sales of merchandise under the two inventory systems. You will recall that there is a control account for every type of inventory in the general ledger and that the stores maintain a separate record of each inventory item. The total rand value of all the individual inventory items on hand in the stores must be the same as the balance of the control account in the general ledger.

Inventory is an asset, and asset accounts have debit balances. Therefore, when inventory is purchased, the inventory control account in the general ledger will be debited, resulting in an increase in the inventory account. Likewise, when inventory is sold, the inventory control account

is credited, resulting in a reduction in the inventory account. Inventory can be purchased and sold either for cash or on account.

Periodic inventory system

With the periodic system, the inventory control account and cost of sales account are only updated periodically, usually at the end of the month or at the end of the financial year. During the month or year, all purchases of inventory are debited to a purchases account. We can say that the purchases account "takes the place" of the inventory control account during the year.

Example 4.4

On 1 April 2017, the inventory of merchandise control account of Northwest Limited reflected a balance of R30 000. On 31 March 2017, the sales account had a balance of R570 000, while the purchases account reflected a balance of R460 000. On 31 March 2017, a physical count of inventory was held, and the value of the inventory on hand was calculated as R42 000.

On 31 March 2017, which is the end of the financial year, the cost of sales for the year is determined as follows:

	R
Opening balance of inventory on 1 April 2017	30 000
Purchases of merchandise during the year	460 000
Available for sale	490 000
Closing balance of inventory on 31 March 2018	42 000
Cost of sales for the year	448 000

Therefore, the gross profit for the year is as follows:

	R
Sales for the year	570 000
Less: Cost of sales for the year	448 000
Gross profit for the year	122 000

Example 4.5

Freestate Limited had no inventory on hand at the beginning of the year. During the year, the following four transactions took place:

1 Purchased merchandise on account for R400 000
2 Sold merchandise for cash, R120 000
3 Purchased merchandise for cash, R50 000
4 Sold merchandise on account, R240 000

Freestate uses the periodic inventory system, and the physical inventory on hand was valued at R210 000 at the end of the year.

Required

(a) Prepare general journal entries for the four transactions.
(b) Determine the gross profit for the year.
(c) Prepare the year-end adjusting journal entry.
(d) Determine the mark-up on cost.

(a) General journal entries

Transaction		Debit (R)	Credit (R)
1	Purchases	400 000	
	Trade creditors		400 000
	Purchased inventory on account		
2	Bank	120 000	
	Sales		120 000
	Sold inventory for cash		
3	Purchases	50 000	
	Bank		50 000
	Purchased inventory for cash		

		Debit (R)	Credit (R)
4	Trade debtors	240 000	
	Sales		240 000
	Sold inventory for on account		

(b) Gross profit

	R	
Sales	360 000	(120 000 + 240 000)
Less: Cost of sales	240 000	
Opening inventory	0	
Plus: Purchases	450 000	(400 000 + 50 000)
Available for sales	450 000	
Less: Closing inventory	210 000	(given)
Equals: Cost of sales	240 000	
Gross profit	120 000	

(c) Year-end adjusting journal

	Debit (R)	Credit (R)
Cost of sales (see (b) above)	240 000	
Inventory of merchandise control account (given)	210 000	
Purchases of merchandise (see (b) above)		450 000
Adjusting inventory and cost of sales at year-end		

(d) Mark-up on cost

Gross profit = R120 000, and cost = R240 000 ∴ mark-up is 120 000 / 240 000 x 100 = 50%

Perpetual inventory system

Note that according to the perpetual system, there is no purchases account. According to the perpetual system, the inventory of merchandise control account and the cost of sales account are updated every time merchandise is received or issued. Sales transactions will therefore require two journal entries: one to record the sale, and one to update the inventory account and record the cost of the goods sold.

Activity 4.6

Use the information in example 4.5 to prepare general journal entries to record the four transactions under a perpetual inventory system. Determine the gross profit for the year.

Feedback on activity 4.6

General journal entries

Transaction		Debit (R)	Credit (R)
1	Inventory of merchandise control account	400 000	
	Trade creditors		400 000
	Purchased inventory on account		
2	Bank	120 000	
	Sales		120 000
	Sold merchandise for cash		
2	Cost of sales	80 000	
	Inventory of merchandise control account		80 000
	Recording cost of inventory sold (120 000 / 150 x 100)		
3	Inventory of merchandise control account	50 000	
	Bank		50 000
	Purchased inventory for cash		
4	Trade debtors	240 000	
	Sales		240 000
	Sold inventory on account		
4	Cost of sales	160 000	
	Inventory of merchandise control account		160 000
	Recording cost of inventory sold (240 000/ 150 x 100)		

Gross profit

	R
Sales	360 000
Less: Cost of sales	240 000
Gross profit	120 000

You will notice that although the recording of transactions during the year was different, the gross profit for the year is the same. According to the perpetual system, up-to-date information would have been available throughout the year.

4.5.4 Purchases and sales returns

Buyers sometimes return goods they purchased to the seller of the goods in the normal course of business. The reason for these returns may be that the goods were found to be defective or not of the required standard. Of course, such returns must be recorded in the accounting records of both the buyer and the seller. The accounting entry that will record a return of goods will be the opposite of the entry that recorded the purchase or the sale of the goods in the first place.

Example 4.6

On 1 July, KwaZulu-Natal purchased merchandise on account from the supplier for R400 000.
On 10 July, merchandise that had cost R5 000 was sold to the customer for R7 500 cash.
On 15 July, merchandise to the value of R10 000 was returned to the supplier.
On 17 July, a customer returned goods for a refund of R1 500.

Required

Prepare general journal entries for these transactions under the following inventory systems:

(a) the periodic inventory system
(b) the perpetual inventory system

(a) Periodic inventory system		Debit (R)	Credit (R)
1 July	Purchases of merchandise	400 000	
	Trade creditors		400 000
	Purchased inventory on account		
10 July	Bank	7 500	
	Sales		7 500
	Sold inventory for cash		
15 July	Trade creditors	10 000	
	Purchases returns		10 000
	Defective inventory purchased returned		
17 July	Sales returns	1 500	
	Bank		1 500
	Sold goods returned		

(b) Perpetual inventory system		Debit (R)	Credit (R)
1 July	Inventory of merchandise control account	400 000	
	Trade creditors		400 000
	Purchased inventory on account		
10 July	Bank	7 500	
	Sales		7 500
	Sold inventory for cash		
10 July	Cost of sales	5 000	
	Inventory of merchandise control account		5 000
	Recording cost of goods sold		
15 July	Trade creditors	10 000	
	Inventory of merchandise control account		10 000
	Goods returned to supplier		
		Debit (R)	Credit (R)
17 July	Sales returns	1 500	
	Bank		1 500
	Goods returned by customer (see note)		
17 July	Inventory of merchandise control account	1 000	
	Cost of sales		1 000
	Adjusting cost of sales for returned goods (see note)		

Note

The sales were initially for cash. Therefore, the goods were returned for a cash refund, and the debtors account is not affected. Had the sales been on account, the entry for the sales return would be to debit *sales returns* and to credit *debtors*.

Goods that had cost R5 000 were sold for R7 500. The mark-up is therefore R2 500 (R7 500 – R5 000), and the mark-up percentage on cost is 50% (2 500 / 5 000 x 100 = 50%).

4.6 INVENTORY OF MATERIALS

4.6.1 Direct and indirect materials

We defined inventory of materials as those components and materials that will form an integral part of the completed goods but are still being held in the materials store (i.e. they have not been transferred to the manufacturing process yet). You will recall that in learning unit 2, we divided materials into two categories: direct materials and indirect materials.

Direct materials are those materials and components

- that will be converted in the manufacturing process
- that will become an integral part of the finished goods
- for which it is practical to trace the cost to the finished goods

Examples of direct materials are wood and fabric used in the production of furniture, glass and metal used in the production of lampshades, paper used in the production of books, etc.

Indirect materials are those materials

- that do become an integral part of the finished goods, *but*
- for which it is impossible or impractical to trace the cost to the finished goods

Examples of indirect materials that form an integral part of the finished goods but for which it is impossible or impractical to trace the cost to the finished goods would be the cotton used in stitching the fabric in furniture manufacturing, the tiny screws used in the production of lamp shades, the ink used in the printing of books, etc.

We classify other supplies consumed in the manufacturing process that do not form an integral part of the finished goods as consumables. Examples of consumables are grease for lubricating the manufacturing equipment, light bulbs for lighting the factory floor, cleaning materials for the equipment and factory floor, pens and paper used by factory supervisors, etc.

Usually, direct materials and indirect materials that form an integral part of the finished goods are held in the materials store, while consumables like light bulbs and stationery are held in the consumables store. Non-manufacturing departments also use consumables.

Example 4.7

Eastern Cape (Pty) Limited manufactures aluminium cans that it sells to manufacturers of canned foods. The following are some of the materials and supplies that Eastern Cape uses in the manufacturing process:

1 aluminium sheets from which the cans are pressed
2 varnish used for varnishing the bottoms of the cans
3 special coating for spraying the inside of the cans
4 cleaning agents for washing the cans before packing
5 cartons for stacking the cans, ready for shipment; each carton contains 1 000 cans
6 mutton cloth for cleaning the production machinery

Indicate for each of the above whether you would classify it as direct materials, indirect materials or consumables.

1	aluminium sheets from which the cans are pressed:	direct materials
2	varnish used for varnishing the bottoms of the cans:	indirect materials
3	special coating for spraying the inside of the cans:	indirect materials
4	cleaning agents for washing the cans before packing	consumables
5	cartons for stacking the cans ready for shipment:	direct materials
6	mutton cloth for cleaning the machinery:	consumables

Notes:

The cans are packed into cartons before they are sold. The finished product is therefore not a single can, but a carton containing 1 000 cans. Therefore, both the aluminium and the cartons form an integral part of the finished goods, and the cost thereof can be traced readily to the final product.

Both the varnish and the special coating form an integral part of the manufactured cans, but it is impossible or impractical to trace the cost thereof to the finished product.

The cleaning agents and mutton cloth are consumed (used up) in the manufacturing process, but they do not form an integral part of the finished product.

4.6.2 Purchasing and issuing materials

The same principles that applied to the purchasing and sales of merchandise apply to the purchasing and issuing of materials. Like the merchandiser, the manufacturer will keep an inventory control account in the general ledger of the company for each type of inventory. The total rand value of all the individual inventory items on hand in the stores must be the same as the balance of the corresponding control account in the general ledger.

Inventories are assets of the company, and inventory accounts in the general ledger will have debit balances. When materials are purchased, the inventory of materials control account in the general ledger will be debited, resulting in an increase in the inventory account. Likewise, when materials are issued to production, the inventory of materials control account is credited, resulting in a reduction in the inventory account.

Example 4.8

The details below pertain to the delivery of 1 000 components that Western Cape (Pty) Limited uses in a manufacturing process.

Supplier's invoice:	
1 000 units of component #dssv at a unit cost of R160	160 000
5% trade discount	(8 000)
	152 000
VAT at 14%	21 280
	173 280
Courier charges	400
VAT at 14%	56
	456

Required:

1 Under what category of inventory will component #dssv be classified in the accounting records of Western Cape (Pty) Limited?
2 Assume that Western Cape (Pty) Limited is registered for VAT purposes. Calculate the unit cost of the components that will be recorded as inventory.

Suggested solution:

1 Component #dssv will be classified as inventory of materials since Western Cape (Pty) Limited intends to use the components in a manufacturing process.

2 The unit cost of the components that will be recorded as inventory is R152,40.

Workings	**R**
Purchase price of 1 000 units	152 000
Courier charges	400
Total cost of 1 000 units	152 400

The cost per unit is therefore R152 400 / 1 000 = R152,40.

Note: Recoverable taxes and trade discounts are excluded from the cost of inventory.

4.6.3 Recording materials inventory transactions

The accounting entries for the purchasing and issuing of materials and consumables will be the same as for merchandise, except that no cost of sales is recorded and costs of materials flow from the inventory accounts to either the work-in-progress account (direct materials) or the production overheads clearance account (indirect materials and consumables).

Example 4.9

The following are the transactions of Northern Cape Limited:

1 Purchased materials for R400 000 on account.
2 Issued direct materials costing R150 000 and indirect materials costing R10 000 to production.
3 Bought consumables for R50 000 cash.
4 Issued consumables costing R6 000 to the production.

Required

Use the perpetual inventory system to prepare the general journal entries of Northern Cape Limited for the above transactions.

Suggested solution

Transaction		Debit (R)	Credit (R)
1	Inventory of materials control account	400 000	
	Trade creditors		400 000
	Purchased inventory on account		

Transaction		Debit (R)	Credit (R)
2	Work-in-progress account	150 000	
	Production overheads clearance account	10 000	
	Inventory of materials control account		160 000
	Issued materials to production		
3	Consumables inventory	50 000	
	Bank		50 000
	Purchased consumables for cash		
4	Production overheads clearance account	6 000	
	Consumables inventory		6 000
	Issued consumables to production		

Costs accumulated in the production overheads clearance account will be assigned to work-in-progress according to predetermined rates. For example, indirect materials may be assigned per production unit, while consumables may be assigned on the basis of labour hours. We will discuss the assignment of production overheads in learning unit 7.

Product costs are assigned to the goods being produced throughout the manufacturing process. Most manufacturing companies will use the perpetual system of recording inventory.

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The names used in the examples in this learning unit are those of the provinces of South Africa.

4.7 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Consider the following statements carefully and indicate whether they are *true (t)* or *false (f)*:

1.1 Merchandise consists of goods manufactured by the company with the intention of reselling it.

1.2 Retailers, wholesalers and distributors are all purchasers of merchandise.

1.3 Materials can consist of both components and other materials.

1.4 A manufacturing company would disclose the cost of units that have been completed only partially as inventory in its statement of profit or loss and other comprehensive income.

1.5 The glazing used in the manufacture of pottery would be considered a direct material.

1.6 The higher the ordering cost of a company, the higher its holding cost will be.

1.7 According the perpetual inventory system, freight charges on merchandise purchased are considered a cost of purchase and are debited to the inventory of merchandise control account.

1.8 According to the perpetual inventory system, import taxes on merchandise imported from Europe are considered a cost of purchase and are debited to the inventory of merchandise control account.

1.9 The perpetual inventory system obviates (removes) the need for physical inventory counts.

1.10 The double entry system of accounting means that for every transaction, only one account is debited and only one account is credited.

QUESTION 2

Carefully read the information provided and select only the most correct option as your answer.

2.1 Inventory on hand is classified as … .

(a) an asset
(b) a liability
(c) an expense
(d) an income

2.2 According to the perpetual inventory system, … .

(a) all purchases are recorded in a purchases account
(b) a cost of sales account is updated throughout the year
(c) only one account will be debited, and only one account will be credited when inventory is sold
(d) the value of closing inventory will be higher than if the periodic inventory system had been used

2.3 In determining the value of closing inventory of merchandise for disclosure in the financial statements, all of the following information will be required *except for* … .

(a) the purchase costs of the inventory
(b) the number of physical units on hand on the last day of the financial year
(c) the net realisable value of the inventory
(d) whether a periodic or perpetual inventory system is used for recording inventory

2.4 On the last day of the financial year, merchandise purchased on account was delivered to the premises of Ubuntu Limited. The items delivered were included in the physical count of inventory, but the accounting staff neglected to record the purchase in the accounting records of Ubuntu. This oversight will result in … .

(a) assets and profit being reported at too high an amount
(b) assets and profit being reported at too low an amount
(c) cost of sales and liabilities being recorded at too low an amount, while assets are reported at too high an amount
(d) liabilities being reported at too low an amount, and profit being reported at too high an amount

2.5 XYZ Manufacturing is a small manufacturing organisation. XYZ Manufacturing is not registered for VAT with SARS. Which of the following is not considered as part of the total cost of inventory of XYZ Manufacturing?

(a) cost of bringing the materials to the premises of XYZ Manufacturing
(b) cost of conversion of direct materials
(c) cash discount received for paying a supplier's account early
(d) VAT charged on the purchase of materials

2.6 On the last day of its financial year, Make-It Limited had the following balances in its general ledger accounts:

Deposit on rent of factory building	R50 000
Materials	R30 000
Work-in-progress	R10 000
Finished goods	R90 000

What amount will be disclosed for inventory in the statement of financial position?

(a) R180 000
(b) R90 000
(c) R40 000
(d) R130 000

2.7 On the last day of its financial year, Sell-It Limited had the following balances in its general ledger accounts:

Purchases of merchandise	R600 000
Freight paid on purchases	R30 000
Delivery charges paid on sales	R10 000
Opening inventory	R100 000

With the periodic system, what will the cost of sales for the year be if the closing value of the inventory was R80 000?

(a) R600 000

(b) R620 000
(c) R650 000
(d) R660 000

2.8 During the financial year, Wowsers Limited had sales to the value of R752 400, inclusive of VAT at 14%. The company applies a mark-up of 10% on the cost of inventory to establish the selling price. What was the cost of sales for Wowsers Limited for the year?
   (a) 582 000
   (b) 684 000
   (c) 630 000
   (d) 600 000

QUESTION 3

3.1 Identify the major classifications of inventory.
3.2 Distinguish between the perpetual and periodic inventory systems of a retailer.

QUESTION 4

Briefly explain the difference between direct materials, indirect materials and consumables.

QUESTION 5

Describe the difference between recording the

5.1 purchasing of merchandise and materials according to the perpetual inventory system
5.2 issuing of merchandise and materials according to the perpetual inventory system

QUESTION 6

The following are the inventory transactions of Lots-a-stuff, a retailer, for the financial year ended 31 March 2017:

	R
Purchased inventory on account	114 000
Paid for delivery of the inventory in cash	2 000
Sales of inventory on account	23 000
Paid for delivery of sold goods to the customer in cash	1 000
Sold inventory for cash	11 500
Sold inventory on account	80 500
Purchased inventory on account	30 000
Paid for delivery of inventory in cash	500
Returned unwanted goods to the supplier	10 000

On 1 April 2016, the value of physical inventory on hand was R5 000, and on 31 March 2017, the value of physical inventory on hand was R41 500. Lots-a-stuff applies a mark-up of 15% of cost on all goods sold.

Required

6.1 Prepare the journal entries of Lots-a-stuff for the above transactions according to the perpetual system.

6.2 Prepare a list of total debits and total credits that will be posted to the general ledger from the journal entries in 6.1.

6.3 Prepare the journal entries of Lots-a-stuff for the above transactions with the periodic system.

6.4 Based on the journal entries in 6.3, show the gross profit of Lots-a-stuff for the year.

6.5 Comment on the value of cost of sales shown in 6.2 and 6.4.

QUESTION 7

A supplier's invoice reflects the amount due for inventory purchased as R285 000, inclusive of VAT at 14%. What is the purchase price of the inventory that will be recorded in the inventory of merchandise control account if the buyer company is registered for VAT?

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4.8 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 F Merchandise consists of goods *purchased* by the company with the intention of reselling it.

1.2 T

1.3 T

1.4 F Partially completed inventory (work-in-progress) is classified as current assets and is therefore reported in the statement of financial position.

1.5 F It would be impractical, if not impossible, to trace the cost of the glazing to the completed products. Therefore, glazing is classified as indirect material.

1.6 F There is an inverse relationship between ordering cost and holding cost. Thus the higher the ordering cost of a company, the lower the holding cost will be, and the higher the holding cost, the lower the ordering cost will be.

1.7 T

1.8 T

1.9 F Regardless of the inventory system used, there is a risk of theft of or damage to inventory. A physical inventory count at year-end is required in all instances. (As part of their verification procedures, external auditors will also want to verify the existence of closing inventory and the value thereof.)

1.10 F According to the perpetual inventory system, two accounts will be debited (debtors/cash and cost of sales) and two accounts will be credited (sales and inventory of merchandise) with each sales transaction.

QUESTION 2

2.1 (a)

2.2 (b)

2.3 (d) see note 1

2.4 (d) see note 2

2.5 (c) see note 3

2.6 (a) see note 4

2.7 (c) see note 5

2.8 (d) see note 6

Note 1 IAS 2.10 states that the cost of inventories shall comprise all costs of purchase; (a) is therefore an accurate statement.

In learning unit 1, you learnt that external auditors must establish if the financial statements are a true and fair reflection of the financial position as reported in the statement of financial position. Inventory is an asset reported in the statement of financial position. The auditors will have to satisfy themselves that the inventory actually exists. Therefore, physical inventory counts are held at the end of the financial year; (b) is therefore an accurate statement.

IAS 2.9 states that inventories shall be measured at the lower of cost and net realisable value; (c) is therefore an accurate statement.

The inventory system will not have any effect on the cost of inventory because in terms of IAS 2.10, the cost of inventory is established regardless of the system employed; (d) is therefore an inaccurate statement and thus the correct answer.

Note 2 Let's assume the last purchase of the year was for R30 000. The omitted journal would have been:

Purchases	Dr	30 000
Trade creditors	Cr	30 000

It should be obvious that the trade creditors (i.e. **liabilities**) **would have been understated** by R30 000.

For the sake of explanation let's also assume the other figures:

	As is with error	Should be without error
Opening inventory	250 000	250 000
Purchases	950 000	980 000
	1 200 000	1 230 000
Closing inventory	180 000	180 000
Cost of sales	1 020 000	1 050 000

Clearly, cost of sales was understated by R30 000. Cost of sales is an expense, therefore R30 000 too little was deducted from sales, resulting in **profit being overstated** by R30 000.

The correct quantities of inventory were counted and valued, therefore the closing inventory would have been correct.

Note 3 Regarding options (c) and (d):

Only trade discounts are deducted from the purchase cost.

Since XYZ is not registered for VAT, it cannot claim VAT paid back from SARS, and therefore the VAT will be a purchase cost of materials. IAS 2.11 states that the costs of purchase of inventories comprise *… other taxes (other than those subsequently recoverable by the entity from the taxing authorities)*. Note that the question was about inclusion in the cost of *all* inventory, not only materials inventory, and therefore (b) is also an accurate statement.

Note 4 The deposit paid is not a purchase cost and can therefore not be included in the value of inventory. A deposit paid is refundable and will be disclosed as an account receivable in the statement of financial position.

Note 5 Only costs relating to *purchases* can be purchase costs. Delivery charges on sales are not a purchase cost. The cost of sales is therefore:

Opening inventory	100 000
Plus: Purchases	630 000 (600 000 + 30 000)
	730 000
Less: Closing inventory	80 000
Cost of sales	650 000

Note 6 The process would have been as follows:

First: purchase inventory

Then: add 10% to the cost to establish selling price

Finally: add 14% for VAT

Our calculation is therefore in reverse:

Determine the selling price before VAT: 752 400 / 114 x 100 = 660 000

Determine the cost price before mark-up: 660 000 / 110 x 100 = 600 000

You can test this answer:

Cost	600 000
+ 10%	60 000 (600 000 x 10 / 100)
Selling price	660 000
+ VAT at 14%	92 400 (660 000 x 14 / 100)
	752 400

QUESTION 3

3.1 The major classification of inventory for retailers is merchandise, while for manufacturers it is consumables, materials, work-in-progress and finished goods.

3.2 With the periodic system, the inventory of merchandise account and the cost of sales account are only updated periodically, usually at the end of the financial year. All purchases of merchandise during the year are recorded in a purchases account. At the end of the financial year, the physical inventory in the store is counted and the value thereof is used to establish the cost of sales for the year.

According to the perpetual system, the inventory of merchandise account and the cost of sales account are updated every time an inventory transaction takes place.

QUESTION 4

Direct materials are those materials and components

- that will be converted in the manufacturing process
- that become an integral part of the finished goods
- for which it is practical to trace their cost to the finished goods

Indirect materials are materials that are not direct materials and therefore materials and supplies that do form an integral part of the finished goods but for which it is impossible or impractical to trace their cost to the finished goods.

Consumables are those materials and supplies that are consumed in the manufacturing process; they do not form part of the finished goods.

QUESTION 5

According to the perpetual system, inventory accounts are adjusted every time an inventory transaction takes place.

The following journal entries record the purchase of inventory:

	R	**R**
Inventory of merchandise	xxx	
Trade creditors (or bank)		xxx
Purchase of inventory of merchandise		
OR		
Inventory of materials	xxx	
Trade creditors (or bank)		xxx

Purchase of inventory of materials

Merchandise is issued when sales take place, and materials are issued when required by the manufacturing process. The journal entries are as follows:

	R	R
Trade debtors (or bank)	xxx	
Sales		xxx
Sale of merchandise		
AND		
Cost of sales	xxx	
Inventory of merchandise		xxx
Recording cost of sales		
OR		
Work-in-progress OR manufacturing overheads clearance account	xxx	
Inventory of materials Materials issued to production		xxx

QUESTION 6

Lots-a-stuff is a retailer; therefore, the inventory is merchandise.

6.1 Journal entries of Lots-a-stuff according to the perpetual system

	R	R
Inventory of merchandise	114 000	
Trade creditors		114 000
Inventory purchased on account		
Inventory of merchandise	2 000	
Bank		2 000
Paid delivery cost of purchases		
Trade debtors	23 000	
Sales		23 000
Sales on account		
Cost of sales	20 000	
Inventory of merchandise		20 000
Recording cost of sales (23 000 / 115 x 100)		
Delivery expenses	1 000	
Bank		1 000
Paid for delivery cost to customers		

	R	R
Bank	11 500	
Sales		11 500

Cash sales

Cost of sales	10 000	
Inventory of merchandise		10 000
Recording cost of sales (11 500 / 115 x 100)		
Trade debtors	80 500	
Sales		80 500
Sales on account		
Cost of sales	70 000	
Inventory of merchandise		70 000
Recording cost of sales (70 000 / 115 x 100)		
Inventory of merchandise	30 000	
Trade creditors		30 000
Purchases on account		
Inventory of merchandise	500	
Bank		500
Delivery cost of inventory		
Trade creditors	10 000	
Inventory of merchandise		10 000
Goods returned		

6.2 List of total debits and total credits posted

	R	**R**
Inventory of merchandise (114 000 + 2 000 – 20 000 –10 000 – 70 000 + 30 000 + 500 – 10 000)	36 500	
Trade creditors (114 000 + 30 000 – 10 000)		134 000
Bank (–2 000 – 1 000 + 11 500 – 500)	8 000	
Trade debtors (23 000 + 80 500)	103 500	
Cost of sales (20 000 + 10 000 + 70 000)	100 000	
Delivery expenses	1 000	
Sales (23 000 + 11 500 + 80 500)		115 000
	249 000	249 000

6.3 Journal entries of Lots-a-stuff under the periodic system

	R	**R**
Purchases of merchandise	114 000	
Trade creditors		114 000
Inventory purchased on account		

Purchases of merchandise	2 000	
Bank		2 000
Paid delivery cost of purchases		
Trade debtors	23 000	
Sales		23 000
Sales on account		
Delivery expenses	1 000	
Bank		1 000
Paid for delivery cost to customers		
Bank	11 500	
Sales		11 500
Cash sales		
Trade debtors	80 500	
Sales		80 500
Sales on account		
Purchases of merchandise	30 000	
Trade creditors		30 000
Purchases on account		
Purchases of merchandise	500	
Bank		500
Delivery cost of inventory		
Trade creditors	10 000	
Inventory of merchandise		10 000
Goods returned		

6.4 Gross profit of Lots-a-stuff for the year

	R
Opening inventory on 1 April 2016 (given)	5 000
Purchases during the year (114 000 + 2 000 + 30 000 + 500 – 10 000)	136 500
	141 500
Closing inventory on 31 March 2017 (given)	(41 500)
Cost of sales for the year	100 000
Sales for the year (23 000 + 11 500 + 80 500)	115 000
Cost of sales (from above)	100 000
Gross profit for the year	15 000

6.5 The value of cost of sales in 6.2 and 6.4

The cost of sales is R100 000 in both instances. This is correct, because regardless of whether the perpetual or the periodic system is used during the year, the financial results for the year will be the same. (Sometimes there may be a small difference because of rounding, as you will see in learning unit 5.)

QUESTION 7

Costs of the purchase of inventories comprise, amongst others, the purchase price and taxes other than taxes that are recoverable from the taxing authorities. In this example, VAT is a recoverable tax, because the company is registered for VAT. Therefore, the VAT must be excluded from the purchase price. The purchase price that will be recorded in the inventory of merchandise control account is R250 000. This is calculated as follows:
285 000 / 114 x 100 = 250 000

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LEARNING UNIT 5: VALUATION OF PURCHASED INVENTORIES

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- perform the valuation of purchased inventory

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- determine the value of purchased inventories according to the FIFO method
- determine the value of purchased inventories according to the weighted average method

OVERVIEW

This learning unit is divided into the following sections:

5.1 Introduction
5.2 Cost-flow assumptions
5.3 The FIFO method
5.4 Weighted average method

5.1 INTRODUCTION

In learning unit 3, we learnt that one of the elements of a cost accounting system is an *assumption of when costs flow*. In this learning unit, we will explain what an assumption of cost flows means and how this assumption will affect the valuation of inventory and reported profit.

In learning unit 4, we considered the costs that constitute the cost of inventory when the inventory is purchased. We saw that the purchase cost of inventory included not only the purchase price of the inventory, but also other costs directly attributable to the acquisition of the goods (e.g. handling cost and the cost of transport to bring the inventory to the premises of the company). However, in learning unit 4, we concentrated on the *total* monetary value (total rand value) of inventories purchased or sold. We did not look at the values attached to the *units* of the inventory that move in and out of inventory accounts.

5.2 COST-FLOW ASSUMPTIONS

Because of factors like, amongst others, inflation and special offers of bulk discounts from suppliers, the actual cost of inventory per unit will fluctuate constantly. You are probably aware that the cost of the groceries you buy often increase on a month-on-month basis. Assume a grocery store made the following purchases and sales of 400 g cans of pilchards:

Month 1:	Bought 100 cans at R7 each
Month 1:	Sold 80 cans at R12 each
Month 2:	Bought 110 cans at R8 each
Month 2:	Sold 70 cans at R14 each

It is easy to see that the cost of sales for month 1 was 80 cans sold x R7 each = R560. So the gross profit for month 1 is sales of R960 (80 x R12) minus cost of sales of R560 = R300. At the beginning of month 2, there were 20 cans (100 – 80) in inventory. Another 110 cans were purchased during the month. Inventory available for sale in month 2 were 130 cans, of which 20 cans had cost R7 each, and 110 cans had cost R8 each. What is the cost of the 70 cans that were sold during month 2?

In building a cost accounting system, management must select a *cost-flow assumption* from those prescribed by IFRS. A cost-flow assumption means that management must decide how they "picture" costs concerning units of inventory sold (merchandise) or issued to production (materials). The concept *cost-flow assumption* will become clear to you as we progress through the learning unit.

IAS 2 states the following in section IAS 2.25 regarding the cost-flow assumptions, amongst others:

The cost of inventories… shall be assigned by using the first-in, first-out (FIFO) or weighted average method.

IAS 2.27 further states the following:

The FIFO formula assumes that the items of inventory that were purchased or produced first are sold first…. Under the weighted average method, the cost of each item is determined from the weighted average of the cost of similar items at the beginning of a period and the cost of similar items purchased or produced during the period.

The cost-flow assumption that is selected is important, as it will affect the valuation of inventory and therefore also the cost of sales and profit of the company.

Be careful that you do not confuse cost-flow assumptions (e.g. the FIFO and weighted average methods) with inventory systems (e.g. the perpetual inventory system). Cost-flow assumptions and inventory systems are two separate elements of the cost accounting system. Regardless of the method the company adopts under the cost-flow assumption, the inventory system will still be either the perpetual system or the periodic system.

5.3 THE FIFO METHOD

IAS 2.27 states that the *FIFO method assumes that the items of inventory that were purchased first are sold first.*

This method *assumes* that the cost of the *first* units that came *into* inventory is assigned to the *first* units going *out* of inventory. It does not mean that the actual goods that were purchased first are physically sold or issued first. (Sometimes items of inventory have an expiry date, and then the goods that came in first will also physically be the goods going out first.)

We will now consider the application of the FIFO method under a perpetual inventory system.

5.3.1 Perpetual inventory system with the FIFO method

In the discussion of the application of the FIFO method with the perpetual inventory system, we will first look at the effect on the inventory of merchandisers (i.e. inventory of merchandise) and then at the effect on the inventory of manufacturers (i.e. inventory of materials). The effects on inventory of work-in-progress and inventory of finished goods fall beyond the scope of this discussion, although the same principles will apply to work-in-progress and finished goods.

With the perpetual system, the accounting records for inventory are updated continuously (perpetually). The value of inventory on hand is therefore available at any point in time.

5.3.2 Inventory of merchandise (merchandisers) – FIFO

With the perpetual system, the inventory of merchandise control account is updated and the cost of the goods sold is recorded in the cost of sales account every time that a sale occurs.

Example 5.1

Brazil sells one type of doll only. All dolls are identical. Brazil made the following purchases during April:

1 April	Doll A	R200
3 April	Doll B	R210
4 April	Doll C	R220
6 April	Doll D	R230
		R860

On 7 April, Brazil sells its first doll for R400 and gives doll C to the customer.

According to the FIFO method, it is *assumed* that doll C had cost R200. This means that the cost of the *first* doll *in* (doll A) is assigned to the *first* doll *out* (doll C). If at the end of April there were no further purchases and sales, then the following would be the journal entries for the month of April:

	R	R
Inventory of merchandise	860	
Trade creditors		860
Total purchases of merchandise (assume on account)		
Bank	400	
Sales		400
Sales of merchandise (assume for cash)		
Cost of sales	200	
Inventory of merchandise control account		200
Recording cost of sales in accordance with FIFO method		

The gross profit of Brazil for the month will be R200 (R400 – R200), and the value of closing inventory at 30 April will be as follows:

1 doll at x R210 =	R210
1 doll at x R220 =	R220
1 doll at x R230 =	R230
3 dolls	R660

We mentioned in learning unit 4 that for each type of inventory, a company will maintain a control account in the general ledger and the company store will keep a record of the quantity and value of each inventory item. The total value of the individual items in the records of the store must be the same as the value of the control account in the general ledger. Accurate record keeping is essential where the FIFO method is applied. Example 5.2 will look at the recording of inventory transactions in the store inventory records of a merchandiser applying the FIFO method under a perpetual inventory system. Store records are maintained on inventory cards. Inventory cards are usually held in electronic format.

Example 5.2

Russia uses a perpetual inventory system and applies the FIFO method for the valuation of merchandise. The following transactions occurred for inventory item 1 for the year ending 31 March 2017:

1 April	Sale of 15 units
2 April	Purchase of 8 units at R1 020 each
3 April	Purchase of 12 units at R1 030 each
4 April	Sale of 20 units

5 April	Sale of 6 units
6 April	Purchase of 10 units at R1 050 each
7 April	Purchase of 4 units at R1 080 each
8 April	Sale of 12 units

The opening balance of inventory on 1 April 2017 was 25 units at a cost of R1 000 each. The selling price remained constant at R1 500 per unit.

The FIFO perpetual inventory card will be prepared as follows:

The opening inventory is entered in the columns under the heading "Balance in inventory":

Inventory card for item 1

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
1 April	Balance				25	1 000	25 000

Each transaction is entered as it occurs. The details of the transaction are entered in the columns under the heading "Movement in inventory". Brackets are used to denote movements out of inventory. The columns under "Balance in inventory" are then updated to reflect the total units in inventory and their cost value. After the sales of 1 April, the inventory card will appear as follows:

Inventory card for item 1

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
1 April	Balance				25	1 000	25 000
1	Sales	(15)	1 000	(15 000)	10	1 000	10 000

At this stage there are 10 (25 – 15) units in inventory at a unit cost of R1 000 each. Another purchase takes place on 2 April, but at a different unit cost (R1 020). The transaction details are entered in the columns under "Movement in inventory"; carefully observe how the "Balance in inventory" columns are updated:

Inventory card for item 1

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
1 April	Balance				25	1 000	25 000
1	Sales	(15)	1 000	(15 000)	10	1 000	10 000
2	Purchases	8	1 020	8 160			
	Balance				10	1 000	10 000
					8	1 020	8 160
					18		**18 160**

We now use three lines to reflect the details of the units of inventory on hand in the "Balance in inventory" columns. A careful record is kept of how many units are in inventory at the different unit costs. The figures in bold type reflect the total units of inventory and their total value (i.e. the balance of inventory on hand).

On 3 April, there is another purchase of 12 units at R1 030 each. We now use four lines to record the balance of the inventory on hand:

Inventory card for item 1

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
1 April	Balance				25	1 000	25 000
1	Sales	(15)	1 000	(15 000)	10	1 000	10 000
2	Purchases	8	1 020	8 160			
	Balance				10	1 000	10 000
					8	1 020	8 160
					18		**18 160**
3	Purchases	12	1 030	12 360			
	Balance				10	1 000	10 000
					8	1 020	8 160
					12	1 030	12 360
					30		**30 520**

The next transaction occurs on 4 April, when units 20 are sold. FIFO assumes that the cost of the first units into inventory is assigned to the first units out of inventory. The first units into inventory are the 10 units at R1 000 each, so a cost of R10 000 (10 x R1 000) will be assigned to the sold units first. The next units into inventory are the 8 units at R1 020 each. Therefore the cost of R8 160 (8 x R1 020) is also assigned to the 20 units sold. So far, we have assigned the cost of the first 10 units plus the cost of the next 8 units (i.e. 18 units) to the 20 units sold. We therefore need to assign costs for another 2 units. The cost assigned to these 2 units will be the unit cost of the next units into inventory (i.e. R1 030 each). Therefore, the total cost assigned to the 20 units sold is:

10 units at R1 000 =	R10 000
8 units at R1 020 =	R 8 160
2 units at R1 030 =	R 2 150
20	R20 310

Carefully observe how this is recorded in the inventory card.

Inventory card for item 1

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
1 April	Balance				25	1 000	25 000
1	Sales	(15)	1 000	(15 000)	10	1 000	10 000
2	Purchases	8	1 020	8 160			
	Balance				10	1 000	10 000
					8	1 020	8 160
					18		**18 160**
3	Purchases	12	1 030	12 360			
	Balance				10	1 000	10 000
					8	1 020	8 160
					12	1 030	12 360
					30		**30 520**
4	Sales	(10)	1 000	(10 000)			
		(8)	1 020	(8 160)			
		(2)	1 030	(2 060)			
	Balance				**10**	1 030	**10 300**

The completed inventory card for all transactions appears below. Make sure that you understand each entry made. The balance of inventory on hand is indicated in bold type. Note how these quantities and values in bold type demonstrate that the quantities and value of inventory on hand with the perpetual inventory system is available at any point in time.

Inventory card for item 1

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
1 April	Balance				25	1 000	25 000
1	Sales	(15)	1 000	(15 000)	10	1 000	10 000
2	Purchases	8	1 020	8 160			
	Balance				10	1 000	10 000
					8	1 020	8 160
					18		**18 160**
3	Purchases	12	1 030	12 360			
	Balance				10	1 000	10 000
					8	1 020	8 160
					12	1 030	12 360
					30		**30 520**
4	Sales	(10)	1 000	(10 000)			
		(8)	1 020	(8 160)			
		(2)	1 030	(2 060)			
	Balance				**10**	1 030	**10 300**
5	Sales	(6)	(1 030)	(6 180)			
	Balance				**4**	1 030	**4 120**
6	Purchases	10	1 050	10 500			
	Balance				4	1 030	4 120
					10	1 050	10 500
					14		**14 620**
7	Purchases	4	1 080	4 320			
	Balance				4	1 030	4 120
					10	1 050	10 500
					4	1 080	4 320
	Balance				**18**		**18 940**
8	Sales	(4)	(1 030)	(4 120)			
		(8)	(1 050)	(8 400)			
	Balance				2	1 050	2 100
					4	1 080	4 320
					6		**6 420**

The above is an example of the record of one inventory item only. Every item of inventory will have its own inventory card. If the balances of inventory on hand (e.g. the R6 420 indicated in bold above) of all the inventory cards are added together on a specific date, the total should be the same as the value of the inventory control account in the general ledger on that date.

Assume all the above transactions were on account and that the company carries only item number 1 in inventory (i.e. the above inventory card represents all the inventory of the company). The journal entries for the transactions in this example appear below. Compare these journal entries with the entries in the inventory card.

		Debit (R)	Credit (R)
1 April	Trade debtors	22 500	
	Sales (15 x R1 500)		22 500
	Sale of 15 units		
	Cost of sales	15 000	
	Inventory of merchandise control account		15 000
	Cost of merchandise sold recorded		
2 April	Inventory of merchandise control account	8 160	
	Trade creditors		8 160
	Purchase of 8 units at R1 020 each		
3 April	Inventory of merchandise control account	12 360	
	Trade creditors		12 360
	Purchase of 12 units at R1 030 each		
4 April	Trade debtors	30 000	
	Sales (20 x R1 500)		30 000
	Sale of 20 units		
	Cost of sales (10 000 + 8 160 + 2 060)	20 220	
	Inventory of merchandise control account		20 220
	Cost of merchandise sold recorded		
5 April	Trade debtors	9 000	
	Sales (6 x R1 500)		9 000
	Sale of 6 units		
	Cost of sales	6 180	
	Inventory of merchandise control account		6 180
	Cost of merchandise sold recorded		
6 April	Inventory of merchandise control account	10 500	
	Trade creditors		10 500
	Purchase of 10 units at R1 050 each		
7 April	Inventory of merchandise control account	4 320	
	Trade creditors		4 320
	Purchase of 4 units at R1 080 each		
8 April	Trade debtors	18 000	
	Sales (12 x R1 500)		18 000
	Sale of 12 units		
	Cost of sales (4 120 + 8 400)	12 520	
	Inventory of merchandise control account		12 520
	Cost of merchandise sold recorded		

The inventory of merchandise control account will appear in the general ledger of Russia as follows:

Inventory of merchandise control account

		R			R
1 April	Balance b/d	25 000	30 April	Sales (debtors journal)	53 920
30 April	Purchases (creditors journal)	35 340	30 April	Balance c/f	6 420
		60 340			60 340
1 May	Balance b/d	6 420			

Compare the value of closing inventory in the general ledger control account to the value of closing inventory in the inventory card: both indicate the value of R6 420. Note that only summaries of the books of first entry (journals) are posted to the general ledger. The details of transactions are contained in the subsidiary ledgers (in this example, the inventory card). Although we recorded the transactions in the general journal for illustration purposes, in practice, the purchases of inventory will be recorded in a creditors journal (also called a purchases journal), and sales will be recorded in a debtors journal (also called a sales journal).

5.3.3 Inventory of materials (manufacturers) – FIFO

With the perpetual system, we update the inventory of materials control account with a transfer to the work-in-progress account with every issue of direct materials. The FIFO method assumes that the cost of the items that were purchased first will flow to production first.

Figure 2.6 of learning unit 2 illustrated the assignment of costs throughout the production process. The question now is: *what* cost will be assigned to the units of material put into production?

Example 5.3

India (Pty) Limited manufactures cricket bats. The bats are made from willow wood that India purchases in 0,75 metre lengths. These lengths of wood are put into production in stage 1 of the manufacturing process. At the beginning of April, there was no inventory of wood.

During the month, the following purchases of wood lengths were made:

Date	Quantity	Unit cost (R)	Total cost (R)
1 April	80	700	56 000
10 April	20	720	14 400
15 April	60	750	45 000

During the month, wood lengths were transferred to work-in-progress as follows:

Date	Quantity
1 April	50
12 April	10
17 April	70

These transactions will appear in the inventory card for wood lengths as follows:

Inventory card for 0,75 m willow wood lengths

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
1 April	Purchases	80	700	56 000			
1 April	Issues	(50)	700	(35 000)			
	Balance				**30**	**700**	**21 000**
10 April	Purchases	20	720	14 400			
10 April	Balance				30	700	21 000
					20	720	14 400
					50		**35 400**
12 April	Issues	(10)	700	(7 000)			
12 April	Balance				20	700	14 000
					20	720	14 400
					40		**28 400**
15 April	Purchases	60	750	45 000			
15 April	Balance				20	700	14 000
					20	720	14 400
					60	750	45 000
					100		**73 400**
17 April	Issues	(20)	700	(14 000)			
17 April		(20)	720	(14 400)			
17 April		(30)	750	(22 500)			
17 April	Balance				**30**	**750**	**22 500**

Assuming that all purchase transactions were on account, the journal entries for the transactions in this example appear below. Compare these journal entries with the entries in the inventory card.

		R	R
1 April	Inventory of materials control account	56 000	
	Trade creditors		56 000
	Purchased 80 units at R700 each		
1 April	Work-in-progress inventory account	35 000	
	Inventory of materials control account		35 000
	50 units issued to production		
10 April	Inventory of materials control account	14 400	
	Trade creditors		14 400
	Purchased 20 units at R720 each		
12 April	Work-in-progress inventory account	7 000	
	Inventory of materials control account		7 000
	10 units issued to production		
15 April	Inventory of materials control account	45 000	
	Trade creditors		45 000
	Purchased 60 units at R750 each		

		R	R
17 April	Work-in-progress inventory account	50 900	
	Inventory of materials control account		50 900
	70 units issued to production		

The inventory of materials control account in the general ledger will appear as follows:

Inventory of materials account

		R			R
30 April	Purchases	115 400	30 April	Work-in-progress	92 900
	(Creditors journal)		30 April	Balance c/f	22 500
		115 400			115 400
1 May	Balance b/d	22 500			

Compare the value of closing inventory in the general ledger account with the value of closing inventory in the inventory card; both indicate the value of R22 500.

The principles applied to recording transactions affecting merchandise are identical to the principles applied when recording materials transactions. You will have noticed that the only differences in recording for merchandise and recording for materials are the names of the general ledger accounts and the absence of a cost of sales record when materials are issued to production.

5.3.4 Periodic inventory system (merchandisers) – FIFO

You will recall that with the periodic system, the inventory accounts and cost of sales account are only updated periodically. Because sophisticated computer systems for inventory costing and control are available at reasonable cost, it is unlikely that any manufacturer will use the periodic system of inventory control. Even large retailers, wholesalers and distributors would be unlikely to use the periodic system. However, we discuss it here, as many smaller, independent retailers may employ the system. With the periodic inventory system, the accounting records for inventory are only updated periodically – usually at the end of the financial year. The FIFO method assumes that the items of inventory that were purchased first are also sold first. Let's consider the transactions of Russia in example 5.2 and assume that the periodic inventory system applies.

Example 5.4

Russia had the following transactions for inventory item 1 for the year ended 31 March 2017:

1 April	Sale of 15 units
2 April	Purchase of 8 units at R1 020 each
3 April	Purchase of 12 units at R1 030 each
4 April	Sale of 20 units
5 April	Sale of 6 units
6 April	Purchase of 10 units at R1 050 each
7 April	Purchase of 4 units at R1 080 each
8 April	Sale of 12 units

The opening balance of inventory on 1 April 2017 was 25 units at a value of R1 000 each. For the purposes of this example, assume that 8 April is the end of the financial year. A summary of the inventory transactions (units only) appears below:

Date	Transaction	Number of units
1 April	Opening inventory	25
1 April	Sales	(15)
2 April	Purchases	8
3 April	Purchases	12
4 April	Sales	(20)
5 April	Sales	(6)
6 April	Purchases	10
7 April	Purchases	4
8 April	Sales	(12)
	Closing inventory	6

In terms of the periodic inventory system, purchases of merchandise are debited to the purchases account during the year. Only at the end of the year, after a physical inventory count, the inventory of merchandise control account and the cost of sales account are adjusted and the purchases account closed. After the physical inventory count to establish how many actual units are in the store, the value of these actual units must be determined. This is done by multiplying the actual number of units counted by the cost per unit.

What is the cost per unit that must be applied to the six units in inventory at the end of the year? In terms of FIFO, it is assumed that the cost of inventory purchased first attaches to inventory sold first. With the periodic inventory system, this means that the cost of the six units in inventory at the end of the year will be the most recent (last) costs incurred in the purchasing of inventory. However, what are the most recent costs? Consider the transactions for the year again: the most recent cost was incurred on 7 April when four units were purchased at R1 080 each. However, there are more units in inventory than were purchased on 7 April. We must therefore go to the next most recent cost as well, namely the purchases of 6 April, when 10 units were purchased at R1 050. The four units purchased at the most recent cost plus the 10 units purchased at the next recent cost equals 14 units, which will be sufficient for the valuation of the six units in closing inventory.

We will now calculate the cost of the 6 units on hand as follows:

4 units x R1 080 =	R4 320
2 units x R1 050 =	R2 100
6	R6 420

Therefore, the value of the closing inventory (six units) is R6 420. This value is the same as the one we determined in example 5.2 with the perpetual system. This is because we applied the same rule, namely the assumption that the cost of the items of inventory that were purchased first attached to the items that are sold first. With FIFO, the exact same (most recently in) unit costs are applied to closing inventory under both inventory systems. It is the cost-flow method that we apply, and not the inventory system, that could have a significant effect of the value of inventory. Compare the inventory card for the perpetual system in example 5.2 with the inventory record prepared for the periodic system in this example. You will notice the difference between the two systems: with the perpetual system, the number of units on hand and the value of the units are available every day throughout the year.

Example 5.5

China sells two types of dolls, namely Rainbow and Aurora. The following are the transactions for the year ended 30 June 2017:

		Rainbow (R)	Aurora (R)
1 July 2017	Balance in inventory		
	100 dolls	15 000	
	120 dolls		12 000
31 July	Purchases		
	70 dolls	10 850	
	80 dolls		8 800
31 August	Sales		
	150 dolls	45 000	
	140 dolls		28 000
30 September	Purchases		
	150 dolls	24 000	
	150 dolls		17 250
31 October	Sales		
	120 dolls	36 000	
	130 dolls		26 000
30 November	Purchases		
	110 dolls	19 250	
	110 dolls		14 300
31 December	Sales		
	120 dolls	36 000	
	100 dolls		20 000
31 January	Purchases		
	130 dolls	23 400	
	120 dolls		15 600
28 February	Sales		
	130 dolls	39 000	
	130 dolls		26 000
31 March	Purchases		
	140 dolls	26 600	
	140 dolls		20 300
30 April	Sales		
	100 dolls	30 000	
	120 dolls		24 000
31 May	Purchases		
	100 dolls	20 000	
	120 dolls		18 000
30 June	Sales		
	170 dolls	68 000	
	150 dolls		45 000

Required

1 Prepare the inventory cards for Rainbow and Aurora under a perpetual inventory system, assuming the FIFO method.

2 Prepare the inventory of merchandise control account in the general ledger of China with the perpetual inventory system, applying the FIFO method.

3 Compare the value of closing inventory of China, applying FIFO, under the

3.1 perpetual inventory system

3.2 periodic inventory system

4 Prepare a statement indicating the gross profit of China for the year ended 30 June 2017 under the

4.1 perpetual inventory system

4.2 periodic inventory system

This is a comprehensive example, and we advise you to set aside sufficient time to work through the solution to each section of the question.

Solution

1 Inventory cards for Rainbow and Aurora – **unit costs are determined in working (a)**

Inventory card for Rainbow (perpetual inventory system – FIFO)

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
July 1	Balance				**100**	**150**	**15 000**
July	Purchases	70	155	10 850	**70**	**155**	**10 850**
Aug	Sales	(100)	150	(15 000)			
		(50)	155	(7 750)	**20**	**155**	**3 100**
Sept	Purchases	150	160	24 000	**150**	**160**	**24 000**
Oct	Sales	(20)	155	(3 100)			
		(100)	160	(16 000)	**50**	**160**	**8 000**
Nov	Purchases	110	175	19 250	**110**	**175**	**19 250**
Dec	Sales	(50)	160	(8 000)			
		(70)	175	(12 250)	**40**	**175**	**7 000**
Jan	Purchases	130	180	23 400	**130**	**180**	**23 400**
Feb	Sales	(40)	175	(7 000)			
		(90)	180	(16 200)	**40**	**180**	**7 200**
Mar	Purchases	140	190	26 600	**140**	**190**	**26 600**
Apr	Sales	(40)	180	(7 200)			
		(60)	190	(11 400)	**80**	**190**	**15 200**
May	Purchases	100	200	20 000	**100**	**200**	**20 000**
June	Sales	(80)	190	(15 200)			
		(90)	200	(18 000)	**10**	**200**	**2 000**

Explanation

On 1 July, the balance was 100 units at R150 = R15 000. After purchases in July of 70 units, the balance of 170 units (100 + 70) was made up as follows:

100 units x R150 =	R15 000
70 units x R155 =	R10 850

Costs assigned to the August sales of 150 units were 100 units x R150 and 50 units x R155.

Thus, there were no units left at R150. The balance of units left at R155 was 70 – 50 = 20, as indicated in bold at the end of August. The same applies to the remainder of the entries in the inventory card.

Inventory card for Aurora (perpetual inventory system – FIFO)

		Movement in inventory			Balance in inventory		
Date		Units	Unit cost	Total cost (R)	Units	Unit cost	Total cost (R)
July 1	Balance				**120**	**100**	**12 000**
July	Purchases	80	110	8 800	**80**	**110**	**8 800**
Aug	Sales	(120)	100	(12 000)			
		(20)	110	(2 200)	**60**	**110**	**6 600**
Sept	Purchases	150	115	17 250	**150**	**115**	**17 250**
Oct	Sales	(60)	110	(6 600)			
		(70)	115	(8 050)	**80**	**115**	**9 200**
Nov	Purchases	110	130	14 300	**110**	**130**	**14 300**
Dec	Sales	(80)	115	(9 200)			
		(20)	130	(2 600)	**90**	**130**	**12 100**
Jan	Purchases	120	130	15 600	**120**	**130**	**15 600**
Feb	Sales	(130)	130	(16 900)	**80**	**130**	**10 400**
Mar	Purchases	140	145	20 300	**140**	**145**	**20 300**
Apr	Sales	(80)	130	(10 400)			
		(40)	145	(5 800)	**100**	**145**	**14 500**
May	Purchases	120	150	18 000	**120**	**150**	**18000**
June	Sales	(100)	145	(14 500)			
		(50)	150	(7 500)	**70**	**150**	**10 500**

2 Inventory of merchandise control account: FIFO formula with the perpetual system

Inventory of merchandise control account

		R			**R**
1 July	Balance b/f	27 000	31 Aug	Cost of sales	36 950
31 July	Payables/Bank	19 650	31 Oct	Cost of sales	33 750
30 Sept	Payables/Bank	41 250	31 Dec	Cost of sales	32 050
30 Nov	Payables/Bank	33 550	28 Feb	Cost of sales	40 100
31 Jan	Payables/Bank	39 000	30 Apr	Cost of sales	34 800
31 Mar	Payables/Bank	46 900	30 June	Cost of sales	55 200
31 May	Payables/Bank	38 000		Balance c/f	12 500
		245 350			245 350
1 July	Balance b/f	12 500			
	(see workings d and e)				

3.1 The closing inventory of China with the *perpetual* inventory system, applying the FIFO method was as follows:

10 Rainbow dolls at R200 each	=	2 000
70 Aurora dolls at R150 each	=	10 500
		R12 500

See inventory cards of Rainbow and Aurora.

3.2 The closing inventory of China with the *periodic* inventory system, applying the FIFO method, was R12 500:

10 Rainbow dolls at R200 each	=	2 000
70 Aurora dolls at R150 each	=	10 500
		R12 500

(see working b)

4.1 Gross profit statement of China with the *perpetual* inventory system:

	R	
Sales (**working c**)	423 000	(254 000 + 169 000)
Less: Cost of sales (137 100 + 95 750; **working d**)	232 850	
Gross profit	190 150	

4.2 Gross profit statement of China with the *periodic* inventory system:

	R	
Sales (**working c**)	423 000	(254 000 + 169 000)
Less: Cost of sales	232 850	
Opening inventory	27 000	(15 000 + 12 000)
Plus: Purchases (**working e**)	218 350	
Available for sale	245 350	
Less: Closing inventory (**working b**)	(12 500)	(2 000 + 10 500)
Gross profit	190 150	

Workings

Working a: calculation of unit purchase cost

		Rainbow	Aurora	Rainbow	Aurora	Unit cost calculation
		Total R	Total R	Unit R	Unit R	
1 July 2017	Balance					
	100 dolls	15 000		150		(15 000 / 100
	120 dolls		12 000		100	(12 000 / 120)
31 July	Purchases					
	70 dolls	10 850		155		(10 850 / 70)
	80 dolls		8 800		110	(8 800 / 80)
30 September	Purchases					
	150 dolls	24 000		160		(24 000 / 150)
	150 dolls		17 250		115	(17 250 / 150)
30 November	Purchases					
	110 dolls	19 250		175		(19 250 / 110)
	110 dolls		14 300		130	(14 300 / 110)
31 January	Purchases					
	130 dolls	23 400		180		(23 400 / 130)
	120 dolls		15 600		130	(15 600 / 120)
31 March	Purchases					
	140 dolls	26 600		190		(26 600 / 140)
	140 dolls		20 300		145	(20 300 / 140)
31 May	Purchases					
	100 dolls	20 000		200		(20 000 / 100)
	120 dolls		18 000		150	(18 000 / 120)

Working b: closing value of inventory (periodic inventory)

		Rainbow	Aurora
June	Closing balance	10	70
Unit cost of last purchase in		R200	R150
Last number of units in		100	120

Therefore, sufficient to cover closing inventory.

Closing value of Rainbow = 10 units x R200 = R2 000
Closing value of Aurora = 70 units x R150 = R10 500

Working c: total sales (from information provided in the question)

	Rainbow (R)	Aurora (R)
August	45 000	28 000
October	36 000	26 000
December	36 000	20 000
February	39 000	26 000
April	30 000	24 000
June	68 000	45 000
	254 000	169 000

Working d: total cost of sales (extracts from inventory cards for Rainbow and Aurora)

	Rainbow			Aurora			China
Date	Quantity	Unit cost (R)	Total cost (R)	Quantity	Unit cost (R)	Total cost (R)	Total cost (R)
Aug	(100)	150	(15 000)	(120)	100	(12 000)	
	(50)	155	(7 750)	(20)	110	(2 200)	36 950
Oct	(20)	155	(3 100)	(60)	110	(6 600)	
	(100)	160	(16 000)	(70)	115	(8 050)	33 750
Dec	(50)	160	(8 000)	(80)	115	(9 200)	
	(70)	175	(12 250)	(20)	130	(2 600)	32 050
Feb	(40)	175	(7 000)	(130)	130	(16 900)	
	(90)	180	(16 200)				40 100
Apr	(40)	180	(7 200)	(80)	130	(10 400)	
	(60)	190	(11 400)	(40)	145	(5 800)	34 800
June	(80)	190	(15 200)	(100)	145	(14 500)	
	(90)	200	(18 000)	(50)	150	(7 500)	55 200
			137 100			**95 750**	**232 850**

Working e: total purchases (extracts from inventory cards for Rainbow and Aurora)

	R a i n b o w			A u r o r a			China
Date	Quantity	Unit cost (R)	Total cost (R)	Quantity	Unit cost (R)	Total cost (R)	Total cost (R)
July	70	155	10 850	80	110	8 800	19 650
Sept	150	160	24 000	150	115	17 250	41 250
Nov	110	175	19 250	110	130	14 300	33 550
Jan	130	180	23 400	120	130	15 600	39 000
Mar	140	190	26 600	140	145	20 300	46 900
May	100	200	20 000	120	150	18 000	38 000
			124 100			**94 250**	**218 350**

Activity 5.1

ABC Factory is situated in Isando. The following are the purchases and issues of component zizi, a direct material used in the manufacturing process for June 2017:

Date	Transaction	Units of zizi	Unit cost (R)
1	Opening balance	1 500	1,50
3	Purchases	700	1,60
6	Issued to production	(1 250)	
8	Purchases	1 150	1,60
11	Issued to production	(1 200)	
13	Purchases	1 100	1,75
14	Issued to production	(1 200)	
16	Purchases	1 030	1,80

19	Issued to production	(1 170)	
21	Purchases	1 400	1,90
24	Issued to production	(1 000)	
27	Purchases	1 000	2,00
30	Issued to production	(1 800)	

Required

Applying the FIFO method with the perpetual inventory system:

1 Show the general journals for recording the above transactions.
2 Show the inventory of materials control account in the general ledger.
3 Show the inventory card for component zizi as it will appear in the records of the materials store.

Feedback on activity 5.1

1 General journal entries

		R	R
3 June	Inventory of materials control account	2 250	
	Payables/Bank		2 250
	700 units purchased at R1,60		
6 June	Work-in-progress inventory account	1 875	
	Inventory of materials control account		1 875
	1 250 units issued to production		
8 June	Inventory of materials control account	1 840	
	Payables/Bank		1 840
	1 150 units purchased at R1,60		
11 June	Work-in-progress inventory account	1 895	
	Inventory of materials control account		1 895
	1 200 units issued to production		
13 June	Inventory of materials control account	1 925	
	Payables/Bank		1 925
	1 100 units purchased at R1,75		

		R	R
14 June	Work-in-progress inventory account	1 965	
	Inventory of materials control account		1 965
	1 200 units issued to production		
16 June	Inventory of materials control account	1 854	

	Payables/Bank		1 854
	1 030 units purchased at R1,80		
19 June	Work-in-progress inventory account	2 066	
	Inventory of materials control account		2 066
	1 170 units issued to production		
21 June	Inventory of materials control account	2 660	
	Payables/Bank		2 660
	1 400 units purchased at R1,90		
24 June	Work-in-progress inventory account	1 834	
	Inventory of materials control account		1 834
	1 000 units issued to production		
27 June	Inventory of materials control account	2 000	
	Payables/Bank		2 000
	1 000 units purchased at R2,00		
30 June	Work-in-progress inventory account	3 494	
	Inventory of materials control account		3 494
	1 800 units issued to production		

2 Inventory of materials control account

		R			R
1 Jun	Balance b/f	2 250	30 Jun	Work-in-progress	13 129
30 Jun	Trade payables/Bank	11 399	30 Jun	Balance c/f	520
		13 649			13 649
1 Jul	Balance b/f	520			

3 Inventory card for component zizi

		Movement in inventory			Balance in inventory		
Date June		Units	Unit cost (R)	Total cost (R)	Units	Unit cost (R)	Total cost (R)
1	Balance				1 500	1,50	2 250
3	Purchases	700	1,60	1 120			
	Balance				**1 500**	**1,50**	**2 250**
					700	**1,60**	**1 120**
6	Issued to production	(1 250)	1,50	(1 875)			
	Balance				**250**	**1,50**	**375**
					700	**1,60**	**1 120**
8	Purchases	1 150	1,60	1 840			
	Balance				**250**	**1,50**	**375**
					*** 1 850**	**1,60**	**2 960**
11	Issued to production	(250)	1,50	(375)			

		(950)	1,60	(1 520)			
					900	**1,60**	**1 440**
13	Purchases	1 100	1,75	1 925			
	Balance				**900**	**1,60**	**1 440**
					1 100	**1,75**	**1 925**
14	Issued to production	(900)	1,60	(1 440)			
		(300)	1,75	(525)			
	Balance				**800**	**1,75**	**1 400**
16	Purchases	1 030	1,80	1 854			
	Balance				**800**	**1,75**	**1 400**
					1 030	**1,80**	**1 854**
19	Issued to production	(800)	1,75	(1 400)			
		(370)	1,80	(666)			
	Balance				**660**	**1,80**	**1 188**
21	Purchases	1 400	1,90	2 660			
	Balance				**660**	**1,80**	**1 188**
					1 400	**1,90**	**2 660**
24	Issued to production	(660)	1,80	(1 188)			
		(340)	1,90	(646)			
	Balance				**1 060**	**1,90**	**2 014**
27	Purchases	1 000	2,00	2 000			
	Balance				**1 060**	**1,90**	**2 014**
					1 000	**2,00**	**2 000**
30	Issued to production	(1 060)	1,90	(2 014)			
		(740)	2,00	(1 480)			
	Balance				**260**	**2,00**	**520**

*700 + 1 150 = 1 850 units, all at R1,60 each.

5.4 WEIGHTED AVERAGE METHOD

IAS 2.27 states that *under the weighted average method, the cost of each item is determined from the weighted average of the cost of similar items at the beginning of a period and the cost of similar items purchased or produced during the period.*

The weighted average method therefore requires the unit cost of inventory to be adjusted after every purchase of inventory to reflect an average cost per unit.

5.4.1 Perpetual inventory system with the weighted average method

In this section, we will first look at the inventory of merchandisers and then at the inventory of manufacturers in the application of the weighted average method with the perpetual inventory system.

With the perpetual system, the accounting records for inventory are updated continuously (perpetually) every time inventory is received or issued. The value of inventory on hand is therefore available at any point in time.

5.4.2 Inventory of merchandise – weighted average method

With the perpetual system, the inventory of merchandise control account is updated and the cost of the goods sold is recorded in the cost of sales account every time that a sale occurs.

Example 5.6

We will use the same information as in example 5.1. Brazil sells one type of doll. All dolls are identical. The following purchases were made during April:

1 April	Doll A	R200
3 April	Doll B	R210
4 April	Doll C	R220
6 April	Doll D	R230
		R860

On 7 April, Brazil sells its first doll for R400 and gives doll C to the customer.

If Brazil adopts the weighted average method with the perpetual inventory system, then the inventory card for dolls will be as follows:

Inventory card for dolls

		Movement in inventory			Balance in inventory		
Date April		Quantity	Unit cost (R)	Total cost (R)	Units	Unit cost	Total cost (R)
1	Purchases	1	200	200	1	200	200
3	Purchases	1	210	210	1	210	210
		R410 / 2 = R205			**2**	**205**	**410**
4	Purchases	1	220	220	1	220	220
		R630 / 3 = R210			**3**	**210**	**630**
6	Purchases	1	230	230	1	230	230
		R860 / 4 = R215			**4**	**215**	**860**
7	Sales	(1)	215	(215)	(1)	215	(215)
					3	**215**	**645**

Under the weighted average method, an average cost per unit is calculated after every purchase of inventory. The inventory of dolls on 6 April would be four dolls at R215 each = R860 in total. When doll C is sold, the weighted average method *assumes* that the cost attached to doll C is R215, even though in reality it was R220.

You will recall that when we applied the FIFO method in example 5.1, we assigned a cost of R200 to doll C. We mentioned earlier in the learning unit that the cost-flow decision is an important one, because it will influence the value of closing inventory as well as the profit of the company. Consider the different results when we apply the two cost-flow methods:

	FIFO method (example 5.1)	Weighted average method (example 5.6)
	R	R
Sales	400	400
Cost of sales	200	215
Gross profit	200	185
Value of closing inventory	660	645

The gross profit under the weighted average method is lower than the gross profit under the FIFO method, and the value of closing inventory is lower under the weighted average method

than under the FIFO method. This will usually be the case and is the result of inflation. Under FIFO, the first (therefore lower) costs are expensed as cost of sales first. The weighted average unit cost is a mix of earlier (lower) costs with later (higher) costs. Therefore, costs expensed as cost of sales will be higher under the weighted average method than under the FIFO method.

Example 5.7

We will now use the information in example 5.2 and prepare the inventory card under the weighted average method. We round all calculations to the nearest R1. Note the alternative method used to prepare this inventory card compared to the inventory card in example 5.6. Every time a purchase occurs, a new weighted average cost per unit is calculated.

Inventory card for item 1

		Calculation of unit cost	Balance in inventory		
Date April			Units	Unit cost	Total cost (R)
1	Balance		25	1 000	25 000
1	Sales		(15)	1 000	(15 000)
	Balance		**10**	**1 000**	**10 000**
2	Purchases		8	1 020	8 160
	Balance	R18 160 / 18 = R1 008,889	**18**	**1 009**	**18 160**

On 1 April, there were 10 units left in inventory at R1 000 each, therefore
(10 x 1 000) R10 000
On 2 April, eight units were purchased at R1 020, therefore
(8 x R1 020) R8 160
We now have 18 (10 + 8) units in inventory at a total cost of R18 160

Therefore, the new unit cost is R18 160 / 18 = R1 008,888888.
However, we round off to the nearest R1, therefore R1 009.

	Balance	R18 160 / 18 = R1 008,889	**18**	**1 009**	**18 160**
3	Purchases		12	1 030	12 360
	Balance	R30 520 / 30 = R1 017,333	**30**	**1 017**	**30 520**
4	Sales		(20)	1 017	(20 340)
	Balance		**10**	**1 017**	**10 180**
5	Sales		(6)	1 017	(6 102)
	Balance		**4**	**1 017**	**4 078**
6	Purchases		10	1 050	10 500
	Balance	R14 568 / 14 = R1 041,286	**14**	**1 041**	**14 578**
7	Purchases		4	1 080	4 320
	Balance	R18 888 / 18 = R1 049,889	**18**	**1 050**	**18 898**
8	Sales		(12)	1 050	(12 600)
	Balance		**6**	**1 050**	**6 298**

Note that the running total in the last column reflects a balance of R6 298. However, if you work across the last three columns, you will see that 6 units x R1 050 = R6 300. This difference of R2

is the result of rounding the calculations of unit costs to the nearest R1. Don't be concerned about these small differences. If there is any difference at the end of the year when a physical inventory count is carried out, the total will be adjusted to reflect a closing balance of 6 units x R1 050 = R6 300.

We calculate the unit costs in the above example as follows:

R18 160 / 18 = 1 008,888 = R1 009 → here we say we rounded up to the nearest rand

R30 520 / 30 = 1 017,333 = R1 017 → here we say we rounded down to the nearest rand

R14 568 / 14 = 1 041,285 = R1 041 → here we say we rounded down to the nearest rand

R18 898 / 18 = 1 049,888 = R1 050 → here we say we rounded up to the nearest rand

The rule is that when the decimal is 0,5 or more, we round up (e.g. in R1 008,888, the decimal "(0),888" is more than 0,5, so we round up to R1 009). If the decimal is below 0,5, we round down (e.g. in R1 017,333, the decimal of "(0),333" is less than 0,5, so we ignore the decimals and round down to R1 017.

5.4.3 Inventory of materials – weighted average method

We will now consider the recording of direct materials transactions with the perpetual inventory system when applying the weighted average method.

Example 5.8

We apply the same principles for recording direct materials that we applied for recording merchandise. For illustration purposes, we will use the same information as in example 5.3 but assume that the weighted average method is applied.

Materials purchased during the month

Date	Quantity	Unit cost (R)	Total cost (R)
1 April	80	700	56 000
10 April	20	720	14 400
15 April	60	750	45 000

Materials transferred to production during the month

Date	Quantity
1 April	50
12 April	10
17 April	70

On 1 April, 80 units are purchased and 50 of these are put into production. At this stage, there is only one unit price at stake, and the weighted average cost per unit is R700. Therefore, at the end of 1 April, there are 30 units in inventory at a unit cost of R700 (i.e. the total cost of inventory was R21 000).

On 10 April, a further 20 units are purchased at a different unit price. The weighted average cost per unit on 10 April is R708, which we calculate as follows:

30 units at R700 per unit	=	R21 000
20 units at R720 per unit	=	R14 400
Total cost of 50 (30 + 20) units	=	R35 400

Weighted average cost per unit is R35 400 / 50 = R708 per unit.

The 10 units issued on 12 April is issued at a unit cost of R708, leaving 40 units at a unit cost of R708. The weighted average unit cost will change when the next purchase is made on 15 April.

Inventory on 15 April will be as follows:

40 units at a weighted average unit cost of R708	=	R28 320
Purchases of 60 units at R750 each	=	R45 000
Total cost of 100 (40 + 60) units		R73 320

Weighted average cost per unit is R73 320 / 100 = R733,20.

The new weighted average unit cost is R733,20, and the next issue to production will be made at a unit cost of R733,20. The above is summarised as follows:

Inventory card for wood lengths

		Calculation of unit cost	Balance in inventory		
Date April			Units	Unit cost	Total cost (R)
1	Purchases		80	700	56 000
1	Issued to production		(50)	700	(35 000)
	Balance		**30**	**700**	**21 000**
10	Purchases		20	720	14 400
	Balance	35 400 / 50 = 708	**50**	**708**	**35 400**
12	Issued to production		(10)	708	(7 080)
	Balance		**40**	**708**	**28 320**
15	Purchases		60	750	45 000
	Balance	73 320 / 100 = 733,20	**100**	**733,20**	**73 320**
17	Issued to production		(70)	733,20	(51 324)
	Balance		**30**	**733,20**	**21 996**

In example 5.3 where we applied the FIFO method, the value of the final closing inventory was R22 500, which is higher than in this example where we applied the weighted average method to the same information. This is because under FIFO, cheaper units (those that were purchased earlier) are assumed to move out of inventory first, leaving the more expensive costs with inventory on hand. Under the weighted average method, the unit cost is smoothed out so that the cost of each unit on hand is made up of an average of the cheaper and more expensive units.

5.4.4 Periodic inventory system (retailers) – weighted average method

With the periodic inventory system, the accounting records for inventory are updated only periodically – usually at the end of the financial year. The weighted average method requires that the unit cost of inventory is adjusted after every purchase of inventory to reflect average cost per unit.

Let's consider the transactions of Russia in example 5.2 and assume that the periodic inventory system applies.

Example 5.9

The transactions for inventory item 1 for the year ended 31 March 2017 are as follows:

1 April	Sale of 15 units
2 April	Purchase of 8 units at R1 020 each
3 April	Purchase of 12 units at R1 030 each
4 April	Sale of 20 units
5 April	Sale of 6 units
6 April	Purchase of 10 units at R1 050 each
7 April	Purchase of 4 units at R1 080 each
8 April	Sale of 12 units

The opening balance of inventory on 1 April 2016 was 25 units at a value of R1 000 each. Assume that 8 April is the end of the financial year.

Inventory item 1: periodic system and weighted average method

Date April	Transaction	Number of units purchased	Number of units sold	Unit cost (R)	Total cost (R)
1	Opening inventory	25		1 000	25 000
1	Sales		(15)		
2	Purchases	8		1 020	8 160
3	Purchases	12		1 030	12 360
4	Sales		(20)		
5	Sales		(6)		
6	Purchases	10		1 050	10 500
7	Purchases	4		1 080	4 320
8	Sales		(12)		
	Totals in at weighted average 60 340 / 59 = 1 023	59		1 023	60 340
	Total out	(53)	(53)		
	Closing inventory	**6**		**1 023**	**6 138**

The weighted average unit cost is R60 340 / 59 = R1 022,711, rounded up to R1 023. The amount that will be recorded as closing inventory at the end of the year will be the number of units counted as physically being in inventory x R1 023 = 6 x R1 023 = R6 138. The cost of sales and gross profit for the year will be determined as follows:

	R
Sale of 53 units x R1 500 (see example 5.2)	79 500
Cost of sales	54 202
Opening inventory	25 000
Plus: Purchases (8 160 + 12 360 + 10 500 + 4 320)	35 340
Available for sale	60 340
Closing inventory	(6 138)
Gross profit	25 298

Referring back to example 5.4 (periodic system; FIFO), you will note that once again the value of closing inventory when applying the FIFO method (R6 420) was higher than when applying the weighted average method (R6 138).

We can now summarise the application of the two inventory systems, applying the two cost-flow methods, as follows:

	Inventory system	Cost-flow method	Closing inventory
Example 5.2	Perpetual	FIFO	R6 420
Example 5.7	Perpetual	Weighted average	R6 300
Example 5.4	Periodic	FIFO	R6 420
Example 5.9	Periodic	Weighted average	R6 138

In examples 5.2 and 5.4, where we used the FIFO method, we applied the same unit costs to sold units for both inventory systems. Therefore, the value of closing inventory is the same for both systems. In examples 5.6 and 5.8, where we used the weighted average method, the values of closing inventory differ by R162. This is because with the perpetual system, we continuously determined and applied a different average unit cost, while with the periodic system, we calculated a single unit cost based on the year's transactions and applied it to closing inventory only. With the perpetual system, the average unit cost applied to sales was (15 000 + 20 340 + 6 102 + 12 600) ÷ 53 units sold = R1 020, while the average cost applied to sales with the periodic system was R1 023. If we multiply this difference of R3 (R1023 – R1020) per unit by the 53 units sold, we get R159. The remaining difference of R3 is the result of rounding.

Activity 5.2

Distinguish between inventory systems and inventory cost-flow assumptions.

Feedback on activity 5.2

Both inventory systems and cost flow assumptions are elements of a cost accounting system. An inventory system determines the *currency of the information* contained in the inventory accounts, in other words, whether inventory and accounting records are updated perpetually (with the perpetual system) or only periodically (with the periodic system). A cost-flow assumption determines when *inventory costs flow* through the inventory accounts to cost of sales.

Activity 5.3

PQR Retail Company sells a single product, Soca. The following represents the purchases and sales transactions of the company for December 2017.

		R per unit
5 December	Sold 15 units	2 500
6 December	Purchased 10 units	1 000
7 December	Purchased 5 units	900
8 December	Sold 12 units	2 500
10 December	Purchased 7 units	1 010
12 December	Sold 6 units	2 500
15 December	Sold 4 units	2 500
17 December	Purchased 25 units	1 015
20 December	Purchased 25 units	1 050
21 December	Purchased 20 units	1 100
22 December	Sold 20 units	3 000
23 December	Sold 10 units	3 000
24 December	Sold 15 units	3 000
31 December	Sold 10 units	2 000

On 1 December 2017, there were 20 units of Soca on hand at a total cost of R19 000.

Required

Applying the weighted average method, calculate the value of the closing inventory of Soca at 31 December 2017 under the

1 perpetual inventory system
2 periodic inventory system

Prepare a statement indicating the gross profit of Soca for the year ended 31 December 2017 under the

3 perpetual inventory system
4 periodic inventory system

Feedback on activity 5.3

1 The value of closing inventory with the perpetual inventory system when applying the weighted average method is R20 946 (working a).
2 The value of closing inventory with the periodic inventory system when applying the weighted average method is R20 392 (working c).
3 Statement indicating gross profit for December 2017 with the perpetual inventory system when applying the weighted average method:

	R
Sales (working b)	247 500
Less: Cost of sales (working b)	(93 249)
Gross profit	154 251

4 Statement indicating gross profit for December 2017 with the periodic inventory system when applying the weighted average method:

	R
Sales (working b)	247 500
Less: Cost of sales	(93 803)
Opening inventory (given in question)	19 000
Plus: Purchases (working a)	95 195
Available for sale	114 195
Less: Closing inventory (working c)	(20 392)
Gross profit	153 697

Workings

Working a: closing inventory for the weighted average method and the perpetual system

		Calculation of unit cost	Balance in inventory		
April			Units	Unit cost	Total cost (R)
1	Balance		20	950,00	19 000
5	Sales		(15)	950,00	(14 250)
	Balance		**5**	**950,00**	**4 750**
6	Purchases		10	1 000,00	10 000
	Balance	(14 750 / 15 = 983,3333)	**15**	**983,33**	**14 750**
7	Purchases		5	900,00	4 500
	Balance	(19 250 / 20 = 962,50)	**20**	**962,50**	**19 250**
8	Sales		(12)	962,50	(11 550)
	Balance		**8**	**962,50**	**7 700**
10	Purchases		7	1 010,00	7 070
	Balance	(14 770 / 15 = 984,66667)	**15**	**984,67**	**14 770**
12	Sales		(6)	984,67	(5 908)
	Balance		9	984,67	8 862
15	Sales		(4)	984,67	(3 939)
	Balance		**5**	**984,67**	**4 923**
17	Purchases		25	1 015	25 375
	Balance	(30 298 / 30 = 1 009,933333)	**30**	**1 009,93**	**30 298**
20	Purchases		25	1 050	26 250
	Balance	(56 548 / 55 = 1 028,145455)	**55**	**1 028,15**	**56 548**
21	Purchases		20	1 100	22 000
	Balance	(78 548 / 75 = 1 047,306667)	**75**	**1 047,31**	**78 548**
22	Sales		(20)	1 047,31	(20 946)
	Balance		**55**	**1 047,31**	**57 602**
23	Sales		(10)	1 047,31	(10 473)
	Balance		**45**	**1 047,31**	**47 129**
24	Sales		(15)	1 047,31	(15 710)
	Balance		**30**	**1 047,31**	**31 419**
31	Sales		(10)	1 047,31	(10 473)
	Balance		**20**	**1 047,31**	**20 946**

Total purchases: 10 000 + 4 500 + 7 070 + 25 375 + 26 250 + 22 000 = 95 195

Working b

	Sales			Cost of sales		
Date	Units	R per unit [1]	Total (R)	Units	R per unit [2]	Total (R)
5	15	2 500	37 500	15	950,00	14 250
8	12	2 500	30 000	12	962,50	11 550
12	6	2 500	15 000	6	984,67	5 908
15	4	2 500	10 000	4	984,67	3 939
22	20	3 000	60 000	20	1 047,31	20 946
23	10	3 000	30 000	10	1 047,31	10 473
24	15	3 000	45 000	15	1 047,31	15 710
31	10	2 000	20 000	10	1 047,31	10 473
			247 500			**93 249**

[1] Information provided in question; [2] From working a

Working c: closing inventory for the weighted average method and the periodic system

April	Transaction	Number of units purchased	Number of units sold	Unit cost (R)	Total cost (R)
1	Opening inventory	20		950,00	19 000
5	Sales		15		
6	Purchases	10		1 000,00	10 000
7	Purchases	5		900,00	4 500
8	Sales		12		
10	Sales	7		1 010,00	7 070
12	Purchases		6		
15	Purchases		4		
17	Sales	25		1 015,00	25 375
20	Purchases	25		1 050,00	26 250
21	Purchases	20		1 100,00	22 000
22	Sales		20		
23	Sales		10		
24	Sales		15		
31	Sales		10		
	R114 195 / 112 = R1 019,60	112		1 019,60	114 195
	Total units sold	(92)	92		
	Closing inventory	**20**		**1 019,60**	**20 392**

---oOo---

The names used in the examples in this learning unit are those of South Africa's partners in BRICS (**B**razil, **R**ussia, **I**ndia, **C**hina – and **S**outh Africa). The association of these five major emerging economies is named after the acronym for the names of the countries.

5.5 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Consider the following statements carefully and indicate whether they are *true (t)* or *false (f)*:

1.1 The periodic inventory system of inventory provides up-to-date information about the value of inventory at any given time.

1.2 The physical movement of inventory must be consistent with the cost-flow method used.

1.3 When the FIFO method is applied, the cost of goods sold would be the same whether a perpetual or periodic system is used.

1.4 The value of closing inventory will always be the same, regardless of the cost-flow assumption adopted.

1.5 The value of closing inventory applying the FIFO method more closely approximates current cost than the weighted average method.

1.6 The cost of sales reported for the year will be lower if the FIFO method is applied than if the weighted average method is applied.

1.7 When prices are rising, the weighted average method will give a higher value for closing inventory than the FIFO method.

1.8 If the FIFO method is applied and the cost of a component of direct material changes frequently, the value of closing inventory will be the same according to the perpetual inventory system and the periodic inventory system.

1.9 If the FIFO method is applied, the oldest costs of inventory purchases rarely have an effect on the value of closing inventory at the end of the year.

1.10 Most manufacturing organisations would use the periodic inventory system because the information it provides is superior to the information obtained from a perpetual inventory system.

QUESTION 2

This question consists of eight multiple-choice questions. Carefully read through the information provided and select only the most correct option as your answer.

2.1 You work in the accounting department of KLM Company. The company's financial year ends on 31 December 2017. The company uses a periodic inventory system. On 30 June 2017, the accountant asks you to prepare interim financial statements for the six months ended 30 June 2017. What represents the value of inventory on 1 January 2017?

(a) the opening balance of the cost of sales account in the general ledger
(b) the closing balance of the cost of sales account in the general ledger
(c) the opening balance of the inventory of merchandise account
(d) the opening balance of the purchases account

2.2 The following balances appear in the trial balance of A Company on the last day of the financial year:

Consumables	R 6 000
Materials	33 000
Work-in-progress	11 000
Finished goods	90 000
Prepaid factory rent	9 000

Which amount will be reported as inventory in he statement of financial position?

(a) R90 000
(b) R134 000
(c) R140 000
(d) R149 000

2.3 In establishing the value of closing inventory of merchandise for disclosure in the financial statements, all of the following information will be required, *except for* … .

(a) the purchase costs of the inventory
(b) the number of physical units on hand on the last day of the financial year
(c) the cost-flow assumption to be adopted
(d) whether a periodic or perpetual inventory system is used for recording inventory

The information below pertains to questions 2.4 and 2.5.

The following information was taken from the inventory records of G Company for August 2017:

	Units	Unit cost (R)	Total cost (R)
Balance of inventory on 1 August	6 000	20	120 000
First purchases	7 000	23	161 000
Second purchases	2 000	26	52 000
Sales	(4 000)		
Sales	(8 000)		
Balance of inventory on 31 August	3 000		

2.4 Rounded to the nearest R1 000, what is the value of closing inventory if G Company uses the periodic inventory system and the weighted average method?

(a) R52 000
(b) R67 000
(c) R69 000
(d) R78 000

2.5 Assuming that G Company uses a perpetual inventory system, what is the value of closing inventory if the company applies the FIFO method?

(a) R75 000
(b) R67 000
(c) R69 000
(d) R78 000

The information below pertains to questions 2.6 and 2.7.

H Company sells a luxury chocolate bar. The following information was taken from the company's records for November 2017:

	Units	Unit cost (R)	Total cost (R)
Balance of inventory on 1 November	200	10	2 000
First purchases	700	12	8 400
Second purchases	150	15	2 250
Balance of inventory on 30 November	260		

2.6 Assume that H Company uses the weighted average method and a periodic inventory system. What would the value of closing inventory be?

(a) R2 984
(b) R3 012
(c) R3 049
(d) R3 132

2.7 Assume that H Company uses the FIFO method and a perpetual inventory system. What would cost of sales for the month be?

(a) R9 080
(b) R9 140
(c) R9 160
(d) R9 200

2.8 At the beginning of February, the inventory of Undlunkulu Limited was R150 000. Purchases during the month cost R600 000. Undlunkulu also paid freight on purchases of R10 000 as well as on sales of R6 000. The value of inventory at the end of February was R160 000. What was the cost of sales for February?

(a) R600 000
(b) R590 000
(c) R606 000
(d) R600 000

QUESTION 3

C Company uses a periodic inventory system. The following information relates to the year ended 30 September 2017:

Sales	R1 960 000
Opening inventory of merchandise	R200 000
Closing inventory of merchandise	R250 000

A mark-up of 12% on cost is applied consistently to establish the selling price.

3.1 What was the amount for purchases for the year?

3.2 What is the gross profit for the year?

QUESTION 4

AM Company had 500 units of chocolates in inventory that had cost R5 each. It purchased a further 300 chocolates and paid R2 400. It then sold 600 chocolates for R10 each and made a gross profit of R2 700. What is the cost-flow assumption (method) that AM Company adopted? Support your answer with appropriate calculations.

---oOo---

5.6 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 F The *perpetual system* provides up-to-date information about the value of inventory at any given time.
1.2 F The cost-flow method applied is based on a *cost-flow assumption* only.
1.3 T
1.4 F The cost-flow method applied will affect the value of closing inventory and the profit.
1.5 T This is because older, cheaper costs flow out of inventory first.
1.6 T
1.7 F The weighted average is an average of older, cheaper prices and later higher prices. FIFO assigns the latest (higher) prices to closing inventory.
1.8 T
1.9 T
1.10 F Costs are assigned to production throughout the year; therefore, the perpetual system is more suited to manufacturing organisations.

QUESTION 2

2.1 (c) With the periodic system, the inventory account is adjusted at year-end only. The inventory account would have been updated for the last time on 31 December 2016, and the closing balance on 31 December 2016 will be same as the opening balance on 1 January 2017.
2.2 (c) = 6 000 + 33 000 + 11 000 + 90 000
2.3 (d)
2.4 (b)
2.5 (a)
2.6 (d)
2.7 (a)
2.8 (d) = 150 000 + 600 000 + 10 000 – 160 000

2.4	Units	Unit cost (R)	Total cost (R)
Balance of inventory on 1 August	6 000	20	120 000
First purchases	7 000	23	161 000
Second purchases	2 000	26	52 000
Weighted average (333 000 / 15 000)	**15 000**	**22,2**	**333 000**
Sales	(4 000)		
Sales	(8 000)		
Balance of inventory on 31 August	**3 000**	**22,2**	**66 600**
Rounded to nearest R1 000			**67 000**

2.5 Last (most recent) purchase	2 000	26	52 000
Next most recent	1 000	23	23 000
Closing inventory FIFO	3 000		75 000

2.6	Units	Unit cost (R)	Total cost (R)
Balance of inventory on 1 November	200	10	2 000
First purchases	700	12	8 400
Second purchases	150	15	2 250
Weighted average 12 650 / 1 050	1 050	12,04	*12 650
Sales	(790)		
Balance of inventory on 30 November	260	12,04	**3 132**

2.7	Units	Unit cost (R)	Total cost (R)
Most recent cost	150	15	2 250
Next recent cost	110	12	1 320
Closing inventory under FIFO	260		(3 570)
Opening inventory + purchases			*12 650
Cost of sales			**9 080**

QUESTION 3

3.1 R1 800 000
3.2 R210 000

To answer question 3.1, you can use the same format you used for determining cost of sales and fill in the figures that are known, or you can calculate the answer from the information supplied in the question:

	R	Workings
Opening inventory (given)	200 000	
Plus: **Purchases**		
Equals: Available for sale		
Minus: Closing inventory (given)	250 000	
Equals: Cost of sales	1 750 000	= 1 960 000 / 112 x 100

Working back, we can determine the amount available for sale (1 750 000 + 250 000) and fill that in:

	R	Workings
Opening inventory (given)	200 000	
Plus: **Purchases**		
Equals: Available for sale	2 000 000	= 1 750 000 + 250 000
Minus: Closing inventory (given)	250 000	
Equals: Cost of sales	1 750 000	= 1 960 000 / 112 x 100

We can now determine the purchases as being (2 000 000 – 200 000) and fill that in:

	R	Workings
Opening inventory (given)	200 000	
Plus: **Purchases**	**1 800 000**	= 2 000 000 – 200 000
Equals: Available for sale	2 000 000	= 1 750 000 + 250 000
Minus:– Closing inventory (given)	250 000	
Equals: Cost of sales	1 750 000	= 1 960 000 / 112 x 100
Sales (given)	1 960 000	
Less: Cost of sales	1 750 000	= 1 960 000 / 112 x 100
Gross profit	**210 000**	

QUESTION 4

AM Company applies the FIFO method.

Workings

In order to answer the question, you have to calculate the unit cost of closing inventory. We do this by first calculating the cost of sales based on the information we have:

Working 1		Units	R per unit	Total R
Sales	(given)	600	10	6 000
* *Cost of sales*	*(6 000 – 2 700)*			*3 300*
Gross profit	(given)			2 700

From the information provided in the question, we know that the value of opening inventory is R5 per unit. Therefore, the total value of opening inventory is 500 x R5 = R2 500

The question also provides information of purchases: 300 units x R8 = R2 400

Value of 500 + 300 = 800 chocolates available for sale R4 900

* Cost of 600 chocolates sold (from working 1) (R3 300)

Therefore, value of 500 + 300 – 600 = 200 chocolates in closing inventory R1 600

Therefore, the unit cost of closing inventory is R8 (R1 600 / 200), which is the same unit cost as the most recent purchase, which indicates that first costs in flow out first.

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LEARNING UNIT 6: PAYROLL ACCOUNTING

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- define the terms and concepts relating to payroll costs
- record the accounting entries for labour costs

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- determine net remuneration, including overtime and normal deductions
- differentiate between direct and indirect labour
- record all accounting entries in respect of remuneration

OVERVIEW

This learning unit is divided into the following sections:

6.1 Introduction
6.2 Terms and concepts
6.3 Labour cost control
6.4 Payroll preparation
6.5 Accounting entries for labour costs
6.6 Accounting for bonuses and leave
6.7 Labour recovery rate

6.1 INTRODUCTION

In learning unit 1, we identified one of the differences between the financial and management accounting systems as the users of the information prepared by these systems. We mentioned that external users refer to people not on the payroll of the company, while internal users refer to those people on the payroll of the company. However, what does payroll mean?

The payroll of an organisation (the employer) consists of a list of all the people (the employees) who work for the employer and receive money (remuneration) from the employer for their work (labour). The payroll shows the total amount due to each employee for their labour during the preceding week, month or another period. Generally, the payroll function is the responsibility of the financial accountant. The total amount due to each employee will be the total remuneration that the employee is entitled to in terms of their contract of employment with the employer, minus any legal deductions from the remuneration.

Several pieces of legislation regulate employment and the employer/employee relationship in South Africa, amongst others, the Basic Conditions of Employment Act of 1997, as amended, the Labour Relations Act of 1995, as amended, the Unemployment Insurance Act of 2001 and the Income Tax Act of 1962, as amended.

Note that in the preceding paragraph, we mention the name of an act, a date and the words "as amended". The date indicates when the act was promulgated (or came into effect), and "as amended" means that since promulgation, the act has been changed by one or more amendment acts.

6.2 TERMS AND CONCEPTS

Income Tax Act

For the purposes of this learning unit, we will look at the Income Tax Act for the definitions of terms. Below are extracts from the Fourth Schedule of the Income Tax Act. Paragraph 1 of the Fourth Schedule contains the following definitions:

*"**employee**" means … any person … who receives any remuneration … from an employer*

*"**employer"** means any person … who pays … to any (employee) any amount by way of remuneration*

*"**remuneration**" means any amount … which is paid … to any (employee) by way of any salary, … wage, overtime pay, bonus, …*

*"**employees' tax**" means the tax required to be deducted … by an employer … from remuneration paid … to an employee*

Although the definition of *employer* above refers to a *person*, that person is not necessarily a human being. Employers are mostly companies, government departments, etc. In your Commercial Law module, you will learn about natural persons (human beings) and legal persons (e.g. companies).

Paragraph 2(1)(a) further states that employers "shall pay the amount … deducted" in respect of employees' tax "to the Commissioner within seven days after the end of the month during which

the (tax) was deducted". This tax is called as PAYE (**p**ay **a**s **y**ou **e**arn). Section 1 of the Act defines the Commissioner as the Commissioner for SARS.

Note that the Act is divided into *sections*, while the Schedules to the Act are divided into *paragraphs*. All sections and paragraphs are numbered.

The definition of remuneration in the Fourth Schedule contains many more elements than those mentioned in the above extract. However, only those quoted above are relevant for the purposes of this learning unit.

We refer to a person's salary or wage as the person's *pay;* details of the *pay* appear on a *payslip*, and employees receive their *pay* on *pay day*. The distinction between salaries and wages lies in the basis on which the gross salary or gross wage is calculated.

Unemployment Insurance Act

The purpose of the Unemployment Insurance Act, as stated in section 2 of the Act, is to establish an unemployment insurance fund "from which employees who become unemployed or their beneficiaries, as the case may be, are entitled to benefits and in so doing to alleviate the harmful economic and social effects of unemployment". The Unemployment Insurance Fund is abbreviated UIF.

6.3 LABOUR COST CONTROL

The aim of all the business processes in a company is to achieve the goals of the company. Therefore, the employment and remuneration processes will also aim to achieve the goals of the organisation as efficiently, effectively and economically as possible. Labour cost makes up a significant portion of the company's total costs, and in a manufacturing company, labour cost will thus constitute a significant portion of the cost of finished goods.

You will recall that the financial statements of a company must be prepared in compliance with the requirements of IFRS. The rules for the measurement of the cost of inventory are prescribed in IAS 2. In learning unit 4, we looked at the requirements for establishing the cost of purchased inventories in terms of IAS 2. However, IAS 2 also deals with the cost of manufactured inventory. Let's now look at IAS 2.10 and IAS 2.12:

IAS 2.10: *The cost of inventories shall comprise all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition.*

IAS 2.12: *The costs of conversion of inventories include costs directly related to the units of production, such as direct labour. They also include a systematic allocation of fixed and variable production overheads that are incurred in converting materials into finished goods.*

It is very important for a company to ensure that labour cost does not escalate out of control because of, amongst others, the inefficiency of employees and supervisors as well as unusual occurrences of idle time and overtime. Certain procedures are vital to ensure the validity, accuracy and completeness of the labour costs of the company. These procedures include the following:

- keeping an accurate record – per job, process or department[1] – of the hours worked (or units produced)[2] by each employee
- analysing these records (e.g. time sheets) to determine where the cost of the labour must be charged

- allocating payroll cost to appropriate jobs, processes or production departments
- preparing the payroll and paying employees and third parties[3]

[1] depending on whether a job or process costing system is in place

[2] depending on the wage system in place (See section 6.4.)

[3] Third parties are those entities to whom the amounts legally deducted from salaries and wages must be paid (e.g. PAYE deductions must be paid to SARS).

Several functions in the organisation play a role in the control of labour cost, amongst others, human resources, time keeping, payroll and cost accounting. In the discussion that follows, we focus on a manufacturing company.

6.3.1 Human resources department

All organisations must ensure that they employ the right number of people with the right skills to meet the goals of the organisation. After employment, the employees must receive continuous training and development to ensure maximum labour performance and labour stability. Planning for labour occurs in conjunction with the human resources department of the company.

The human resources department has a staff function relationship with the other departments in the company, such as the accounting department and the production department. That means that the human resources department will advise and assist other departments in respect of the employment, remuneration, training and workplace safety of employees as well as on matters of labour relations. The human resources department will also monitor labour stability in the organisation.

Labour stability refers to the company's ability to retain its employees. The period that employees remain with the company is of great importance to the company. Any new employee, regardless of how qualified they may be, will require some time to settle into the new environment and perform optimally. (In more advanced courses of management accounting, you will learn about this *learning curve*.) We use labour turnover to measure labour stability. Labour turnover refers to employees leaving the company and having to be replaced. Employees may leave an employer for one of several reasons, such as retirement, death, resignation and dismissal. When labour turnover is high because of resignation and dismissal, the company would have to investigate the causes thereof.

6.3.2 Timekeeping, payroll and cost accounting

Both the timekeeping and payroll departments will maintain labour records. Depending on the size of the organisation, timekeeping and payroll may be either separate departments or separate functions within the same department.

Timekeeping

The timekeeping function is responsible for maintaining records of attendance and time spent on production. Methods of timekeeping include the signing of attendance registers by employees, clock card systems (employees insert a card into a clock that will record the time with each insertion) and biometric systems (where employees are recognised based on a physical trait, e.g. fingerprints). In many organisations, timekeeping is an automated process. Timekeeping records will contain information of the time (hours) worked by an employee and information of what that time was spent on. This information is prepared on a labour time record (sometimes called a time ticket) and submitted to the payroll and cost accounting functions for further processing. The following is an example of a labour time record:

Figure 6.1

Time ticket

Record number	----------	Week ending	----------
Employee number	----------	Hourly rate	----------
Employee name	----------	Approved by	----------
Employee classification	----------		

Job number/ Department *	Time started	Time completed	Total hours	Rate	Cost
Total cost					

*depending on whether a job or a process costing system is used

In practice, not all the hours that an employee spends at work are spent on production. This non-productive time is called *idle time*. There are several reasons for idle time, for example, employees may be called away from their workstations to attend staff meetings or training sessions. This type of idle time is considered normal and is built into the planning and budgeting processes of the company. Abnormal or unforeseen idle time can also occur, for example, because of equipment breakdowns, load-shedding, etc.

The timekeeping function will send details of time records to the payroll function (to prepare wages) and the cost accounting function (to assign costs).

Payroll

The payroll function must prepare the payroll and pay net salaries and wages to employees. Payroll preparation entails computing wages and salaries by determining the gross amount due to each employee and the total deductions to be made from the gross amount. Details of remuneration (e.g. the hourly rate) are obtained from the human resources department, and details of hours worked from the timekeeping function. The payroll function must maintain current information regarding the deductions to be made (e.g. current tax tables, UIF contributions and medical aid contributions).

Cost accounting

The cost accounting function is responsible for classifying labour cost as either direct labour or indirect labour (production overheads) as well as assigning the labour cost to jobs or production departments or processes.

6.4 PAYROLL PREPARATION

6.4.1 Remuneration

In section 6.2, we saw that the remuneration of employees consists of a number of elements. We discuss the most common elements below.

Salaries

We associate the term *salary* with the remuneration paid to employees who are remunerated at a fixed amount for each pay period regardless of the number of hours worked or the output attained. Salaries are paid on a monthly basis and are typically paid to employees in administrative and supervisory positions. The salaries paid to employees involved in the manufacturing process (e.g. supervisors and quality controllers) form part of cost of indirect labour and are charged to production overheads. We expense and disclose the cost of all other salaries as a period cost in the statement of profit or loss.

Wages

Generally, we use the term *wages* where the remuneration paid to employees could vary from one period to the next. The reason for the fluctuation is that the remuneration is dependent on the hours worked or the output attained by the employee. Wages are usually paid to employees on a weekly basis. Wages paid to employees directly involved in the conversion process are considered as cost of direct labour and charged to a specific job or production department or process. The cost of wages paid to other employees involved in the manufacturing process, such as the wages paid to factory cleaners, are considered as cost of indirect labour and charged to production overheads.

Overtime pay

Overtime refers to hours worked over and above the hours contracted between the employer and the employee. Salaried employees in more senior positions will generally not receive any payment for overtime worked, regardless of the actual number of hours worked. Employees in more junior positions will usually be entitled to be remunerated for overtime worked, provided that the employer agreed to the overtime. The Basic Conditions of Employment Act regulates the maximum overtime and minimum payment for overtime. The premium paid for overtime worked may be allocated to either direct labour or indirect labour, depending on the reason for the overtime:

- If overtime is a regular occurrence, say because of a shortage of the specific skills required, the overtime premium may be considered part of direct labour cost and allocated to the products requiring those special skills.
- If overtime is not a regular occurrence but is worked to meet seasonal demands or to catch up on a backlog in production, the overtime premium may be considered as indirect labour, charged to production overheads and assigned to all products. This makes sense. Consider the printing department at Unisa, for example: it is usual for the printing staff to work overtime at certain times of the year to ensure that all study material is ready for distribution to students when registration commences. It would not be fair to allocate the extra cost of the overtime premium to those modules that happen to be printed during overtime; it would distort the cost of offering those modules.
- Where overtime is worked to meet the deadline for a specific customer, then the overtime premium is considered as direct labour and allocated to those specific products.

Many companies have a policy of assigning all overtime premium costs to indirect labour, regardless of the reason for the overtime.

Benefits

In addition to the payments set out above, the employee may also be entitled to certain benefits (e.g. membership of a retirement or medical aid plan and unemployment insurance cover). The employee and the employer usually share the costs of these benefits. The employers contribution to the benefits of manufacturing staff is charged as indirect labour costs (production overheads).

Bonus

A bonus is an amount paid to employees over and above the amounts paid in respect of salaries and wages. Bonuses can be based on the performance of individual employees or the company, or they can be paid as a condition of employment, regardless of performance. Usually, the cost of bonuses paid to employees involved in the manufacturing process is charged to indirect labour (i.e. production overheads).

Annual leave and other holidays

In terms of the Basic Conditions of Employment Act, all employees are entitled to 21 consecutive (calendar) days paid leave per year. The Act further stipulates that employers may not pay workers instead of granting them leave, except where the employee's employment is terminated. In addition to paid annual leave, employees are also entitled to payment and time off for certain public holidays. The Act also provides for other leave entitlements (e.g. sick leave and maternity leave) but these fall beyond the scope of this module. Leave pay and holiday pay are not additional monetary entitlements of employees. It refers to the regular payment of salaries and wages made to employees during the period of leave and holidays without the employees working any hours or achieving any output. The cost of wages paid to factory employees on leave or holiday is considered as indirect labour.

The word *annual* means yearly. Therefore, *annual leave* refers to yearly leave. Ten days leave per annum means ten days leave per year.

6.4.2 Wage systems

We mentioned above that the wages of an employee may vary due to hours worked or output attained. We distinguish between *time wage systems* (based on hours worked) and *piece wage systems* (based on output attained).

Time wage systems

In time wage systems, the remuneration paid to an employee is based on the number of hours the employee worked. The gross wages (i.e. wages before any deductions) paid to the employee will be the number of hours worked for the period (e.g. week) multiplied by an hourly rate. Typically, the contract of the employee will stipulate a minimum number of hours at the hourly rate, for example 40 hours per week at an hourly rate of R90 per hour. If an employee worked 40 hours during the week, the gross wages for the week will be 40 hours x R90 = R3 600. If the employee worked 35 hours during the week, the gross wages for the week will be 35 hours x R90 = R3 150. If the employee works more than 40 hours during the week, the hours worked in excess of the 40 hours will be remunerated at an overtime rate. The overtime rate is often 1½ times the normal hourly rate (in decimals, 1½ is 1,5, calculated as ½ = 1 ÷ 2 = 0,5; and 1 + 0,5 = 1,5).

Overtime rate and overtime premium

It is important to distinguish between the *overtime rate* and the *overtime premium*. The *overtime rate* refers to the total rate at which the employee is remunerated for overtime hours worked, while the *overtime premium* refers to the extra cost of the overtime, which is the portion of the overtime rate that exceeds the normal rate. If the normal hourly rate is R90 per hour, then the *overtime rate* is R90 x 1,5 = R135 per hour and the *overtime premium* is R90 x 0,5 = R45 per hour. That means that for every overtime hour worked, the employee will receive the normal rate of R90 plus the overtime premium of R45, therefore, a total overtime rate of R135 per overtime hour. For example, if a machinist in the factory worked 45 hours for the week, then the gross wages for the week will be R4 275:

45 hours at the normal rate of R90 =	R4 050
Plus: 5 hours at the premium of R45 =	225
Total gross wages =	R4 275

If the policy of the company is to charge the cost of overtime to indirect labour, then R4 050 will be charged to direct labour and R225, being the cost of the overtime, will be charged to indirect labour (production overheads).

Piece wage systems

In piece wage systems, the remuneration paid to employees is based on the output of the employee. For example, an employee may be contracted to work 40 hours per week to produce 500 units. Instead of being paid per hour worked, the employee is paid per unit produced, say R15 per unit. If the employee produces 500 units, then the gross wages will be 500 units x R15 = R7 500. Even though employees are paid based on completed units only, they are still entitled to overtime payment. In a piece wage system, overtime is based either on output or on hours. Assume the employee worked 10 hours in the evenings, produced 100 units in these 10 hours and that overtime is remunerated at one-and-a-half times the normal rate.

Overtime based on output

The normal rate per unit is R15, and overtime is remunerated at R15 x 1,5 = R22,50. The overtime premium is therefore 100 units x R7,50 (from 22,50 – 15) = R750.

Overtime based on hours

Overtime is calculated from the wages for contracted normal hours and output (40 hours x 500 units) divided by the normal hours (i.e. R7 500 / 40 hours = R187,50 per hour). The overtime premium is therefore 100 units x R93,75 (from 187,50 x 0,5) = R9 375.

Other than the above discussion, piece wage systems (and a combination of time wage and piece wage systems) fall beyond the scope of this module.

6.4.3 Deductions

There are several labour-related deductions from the remuneration of employees. We discuss the most common deductions below.

Employees' tax (PAYE)

In the module Taxation of Salaried Persons, you will learn the details of how to compute the taxable income and tax liability of persons earning salaries and wages. It is not the purpose of this module to explain the details of the Income Tax Act. Therefore, we will provide tax assumptions in all examples, activities and questions in this learning unit.

The amount of PAYE to be deducted is based on *taxable gross wages*.

Retirement fund contributions

In your Tax module, you will learn how we treat different types of retirement funds (e.g. a pension fund). We will also provide assumptions regarding retirement fund contributions in all examples, activities and questions in this learning unit.

The purpose of a retirement fund is to provide the employee with an income after they have retired from work due to old age. Retirement fund contributions are based on *normal gross wages*.

Medical aid contributions

The law does not prescribe membership of a medical aid scheme, but it is often a condition of employment and is subsidised by the employer. The purpose of membership of a medical aid scheme is to ensure that you can pay for medical treatment received from a general practitioner or a specialist as well as for hospital expenses should you require hospitalisation. Medical aid contributions are based on *normal gross wages*.

The administrators of retirement and medical aid funds invoice the employer each month in advance for the contributions in respect of each employee. It does not concern the administrators what percentage of the contribution the employer and the employee pay. The employer's internal policy will determine the contribution the employer will make towards these benefits for its employees. At the beginning of each year, the employer will inform the administrators of the gross remuneration of each employee on which contributions will be based. This is why the contributions are based on the normal gross wages.

UIF contributions

The Unemployment Insurance Contributions Act No. 4 of 2002 determines in section 6 that employers and employees must contribute to the Unemployment Insurance Fund. The current contribution is 1% of the gross remuneration of the employee paid by the employee, plus 1% of the gross remuneration of the employee paid by the employer. The purpose of the UIF is to provide benefits to employees should they become unemployed. UIF contributions are based on *total gross wages*.

Third party payments

As indicated in the preceding paragraphs, employers usually (and sometimes compulsory – by law) contribute to benefit schemes on behalf of their employees. Retirement funds, the UIF and medical aid funds are all for the benefit of the employee. The employer contributions to these funds in respect of employees, over and above those that the employees make themselves, are referred to as employee benefits.

Deductions made from the remuneration of employees, plus the employers contributions must be paid over to the appropriate third parties (e.g. the Unemployment Insurance Commissioner and SARS) by a specified time.

A third party is an individual or organisation that does not have a direct connection with the two principal parties in a transaction but that is affected by the transaction. The employer and the employee are the two principal parties in an employment contract. SARS, for example, is a third party affected by that contract, because tax must be deducted from the remuneration paid to the employee by law, and the tax must be paid over to SARS. The same applies to the UIF Commissioner and the administrators of retirement funds and medical aid schemes.

6.4.4 Payroll

The procedures for determining payroll costs are straightforward. However, a substantial amount of information is required. We will explain the preparation of the payroll for wages by means of examples. In this module, we will only consider time wage systems.

Example 6.1

Ms Lerato Molefe works in the assembly line of Mercury. In terms of Lerato's employment contract, she must work 40 hours per week, for which she will be remunerated at a rate of R80 per hour. A normal workweek is from Monday to Friday. If she is required to work more than 40 hours per week, she will be remunerated as follows:

Overtime on weekdays, Saturdays and public holidays at 1½ times the normal rate

Overtime on Sundays at double the normal rate

The following deductions must be made from her wages:

PAYE: 18% of *taxable gross wages*
UIF: 1% of *total gross wages*
Pension fund: 7,5% of *normal gross wages*
Medical aid: 7% of *normal gross wages*

Mercury contribute the following for Lerato's benefit:

UIF: 1% of total gross wages
Pension fund: 8% of normal gross wages
Medical aid: 9% of normal gross wages

Details from Lerato's weekly time sheet appear below:

EMPLOYEE NAME: Lerato Molefe			COST CENTRE: Assembly	
EMPLOYEE NUMBER: 200496			WEEK ENDING: 16 February 2017	
Basic hourly rate			R80	
DAY	HOURS WORKED	BASIC WAGES (R)	OVERTIME PREMIUM (R)	TOTAL WAGES (R)
Monday	8			
Tuesday	11			
Wednesday	8			

Thursday	8			
Friday	9			
Saturday	5			
Sunday	5			

Required

1 Complete the weekly time sheet for Lerato Molefe.
2 Prepare a payslip for Lerato for the week ending 16 February 2017.
3 Calculate the employers contributions towards Lerato's employment benefits.

Solution

1 Completed weekly time sheet

EMPLOYEE NAME: Lerato Molefe			COST CENTRE: Assembly	
EMPLOYEE NUMBER: 200496			WEEK ENDING: 16 February 2017	
Basic hourly rate			R80	
DAY	HOURS WORKED	BASIC WAGES (R)	OVERTIME PREMIUM (R)	TOTAL WAGES (R)
Monday	8	640,00	0,00	640,00
Tuesday	11	880,00	120,00	1 000,00
Wednesday	8	640,00	0,00	640,00
Thursday	8	640,00	0,00	640,00
Friday	9	720,00	40,00	760,00
Saturday	5	400,00	200,00	600,00
Sunday	5	400,00	400,00	800,00
TOTAL	54	4 320,00	760,00	5 080,00

Notes:	Basic wages (at normal rate)		Overtime premium	
	R		R	
Tuesday	880	11 hrs x R80	120	3 hrs x R40 (R80 x 0,5)
Friday	720	9 hrs x R80	40	1 hrs x R40 (R80 x 0,5)
Saturday	400	5 hrs x R80	200	5 hrs x R40 (R80 x 0,5)
Sunday	400	5 hrs x R80	400	5 hrs x R80 (R80 x 1)

Overtime on weekdays and Saturdays are remunerated at an *overtime rate* of R120 (R80 x 1,5). For example, Saturday: 5 hrs x R120 = R600 (total); 5 hrs x R80 = R400 (normal rate); 5 hrs x R40 = R200 (overtime premium).

Overtime hours on Sunday are remunerated at an *overtime rate* of R160 (R80 x 2). Therefore, 5 hrs x R160 = R800 (total); 5 hrs x R80 = R400 (normal rate); 5 hrs x R400 (overtime premium).

2 Payslip of Lerato for the week ending 16 February 2017

		Notes	**R**
Normal wages	(40 hours x R80 per hour)		3 200,00
Overtime wages			
Normal overtime*	(9 hours x R80 x 1,5)		1 080,00
Sunday overtime	(5 hours x R80 x 2)		800,00
Total gross wages			5 080,00
Less: Pension fund contribution	(R3 200 x 7,5%)	(a), (b)	(240,00)
Taxable wages			4 840,00
Less: Other deductions			(1 146,00)
PAYE	(4 840 x 18%)	(b)	871,20
UIF	(5 080 x 1%)	(c)	50,80
Medical aid	(3 200 x 7%)	(a)	224,00
Net wage payable			3 694,00

*Tuesday 3 hrs + Friday 1 hr + Saturday 5 hrs = 9 hrs

Notes

(a) The pension fund and medical aid contributions are based on normal wages, established in terms of the minimum conditions in the employment contract (i.e. 40 hours per week). These will be the wages communicated to the administrators of the funds at the beginning of the year.

(b) PAYE is calculated on total gross wages after allowing for the pension fund contribution.

(c) UIF contributions are calculated on total gross wages.

3 Employers contributions towards Lerato's employment benefits

Pension fund (R3 200 x 8%)	256,00
UIF (R5 080 x 1%)	50,80
Medical Aid (R3 200 x 9%)	288,00
	R594,80

Activity 6.1

Bafana is a family business situated in Atlantis. Ms Eunice Arendse owns Bafana. The factory makes hand-crafted items. Eunice is responsible, amongst others, for the ordering all the materials used in the factory and for keeping the accounting records. In one of the divisions of the factory (division A), figurines are made from plaster of Paris. In this division, Eunice's son, Bennie Arendse, is responsible for mixing the plaster of Paris and pouring it into the rubber moulds. When the plaster of Paris is set, Lucy Adams, Eunice's daughter, removes the figurines from the moulds and paints them. Once the paint is dry, Lily Adams, Lucy's daughter, wraps the figurines in bubble wrap and packs them in little cardboard boxes. Sophie Stone is also employed at the factory. Sophie's duties are to clean the factory, wash the used moulds and make tea for the factory workers. Every Saturday and Sunday, Eunice takes the manufactured crafts to the crafts market in Green Point, where she sells them.

All the staff members signed contracts to work eight hours per day, Monday to Friday. The following details relate to the remuneration of the employees of division A:

Bennie Arendse	R150 per hour
Lucy Adams	R150 per hour
Lily Adams	R80 per hour
Sophie Stone	R60 per hour

Overtime worked on weekdays, Saturdays and public holidays is paid at time and a half, and overtime worked on Sundays is paid at double time.

Contributions to the pension fund and the medical aid scheme are based on a five-day week, eight hours per day, and are paid as follows:

Pension fund
Employer contribution: 8%
Employee contribution: 7½%

Medical aid
Employer contribution: 10%
Employee contribution: 5%

PAYE is charged at 16%, except for Eunice, whose PAYE is 25%. The UIF rate is 1%.

In terms of the policy adopted by Bafana, both overtime premiums and employer contributions paid to manufacturing staff are considered as indirect labour.

Eunice Arendse's salary is R50 000 per month.

During November, the following hours were worked in division A:

	Week 1	Week 2	Week 3	Week 4
Bennie Arendse: normal time	40	40	40	40
Lucy Adams: normal time	40	40	40	40
Saturdays	5	5	5	5
Sundays	5	5	5	5
Lily Adams: normal time	40	40	40	38
Sophie Stone: normal time	40	40	40	40

Required

1 Complete the following table in respect of the remuneration of Lucy Adams for week 1:

	Workings	R	Employer contribution (R)
Normal wages			
Overtime wages			
Normal overtime			
Sunday overtime			
Total gross wages			
Less: Pension fund contribution			
Taxable wages			
Less: Other deductions			
PAYE			
UIF			
Medical aid			
Net wage payable			

2 Prepare the pay slip of Lily Adams for week 4.

3 State, with reasons, whether the plaster of Paris, bubble wrap and little cardboard boxes will be classified as direct materials or indirect materials.

Feedback on activity 6.1

1 Remuneration of Lucy Adams for week 1

	Workings	R	Employer contribution (R)
Normal wages	40 hours x R150	6 000,00	
Overtime wages			
Normal overtime	5 hours x R150 x 1,5	1 125,00	
Sunday overtime	5 hours x R150 x 2	1 500,00	
Total gross wages		8 625,00	
Less: Pension fund contribution	[R6 000 x 7,5%] [6 000 x 8%]	450,00	480,00
Taxable wages		8 175,00	
Less: Other deductions		(1 694,25)	
PAYE	R8 175 x 16%	1 308,00	
UIF	[R8 625 x 1%] [R8 625 x 1%]	86,25	86,25
Medical aid	[R6 000 x 5%] [R6 000 x 10%]	300,00	600,00
Net wage payable		6 480,75	

2 Payslip of Lily Adams for week 4

		R
Normal wages	(38 hrs x R80 per hour)	3 050,00
Less: Pension fund contribution	(40 x R80 x 7,5%)	(240,00)
Taxable wages		2 800,00
Less: Other deductions		(638,50)
PAYE	(2 800 x 16%)	448,00
UIF	(3 050 x 1%)	30,50
Medical aid	(40 x R80 x 5%)	160,00
Net wage payable		2 161,50

Note that the pension and medical aid contributions are based on the hours contracted for and not the actual hours worked. This is because the employer informs the administrators of the pension and the medical aid funds of the gross wages at the beginning of the year, and contributions are based on these wages. PAYE and UIF are based on actual gross earnings.

3 Classification of materials

Plaster and boxes are direct materials, as it is both possible and practical to trace their costs to the completed product. Bubble wrap would be indirect materials, as it would be impractical to trace its cost to the final product. However, if the same amount of bubble wrap is used per figurine, it may be possible and practical to trace the cost of the bubble wrap to the final product, in which case it would be considered a direct material.

6.5 ACCOUNTING ENTRIES FOR LABOUR COSTS

Direct and indirect labour

Direct labour cost constitutes the total remuneration paid to employees who physically convert direct materials into finished goods. Direct labour cost is assigned directly to the product through the work-in-progress account. Other labour cost connected with the manufacturing process is considered as indirect labour. Indirect labour is apportioned indirectly to units produced: initially to the production overheads clearance account, where after it is assigned (with indirect materials and other factory overheads) to the work-in-progress account by means of predetermined rates. All other labour cost (e.g. labour cost of administration staff) is expensed as salaries expenses and disclosed in the statement of profit or loss. Refer back to section 6.4.1 for the accounting treatment of the various elements of labour cost.

Example 6.2

Refer to the information in example 6.1 and assume that Mercury considers the cost of benefits and the *overtime premium* paid in its manufacturing section as overheads.

1 Prepare all the journal entries relating to Lerato's wages for the week ending 16 February 2017.

2 Post the journal entries to the general ledger of Mercury.

We have to record the total cost relating to the employment of Lerato Molefe for the week ending 16 February 2017. That means we must account for the following:

Total gross wages (see payslip in example 6.1)	5 080,00
Plus total employer contributions (see example 6.1)	594,80
	R5 674,80

1 Journal entries

		Debit (R)	Credit (R)
16 February	Wages clearance account	5 080,00	
	Wages payable		3 694,00
	Pension fund		240,00
	PAYE		871,20
	UIF		50,80
	Medical aid		224,00
	Recording net wage and other liabilities		
16 February	Wages clearance account	594,80	
	Pension fund (R3 200 x 8%)		256,00
	UIF		50,80
	Medical aid (R3 200 x 9%)		288,00
	Recording employer's liability		

		Debit (R)	Credit (R)
16 February	Wages payable (payment to Lerato)	3 694,00	
	Pension fund (240 + 256)	496,00	
	PAYE	871,20	
	UIF (50,80 + 50,80)	101,60	
	Medical aid (224 + 288)	512,00	
	Bank		5 674,80
	Recording payment of wage related liabilities		
16 February	Work-in-progress	4 320,00	
	Production overheads clearance (760 + 594,80)	1 354,80	
	Wages clearance account		5 674,80
	Assignment of gross wages and benefits to production		

In this last journal entry, you will notice that the total cost of Lerato's employment is allocated to production. The cost of the direct labour portion is assigned directly to the units produced via the work-in-progress account, and the cost of the indirect labour portion (company contribution to benefits and overtime premium) is assigned according to a predetermined rate via the production overheads clearance account.

2 General ledger of Mercury

Wages clearance account

		R			R
16 Feb	Wages journal	5 080,00	16 Feb	WIP and	5 674,80
	Wages journal	594,80		production overheads	
	Balance c/f	5 674,80			5 674,80

Wages payable

		R			R
16 Feb	Bank	3 694,00	16 Feb	Wages clearance	3 694,00

Pension fund

		R			R
16 Feb	Bank	496,00	16 Feb	Wages clearance	240,00
				Wages clearance	256,00
		496,00			496,00

PAYE

		R			R
16 Feb	Bank	871,20	16 Feb	Wages clearance	871,20

UIF

		R			R
16 Feb	Bank	101,60	16 Feb	Wages clearance	50,80
			16 Feb	Wages clearance	50,80
		101,60			101,60

Medical aid

		R			R
16 Feb	Bank	512,00	16 Feb	Wages clearance	224,00
			16 Feb	Wages clearance	288,00
		512,00			512,00

Bank

		R			R
			16 Feb	Wages clearance	5 674,80

Work-in-progress

		R		R
16 Feb	Wages clearance	4 320,00		

Production overheads clearance account

		R		R
16 Feb	Wages control	1 354,80		

Note that after all the journals have been posted, only the work-in-progress account, the production overheads clearance account and the bank account have balances. The gross cost to company relating to Lerato's remuneration has now been apportioned between work-in-progress (for direct portion) and production overheads (POH) (for indirect portion):

	WIP	POH
Direct labour:		
54 hours at normal rate of R80 per hour =	4 320,00	
Indirect labour:		
Overtime premium =		760,00
Total employer contributions =		594,80
		1 354,80

Activity 6.2

Refer to the information in activity 6.1 and do the following:

1 Prepare the payroll of division A of the Bafana for November. Include the remuneration of Eunice Arendse.

2 Calculate the total employer contributions towards the benefits of the employees for November.

3 Prepare general journal entries for the payroll prepared in 1.

4 Prepare the general ledger account for salaries and wages clearance.

Feedback on activity 6.2

1 Payroll of Bafana for November

	Note	Bennie	Lucy	Lily	Sophie	Eunice	Total
		R	R	R	R	R	R
Normal wages/salary	a	24 000,00	24 000,00	12 640,00	9 600,00	50 000,00	120 240,00
Overtime	a		6 000,00				6 000,00
Overtime premium	a		4 500,00				4 500,00
Total gross earnings		24 000,00	34 500,00	12 640,00	9 600,00	50 000,00	130 740,00
Pension contribution	b	1 800,00	1 800,00	960,00	720,00	3 750,00	9 030,00
Taxable earnings		22 200,00	32 700,00	11 680,00	8 880,00	46 250,00	121 710,00
Other deductions		4 992,00	6 777,00	2 635,20	1 996,80	14 562,50	30 963,50
PAYE	c	3 552,00	5 232,00	1 868,80	1 420,80	11 562,50	23 636,10
UIF	d	240,00	345,00	126,40	96,00	500,00	1 307,40
Medical aid	b	1 200,00	1 200,00	640,00	480,00	2 500,00	6 020,00
Net wages/salary		17 208,00	25 923,00	9 044,80	6 884,20	31 688,50	90 746,50

Note a	Workings	Normal wages	Overtime at normal rate	Overtime premium
		R	R	R
Bennie	R150 x 40 hours x 4 weeks	24 000		
Lucy	R150 x 40 hours x 4 weeks	24 000		
	R150 x (10 hours x 4 weeks)		6 000	
	Saturdays: (R150 x 0,5) x (5 hours x 4 weeks)			1 500
	Sundays: R150 x (5 hours x 4 weeks)			3 000
Lily	R80 x [(40 hours x 3 weeks) + 38 hours]	12 640		
Sophie	R60 x 40 hours x 4 weeks	9 600		

Note b

Employees are contracted to work 40 hours per week (8 hours x 5 days). Contributions to the pension fund and medical aid scheme are based on the gross wage for a normal workweek of 40 hours and calculated at 7½% and 5% respectively. Lily's normal gross wage is 40 hours per week x 4 weeks = 160 hours x R80 = R12 800. R12 800 x 7½% = R960, and R12 800 x 5% = R640.

Note c

PAYE is calculated on the taxable income and is 16% for all employees, except Eunice, for whom it is 25%.

Note d

UIF is calculated at 1% of total gross earnings.

2 Employers contributions to the benefits of the employees

		Bennie	Lucy	Lily	Sophie	Eunice	Total
		R	R	R	R	R	R
Normal wages/salary		24 000,00	24 000,00	12 640,00	9 600,00	50 000,00	
Adjust Lily (see note b above)							
2 x R80 = R160				160,00			
Adjusted gross earnings	A	24 000,00	24 000,00	12 800,00	9 600,00	50 000,00	
Overtime			6 000,00				
Overtime premium			4 500,00				
Contra adjustment				(160,00)			
Actual gross wages	B	24 000,00	34 500,00	12 640,00	9 600,00	50 000,00	
Pension: 8% x A		1 920,00	1 920,00	1 024,00	768,00	4 000,00	9 632,00
Medical: 10% x A		2 400,00	2 400,00	1 280,00	960,00	5 000,00	12 040,00
UIF: 1% x B		240,00	345,00	126,40	96,00	500,00	1 307,40
							22 979,40

3 General journal entries for salaries and wages: November

		Debit (R)	Credit (R)
Journal 1	Salaries and wages clearance account	130 740,00	
	Salaries and wages payable		90 746,50
	Pension fund		9 030,00
	PAYE		23 636,10
	UIF		1 307,40
	Medical aid		6 020,00
	Recording net wage and other liabilities		
Journal 2	Salaries and wages clearance account	22 979,40	
	Pension fund		9 632,00
	UIF		1 307,40
	Medical aid		12 040,00
	Recording employer's liability		
Journal 3	Salaries and wages payable	90 746,50	
	Pension fund (9 030 + 9 632)	18 662,00	
	PAYE	23 636,10	
	UIF (1 307,40 + 1 307,40)	2 614,80	
	Medical aid (6 020 + 12 040)	18 060,00	
	Bank		153 719,40
	Recording payment of wage related liabilities		

		Debit (R)	Credit (R)
Journal 4	Salaries expenses (salary Eunice)	50 000,00	
	Salaries expenses (employee benefits Eunice)	9 500,00	
	Work-in-progress (24 000 + 30 000 + 12 640)	66 640,00	
	Production overheads clearance (4 500 + 9 600 + 22 979,40 – 9 500)	27 579,40	
	Salaries and wages clearance		153 719,40
	Allocation of gross wages to production		

Notes

The completed product (finished goods) of division A is a painted figurine which is bubble-wrapped and packed in a cardboard box. Therefore, Bennie, Lucy and Lily are directly involved in the manufacture of the figurines. Thus, their wages are considered as direct labour cost and charged to work-in-progress.

Sophie is a factory worker, but she is not directly involved in the manufacturing process. Therefore, Sophie's wages are considered as indirect labour cost and charged to production overheads.

It is the policy of Bafana to consider all overtime premiums and employers contributions towards the benefits of manufacturing staff as indirect labour. Therefore, the overtime premium paid to Lucy plus the employer contribution towards the pension, medical aid and UIF of Bennie, Lucy, Lily and Sophie are charged to production overheads.

The total amount charged to the production overheads clearance account is made up as follows:

	R	R
Overtime premium, Lucy		4 500,00
Wages, Sophie		9 600,00
Employer contributions for Bennie, Lucy, Lily and Sophie:		13 497,40
Total employer contributions	22 997,40	
Minus: Employer contributions for Eunice	9 500,00	
		27 597,40

Eunice is responsible for administration and marketing; she is not involved in the manufacturing process. Therefore, her salary and the employer contribution towards her benefits are expensed as a period cost.

4 General ledger account: Salaries and wages clearance

Salaries and wages clearance

		R			R
Journal 1	Wages journal	130 740,00	Journal 4	Salaries, WIP,	153 719,40
Journal 2	Wages journal	22 979,40		POH	
		153 719,40			153 719,40

6.6 ACCOUNTING FOR BONUSES AND LEAVE

In section 6.4, we saw that employees' remuneration is made up of salaries/wages, overtime, benefits, bonus and paid time off (annual leave, public holiday, etc). In section 6.5, we considered the accounting treatment of wages, overtime and benefits. In this section, we will look at the accounting treatment of the cost of bonuses and paid time off.

The Basic Conditions of Employment Act determines that all employees are entitled to 21 consecutive (calendar) days paid leave per year. In South Africa, most factories close for a period of two weeks in December. Therefore, it will be a condition of employment for factory workers to take a portion of their annual leave during this shut-down period. This called *compulsory leave*. The balance of the workers' leave entitlement is called *discretionary leave*.

During periods of compulsory leave, discretionary leave or public holidays, workers still receive their normal wages, although there is no production output to which the wages can be assigned directly. Therefore, these payments are considered as cost of indirect labour.

The first principle we apply when accounting for bonuses and paid time off is the following: the employee has earned the bonus and time off throughout the year; therefore, according to the matching principle, the company must recognise the cost thereof in the same period that the employee had earned the bonus and time off. IFRS refers to paid time off as *compensated absences*. (See IAS 19.)

Example 6.3

Ms Mpule Maake is employed by Venus Manufacturing. She is contracted to work eight hours per day, for five days per week (Mondays to Fridays). Her normal weekly wage, based on R80 per hour, is R3 200 (8 hrs x 5 days x R80). Mpule is entitled to three weeks' paid leave per annum as well as 10 paid public holidays. She is also entitled to a year-end bonus equal to two weeks' wages. Therefore, the cost of Mpule's compensated absences and bonus is as follows:

Cost of annual leave: 3 weeks, i.e. 15 work days x 8 hours per day = 120 x R80 per hour	=	R9 600
Cost of paid holidays: 10 days x 8 hours per day = 80 hours x R80 per hour	=	R6 400
Holiday bonus: 2 weeks' wages x R3 200 per week	=	R6 400
		R22 400

There are 52 weeks in a year, and Mpule is expected to work for the factory for 49 weeks (52 – 3). Since, she earns her bonus and leave over a period of 49 weeks, the cost of R22 400 must be spread over the 49 weeks: R22 400 ÷ 49 weeks ≈ R457 per week.

The sign "≈" means approximately. R22 400 ÷ 49 weeks = R457,1428571. We have rounded this to R457, so we say that the cost of Mpule's leave and bonus benefit is approximately (more or less) R457 per week.

When the payroll is prepared for each of the 49 weeks, the following journal entry will make provision for these benefits (using figures relating to Mpule only):

Production overheads clearance account	R457,14	
Bonuses accrued (6400/49)		R130,61
Leave pay accrued (9600/49)		R195,92
Holiday pay accrued (6400/49)		R130,61

We will treat the amounts accumulated in the accrual accounts (bonuses accrued, etc) as liabilities and disclose them in the statement of financial position.

Let's assume that the financial year runs from January to December. Let's further assume that two weeks' annual leave is taken as compulsory leave in December when the factory is closed, and that the bonus is paid in the first week that the factory is closed. Applicable compulsory deductions are as follows:

PAYE:	18% of *taxable gross wages*
UIF:	1% of *total gross wages*
Pension fund:	7,5% of *normal gross wages*
Medical aid:	7% of *normal gross wages*

Mpule's pay slips for the two weeks that the factory is closed will be as follows:

			Week 1	Week 2
			R	R
Normal wages	A		3 200,00	3 200,00
Annual bonus	B		6 400,00	
Total gross wages	C	(A + B)	9 600,00	3 200,00
Less: Pension fund contribution	D	(A x 7,5%)	(240,00)	(240,00)
Taxable wages	E	(C – D)	9 360,00	2 960,00
Less: Other deductions	F	(G + H + I)	(2 004,80)	(788,80)
PAYE	G	(E x 18%)	1 684,80	532,80
UIF	H	(C x 1%)	96,00	32,00
Medical aid	I	(A x 7%)	224,00	224,00
Net wage payable		(E – F)	7 355,20	2 171,20

The journal entries for the two weeks that the factory is closed will be as follows:

Week 1

	R	R
Leave pay accrued [1]	3 200,00	
Bonus accrued [1]	6 400,00	
Pension fund		240,00
PAYE		1684,80
UIF		96,00
Medical aid		224,00
Wages payable		7 355,20

Week 2

	R	R
Leave pay accrued [1]	3 200,00	
Pension fund		240,00
PAYE		532,80
UIF		32,00
Medical aid		224,00
Wages payable		2 171,20

[1] Instead of charging production overheads, we reduce the liability created during the year when production overheads were charged with a portion of these costs during the year.

The holiday pay accrued account will be reduced as public holidays occur during the year. For example, if Mpule worked no overtime for the week 13–17 June and 16 June (Youth Day) is a paid public holiday, then Mpule's payslip for that week will appear as follows:

			Week 1
			R
Normal wages	A		3 200,00
Less: Pension fund contribution	B	(A x 7,5%)	(240,00)
Taxable wages	C	(A – B)	2 960,00
Less: Other deductions	D	(E + F + G)	(788,80)
PAYE	E	(C x18%)	532,80
UIF	F	(A x 1%)	32,00
Medical aid	G	(A x 7%)	224,00
Net wage payable		(E – F)	2 171,20

The related journal entry will be as follows:

	R	R
Wages clearance account (8 hrs x 4 days x R80)	2 560,00	
Holiday pay accrued (8 hrs x 1 day x R80)	640,00	
Pension fund		240,00
PAYE		532,80
UIF		32,00
Medical aid		224,00
Wages payable		2 171,20

When we are preparing the budget of the company, we must factor compensated absences and bonus payments into the cost of labour. The management accountant will therefore determine a labour recovery rate when preparing the budget.

6.7 LABOUR RECOVERY RATE

In addition to the compensated absences discussed above, there are other times that workers do not produce any output. These times are called *idle time*. Some idle time, called *normal idle time*, is anticipated and even planned for in the budget (e.g. the time that employees spend attending meetings and training sessions, or times that equipment undergo routine maintenance). Abnormal idle time is unforeseen and may occur because of power outages, poor materials planning resulting in production staff waiting for materials, etc.

The labour recovery rate is a rate that aims to recover all the cost of labour from the cost of production. The preparation of a company's budget will start with the sales budget. After determining how many units the company is budgeting to sell, a production budget is prepared to ensure that sufficient units will be available for sale in inventory. Once we know the number of units to be produced, we can prepare the budgets for materials and labour requirements.

Example 6.4

The budget of Mars indicates that 200 000 units of product A and 500 000 units of product B must be produced in the following year.

Let's assume that it takes a mixer 15 minutes to mix one unit of A. 15 minutes = 0,25 hours (15 minutes / 60 minutes). Therefore, the production of 200 000 units of A will require 200 000 x 0,25 hours = 50 000 direct labour hours. Let's also assume that it takes an assembler

30 minutes (i.e. 0,5 hours) to assemble one unit of B. Then 500 000 units of B will require 500 000 x 0,5 hours = 250 000 direct labour hours. The direct labour budget will be 50 000 hours x the applicable hourly rate for a mixer, plus 500 000 hours x the applicable hourly rate for an assembler.

The hourly rate used to prepare the labour budget is called the *labour recovery rate*. The labour recovery rate is determined by dividing the *total budgeted labour cost* by the *total budgeted productive hours* per employee for the year. The total budgeted labour cost will include the cost of all the remuneration elements relating to the employee. (This total cost that relating to the employee is called the *cost to company*, i.e. the total cost of the employee to the company, which includes wages, benefits and bonuses.) The total productive hours will take into consideration paid absences and normal idle time.

Let's assume that factory workers work an eight hour day, Mondays to Fridays, which means 40 hours per week (8 x 5) and that mixers and assemblers are paid R50 and R80 per hour respectively. Let's also assume that they are entitled to three weeks' paid leave and 10 paid public holidays per year. Each year, all employees receive a bonus equal to three weeks' normal wages. The employer contributes 12% to the pension fund and 9% to the medical aid scheme. UIF contributions are 1%. Idle time because of staff meetings, staff training and planned maintenance is estimated at 5% of time at work.

We will now determine the total budgeted productive hours and labour cost per employee for the year.

Total budgeted productive hours per employee

Number of hours per year	52 weeks x 40 hours per week	2 080
Less: Annual leave	15 work days x 8 hours	(120)
Less: Paid public holidays	10 work days x 8 hours	(80)
Available hours		1 880
Less: Normal idle time	5% x 1 880	(94)
Annual productive hours per employee		1 786

Total budgeted labour cost per employee

Mixers		R
Normal wage (52 wks – 3 wks annual leave)	49 weeks x 40 hours x R50	98 000
Annual leave	3 weeks x 40 hours x R50	6 000
Bonus	3 weeks x 40 hours x R50	6 000
Employer contribution:		
Pension fund	12% x (52 x 40 x R50)	12 480
Medical aid	9% x (52 x 40 x R50)	9 360
UIF	1% x (98 000 + 6 000 + 6 000)	1 100
Total labour cost per mixer per year		133 980

Assemblers		***R***
Normal wage (52 wks – 3 wks annual leave)	49 weeks x 40 hours x R80	156 800
Annual leave	3 weeks x 40 hours x R80	9 600
Bonus	3 weeks x 40 hours x R80	9 600
Employer contribution		
Pension fund	12% x (52 x 40 x R80)	19 968
Medical aid	9% x (52 x 40 x R80)	14 976
UIF	1% x (156 800 + 9 600 + 9 600)	1 760
Total labour cost per assembler per year		212 704

We determine the labour recovery rate for budgeting purposes as follows:

Total budgeted labour cost for the year / total budgeted productive hours for the year

Therefore, the labour recovery rate for a mixer is R133 980 / 1 786 = R75,02 per hour, and the labour recovery rate for an assembler is R212 704 / 1 786 = R119,10 per hour.

The total labour budget for direct labour employees for the year is as follows:

		R
Product A	50 000 hours x R75,02	3 751 000
Product B	250 000 x R119,10	29 775 000
		33 526 000

We also use the total number of hours required to determine how many workers the company requires and the anticipated overtime. If production were to occur during normal working time only, the factory will require 28 mixers (50 000 / 1 786) and 140 assemblers (250 000 / 1 786) to meet the production demand for the following year.

Activity 6.3

Peter Wilson is a machinist at PQR Factory. The following is an extract from the employment contract between PQR and Peter:

Contracted time:	Mondays to Fridays, 8 hours per day
Hourly rate:	R100
Leave benefits:	Three weeks paid leave per year
Bonus:	Annual bonus equal to four weeks' normal wages
Company contributions:	
Pension fund	16%
Medical aid	10%
UIF	1%
Paid public holidays:	11 work days per annum

If normal idle time of 6% is expected, calculate Peter's labour recovery rate.

Feedback on activity 6.3

1. Calculation of productive hours per annum

Number of hours per year	52 weeks x 8 hours x 5 days	2 080
Less: Annual leave	15 work days x 8 hours	(120)
Less: Paid public holidays	11 work days x 8 hours	(88)
Available hours		1 872
Less: Normal idle time	6% x 1872	(112)
Peter's annual productive hours		1 760

2. Calculation of total labour cost per annum

		R
Normal wage (52 weeks minus 3 weeks annual leave)	49 weeks x 40 hours x R100	196 000
Annual leave	3 weeks x 40 hours x R100	12 000
Bonus	4 weeks x 40 hours x R100	16 000
Employer contribution		
Pension fund	16% x (52 x 40 x R100)	33 280
Medical aid	10% x (52 x 40 x R100)	20 800
UIF	1% x (196 000 + 12 000 + 16 000)	2 240
Peter's total labour cost per year		280 320

3. Calculation of labour recovery rate

Total labour cost / total productive hours = R280 320 / 1 760 = R159,27 per hour.

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The names used in the examples in this learning unit are those of the other three rocky planets in our solar system. Of the eight planets, only Mercury, Venus, Earth and Mars are made of rock. The other four planets (Jupiter, Saturn, Neptune and Uranus) are made of gases.

6.8 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 Keeping an accurate record of the hours worked by each employee is not important in a process costing system.
1.2 Labour stability means that the labour turnover rate is low.
1.3 Retina recognition may be used for the identification of employees in a timekeeping system.
1.4 Productive time refers to the time an employee spends at work.
1.5 Payroll will normally be a function of the human resources department.
1.6 Usually, the cost of employer contributions to employee benefits is considered as indirect labour cost.
1.7 The overtime rate is the same as the overtime premium.
1.8 In a piece wage system, remuneration is based on the number of units produced.
1.9 Pension and medical aid contributions, PAYE payments and UIF contributions are all examples of employee benefits.
1.10 PAYE deducted from the remuneration of employees must be paid to SARS by the 7th of the month following the month for which the payroll was prepared.

QUESTION 2

This question consists of eight multiple-choice questions. Carefully read through the information provided and select only the most correct option as your answer.

2.1 An overtime premium is the … .

(a) additional amount paid for hours worked in excess of the basic workweek
(b) additional amount paid over and above the normal hourly rate for hours worked in excess of the basic workweek
(c) additional amount paid over and above the overtime rate for hours worked in excess of the basic workweek
(d) overtime rate

2.2 The remuneration of these employees would be classified as cost of indirect labour:

(a) machinists in a clothing manufacturer
(b) assemblers in a furniture manufacturer
(c) maintenance workers in a food manufacturer
(d) bricklayers in a construction company

The information below pertains to questions 2.3 and 2.4.

Fikile Zokwana is employed as a machinist at XYZ Factory. During the week, he worked four hours overtime on Saturday and five hours overtime on Sunday. From Monday to Friday, he worked the normal working hours of 40 hours for the week. Overtime on Saturdays is calculated at 1½ times the normal hourly rate, while overtime on Sundays is calculated at twice the normal hourly rate. Fikile's total gross wages for the week was R6 720.

2.3 Fikile's normal wage rate per hour is … .

(a) R80
(b) R100
(c) R120
(d) R140

2.4 The total overtime premium paid to Fikile is … .

(a) R480
(b) R600
(c) R720
(d) R840

The following information pertains to questions 2.5 and 2.6.

Lindiwe Mabuza works in the assembly department of a motorcar manufacturer. The following is her pay slip for the week:

		Employer contribution
	R	R
Normal wages	4 000	
Pension fund contribution	(300)	480
PAYE	(592)	
Medical aid contribution	(240)	360
UIF	(40)	40
Net wages	2 828	

If we assume that the employer contributions for benefits and overtime premiums are regarded as indirect labour, what will the amount debited to the … be?

2.5 work-in-progress account as direct wages

(a) R4 000
(b) R3 408
(c) R2 828
(d) R4 880

2.6 production overheads clearance account as indirect wages

(a) R3 408
(b) R2 050
(c) R1 458
(d) R880

The following information pertains to questions 2.7 and 2.8.

Manto Mazibuko and Zanele Zulu are employed in the manufacturing section of a factory. They are entitled to three weeks' paid leave per annum and a bonus equal to three weeks' normal wages. They are also entitled to 10 paid public holidays per year. They work 40 hours per week, Monday to Friday. Normal wages per hour are R80 for Manto and R110 for Zanele. The company contributes 12% of normal wages on behalf of employees towards the pension fund. Normal idle time is considered as 5% of available hours.

2.7 The total cost to company of Manto is … .

(a) R117 632
(b) R156 800
(c) R195 968
(d) R176 000

2.8 The labour recovery rate for Zanele is … .

(a) R105,93 per hour
(b) R150,87 per hour
(c) R120,72 per hour
(d) R97,95 per hour

QUESTION 3

The following are extracts of the trial balance of Sun Limited at the end of June 2017:

Direct labour	R600 000
Indirect labour	R250 000
Salaries: marketing and sales	R140 000
Salaries: administration	R100 000
PAYE	R283 000
Pension contributions – employees	8%
Pension contributions – employer	16%
Medical aid contributions – employees	10%
Medical aid contributions – employer	10%
UIF contributions – employees	1%
UIF contributions – employer	1%

There were no overtime and bonus payments during the month. Assume that the employer contribution to benefits of all production staff is considered as indirect labour.

Required

Prepare the general journal entries to record all the payroll-related transactions of Sun Limited, including the assignment of product costs, for June 2017.

QUESTION 4

The following information pertains to the employees working in the assembly line of Moon Limited for the week ending Friday, 20 January:

	Normal wages	Overtime
	R	R
E	8 000,00	900,00
D	7 000,00	1312,50
P	9 000,00	337,50

Additional information

Overtime was paid at 1½ the normal rate. All overtime premiums are considered as indirect labour. The employees work 40 hours per week, Mondays to Fridays. Each employee receives a bonus equal to three weeks' normal wages during December, when the company closes for three weeks compulsory annual leave. PAYE is deducted at 18%. Contributions to benefit funds are as follows:

	Employee contribution	Employer contribution
Pension fund	8%	16%
UIF	1%	1%

The total contribution to the medical aid scheme for each employee is R1 500 per week, of which Moon Limited pays 65%.

Required

Use the information available to do the following:

4.1 Prepare the payroll of Moon Limited for the week ending 20 January. Also, indicate the employer contributions to benefits.

4.2 Calculate the amount to be debited to the production overheads clearance account.

4.3 Calculate the hourly recovery rate for each employee.

QUESTION 5

Sello is a miller at the flour making plant of Meteor Limited. Sello's normal working hours are eight hours per day from Mondays to Fridays and five hours on Saturdays. Overtime on Sundays is remunerated at twice the normal hourly rate. All other overtime is paid for at time and a half.

Sello pays PAYE at a rate of 18%. Sello is also a member of the company's pension fund and medical scheme, to which he contributes 8% and 6% of his gross normal earnings respectively. The company's contribution on behalf of employees is 12% to the pension fund and 9% to the medical aid scheme. The current UIF contribution rate is 1%.

It is company policy to treat any overtime premium and idle time as indirect labour.

The information below was obtained from Sello's time sheet for the last week.

EMPLOYEE NAME: Sello			COST CENTRE: Milling
EMPLOYEE NUMBER: 333			WEEK ENDING: 19 June
Basic hourly rate: R90			
DAY	Hours at work	Idle time	Reason for idle time
Monday	8	2	Staff training
Tuesday	8	4	Non-delivery of grain for milling
Wednesday	8	5	Power outage
Thursday*	10		
Friday	9	1	Staff meeting
Saturday	7		
Sunday	5		

*Public holiday

Required

Based on the information provided, do the following:

5.1 Prepare Sello's pay slip for the week ending 19 June.

5.2 Prepare the journal entries to record Sello's wages for the week ending 19 June.

5.3 Calculate Sello's annual productive hours, assuming that he is entitled to three weeks' paid leave per year as well as paid time off on all 12 public holidays. Normal idle time for the week ending 19 June is representative of the normal weekly idle time for the year.

This is an integrated question, and you must set aside sufficient time to work through the solution. The question covers normal time, paid holiday time, idle time, normal overtime and Sunday overtime. Although you will not have to answer an integrated question of this nature in the examination, you will have to answer questions on the individual areas covered by the question.

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6.9 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 F Regardless of whether a job or process costing system is in use, it is very important to keep accurate records of hours worked by each employee.

1.2 T High labour turnover is a sign of instability.

1.3 T Like fingerprints, the iris and the retina are unique to every individual and may be used in biometric systems of identification.

1.4 F Productive time refers only to the time spent directly on the production of units of output. It excludes time that employees spend at work attending meetings, for example.

1.5 F Segregation of duties requires that the authorisation of a transaction is separated from the execution thereof. The timekeeping department will authorise the number of hours to be paid, the human resources department will authorise the hourly rate in terms of the employment contract and the financial accountant will execute the payment through the payroll.

1.6 T

1.7 F The overtime rate refers to the total hourly rate paid for overtime. The overtime premium refers to that portion of the overtime rate that exceeds the normal hourly rate.

1.8 T

1.9 F PAYE is a tax and has no future direct benefit to the employee.

1.10 T Paragraph 2(1)(a) of the Fourth Schedule to the Income Tax Act stipulates that employers "shall pay the amount … deducted" in respect of employees' tax "to the Commissioner within seven days after the end of the month during which the (tax) was deducted".

QUESTION 2

2.1 (b)
2.2 (c)
2.3 (c)
2.4 (d)
2.5 (a)
2.6 (d)
2.7 (c)
2.8 (b)

Notes

2.3 Total remuneration of R6 720 is made up as follows:
40 hours at the normal rate per hour
4 hours at 1,5 x the normal rate per hour
5 hours at 2 x the normal rate per hour
Therefore, the equivalent normal hours is 40 + (4 x 1,5) + (5 x 2) = 56 hours.
The normal hourly rate is R6 720 / 56 hours = R120 per hour.

2.4 Overtime premium for Saturday: 4 hours x (0,5 x R120) = R240
Overtime premium for Sunday: 5 hours x (1 x R120) = R600
Therefore, total overtime premium is R240 + R600 = R840.

2.6 The employers contribution to benefits is considered as indirect wages.

2.7

		R
Normal wage (52 wks – 3 wks annual leave)	49 weeks x 40 hours x R80	156 800
Annual leave	3 weeks x 40 hours x R80	9 600
Bonus	3 weeks x 40 hours x R80	9 600
Employer contribution		
Pension fund	12% x (52 x 40 x R80)	19 968
Manto's total cost to company (labour cost) for the year		195 968

2.8

		R
Normal wage (52 wks – 3 wks annual leave)	49 weeks x 40 hours x R110	215 600
Annual leave	3 weeks x 40 hours x R110	13 200
Bonus	3 weeks x 40 hours x R110	13 200
Employer contribution		
Pension fund	12% x (52 x 40 x R110)	27 456
Zanele's total cost to company (labour cost) for the year		269 456

Calculation of productive hours per annum

Number of hours per year	52 weeks x 8 hours x 5 days	2 080
Less: Annual leave	15 work days x 8 hours	(120)
Less: Paid public holidays	10 work days x 8 hours	(80)
Available hours		1 880
Less: Normal idle time	5% x 1880	(94)
Zanele's annual productive hours		1 786

Labour recovery rate for Zanele
Total labour cost / total productive hours = R269 456 / 1 786 = R150,87 per hour.

QUESTION 3

General journal for Sun Limited

	Debit (R)	Credit (R)
Salaries and wages clearance account	1 090 000	
Salaries and wages payable		599 900
PAYE		283 000
Pension fund (R1 090 000 x 8%)		87 200
Medical aid (R1 090 000 x 10%)		109 000
UIF (R1 090 000 x 1%)		10 900
Recording net wage and other liabilities		

	Debit (R)	Credit (R)
Salaries and wages clearance account	294 300	
Pension fund (R1 090 000 x 16%)		174 400
Medical aid (R1 090 000 x 10%)		109 000
UIF (R1 090 000 x 1%)		10 900
Recording employer's liability		
Salaries and wages payable	599 900	
PAYE	283 000	
Pension fund (87 200 + 174 400)	261 600	
Medical aid (109 000 + 109 000)	218 000	
UIF (10 900 + 10 900)	21 800	
Bank		1 384 300
Recording payment of wage-related liabilities		
Salaries expenses (240 000 + 64 800)	304 800	
Work-in-progress	600 000	
Production overheads (250 000 + 229 500)	479 500	
Wages clearance account (1 090 000 + 294 300)		1 384 300
Allocation of gross wages and salaries		

Workings

(ER = employ**er**; EE = employ**ee**)

		Direct labour	indirect labour	Period costs	Total drs	Total crs	Total ER
		R	R	R	R	R	R
	Wages	600 000	250 000		850 000		
	Salaries M&S			140 000	140 000		
	Salaries Admin			100 000	100 000		
				240 000			
	PAYE					283 000	
EE 8%	Pension	48 000	20 000	19 200		87 200	
ER 16%		96 000	40 000	38 400			174 400
EE 10%	Medical	60 000	25 000	24 000		109000	
ER 10%		60 000	25 000	24 000			109 000
EE 1%	UIF	6 000	2 500	2 400		10 900	
ER 1%		6 000	2 500	2 400			10 900
	Payable					599 900	
					1 090 000	1 090 000	
	Gross earnings	600000	250 000	240 000			
	Employer benefits		229 500	64 800			
	Total	600 000	479 500	304 800			

QUESTION 4

4.1 Payroll of Moon Limited for the week ending 20 January

		Note	E	D	P	Total	ER contribution
			R	R	R	R	R
A	Normal wages		8 000,00	7 000,00	9 000,00	24 000,00	
	Overtime	1	600,00	875,00	225,00	1 700,00	
	Overtime premium	1	300,00	437,50	112,50	850,00	
B	Total gross earnings		8 900,00	8 312,50	9 337,50	26 550,00	
	Pension contribution: 8% x A		640,00	560,00	720,00	1 920,00	
	16% x 24 000						3 840,00
C	Taxable earnings		8 260,00	7 752,50	8 617,50	24 630,00	
D	Other deductions		2 100,80	2 003,57	2 169,53	6 273,90	
	PAYE: 18% x C		1 486,80	1 395,45	1 551,15	4 433,40	
	UIF: 1% x B		89,00	83,12	93,38	265,50	265,50
	Medical aid (R1 500 x 0,35)		525,00	525,00	525,00	1 575,00	
	R1 500 x 3 x 0,65						2 925,00
	Net wages (C – D)		6 159,20	5 748,93	6 447,97	18 356,10	7 030,50

Note 1

	Total overtime at 1½	∴ Overtime at normal rate (X / 1,5 x 1)	Overtime premium
	X	Y	X – Y
E	900,00	600,00	300,00
D	1 312,50	875,00	437,50
P	337,50	225,00	112,50
	2 550,00	1 700,00	850,00

4.2 Amount to be debited to production overheads clearance account

	R
Overtime premium	850,00
Employer contribution to benefits	7 030,50
	7 880,50

4.3 Hourly recovery rate of employees

Annual remuneration	E R	D R	P R
Normal weekly wages (see A in 4.1)	8 000	7 000	9 000
Basic annual wages: (52 – 3 wks) x normal wages	392 000	343 000	441 000
Compulsory annual leave: 3 weeks x normal wages	24 000	21 000	27 000
Annual bonus: 3 weeks x normal wages	24 000	21 000	27 000
Employer contributions:			
Pension (basic wages x 52 weeks x 16%)	66 560	58 240	74 880
UIF (gross/basic wages x 52 weeks x 1%)	4 160	3 640	4 680
Medical (R1 500 x 52 weeks x 65%)	50 700	50 700	50 700
Total annual remuneration	561 420	497 580	625 260

Annual productive time

Number of hours per year	52 weeks x 8 hours x 5 days	2 080
Less: Annual leave	15 work days x 8 hours	(120)
Annual productive hours per employee		1 960

Hourly recovery rate per employee

Annual remuneration	E	D	P
	R	R	R
Total annual remuneration	561 420	497 580	625 260
Annual productive hours	1 960	1 960	1 960
Recovery rate per hour	286,44	253,87	319,01

QUESTION 5

We will answer questions 5.1 to 5.3 with reference to the analysis on the next page.

Analysis of hours worked by Sello							Costs to account for						Accounting in				
													Payslip		Journal		
	Normal hours expected to work	Hours at work per time sheet	Idle time per time sheet	Normal hours actually worked	Previously accrued public holiday	Overtime hours	Idle time at normal rate of R90 per hour	Normal hours actually worked at normal rate of R90	Previously accrued at normal rate of R90	OT hours at normal rate of R90	Normal OT at normal OT premium rate of R90 x 50% = R45	Sunday OT at Sun premium rate of R90 x 100% = R90	Normal wages	Overtime	Work-in-progress account	Production overheads clearance account	Accrual for holiday pay
	A	B	C	D	E	F	G	H	I	J	K	L					
				A-C		B-A-E	CxR90	DxR90	ExR90	FxR90	FxR45	FxR90	H+I	J+K+L	H+J	G+K+L	
Mon	8	8	2	6		0	180	540	0	0	0		720	-	540	180	-
Tue	8	8	4	4		0	360	360	0	0	0		720	-	360	360	-
Wed	8	8	5	3		0	450	270	0	0	0		720	-	270	450	-
Thu	0	10	0	0	8	2	0	0	720	180	90		720	270	180	90	720
Fri	8	9	1	7		1	90	630	0	90	45		720	135	720	135	-
Sat	5	7	0	5		2	0	450	0	180	90		450	270	630	90	-
Sun	0	5	0	0		5	0	0	0	450		450	-	900	450	450	-
		55	12	25	8	10	1 080	2 250	720	900	225	450	4 050	1 575	3 150	1 755	720
												5 625		**5 625**			**5 625**

- Columns A to F contain an analysis of hours actually worked according to the time sheet. Total hours per time sheet = 55 hours, broken down as indicated in columns C, D, E and F (12 + 25 + 8 + 10 = 55 hours).
- Costs were calculated for the hours in columns G to L. The total cost to be accounted for is R5 625 (1 080 + 2 250 + 720 + 900 + 225 + 450).
- The total cost of R5 625 will be shown in the payslip as normal wages (R4 050) and overtime (R1 575).
- In the journal the total cost of R5 625 will be debited to the following accounts:
    - Work-in-progress (R3 150),
    - Production overheads (R1 755)
    - Liability account: accrual for holiday pay (R720)

5.1 Payslip of Sello for the week ending 19 June

		R
Normal wages	(see analysis)	4 050,00
Overtime	(see analysis)	1 575,00
Total gross wages		5 625,00
Less: Pension fund contribution	(R4 050 x 8%)	(324,00)
Taxable wages		5 301,00
Less: Other deductions		(1 253,43)
PAYE	(R5 301 x 18%)	954,18
UIF	(R5 625 x 1%)	56,25
Medical aid	(R4 050 x 6%)	243,00
Net wage payable		4 047,57

5.2 Journal entries

		Debit (R)	Credit (R)
19 June	Wages clearance account (per analysis: 3 150 + 1 755)	4 905,00	
	Holiday pay accrued (per analysis)	720,00	
	Wages payable (see payslip)		4 047,57
	Pension fund (see payslip)		324,00
	PAYE (see payslip)		954,18
	UIF (see payslip)		56,25
	Medical aid (see payslip)		243,00
	Recording net wage and other liabilities		
19 June	Wages clearance account	906,75	
	Pension fund (R4 050 x 12%)		486,00
	UIF (R5 625 x 1%)		56,25
	Medical aid (R4 050 x 9%)		364,50
	Recording employer's liability		
19 June	Wages payable (payment to Sello)	4 047,57	
	Pension fund (324 + 486)	810,00	
	PAYE	954,18	
	UIF (56,25 + 56,25)	112,50	
	Medical aid (243 + 364,50)	607,50	
	Bank		6 531,75
	Recording payment of wage-related liabilities		
19 June	Work-in-progress (see analysis)	3 150,00	
	Production overheads clearance (see analysis)	1 755,00	
	Wages clearance account (5 265 + 910,35)		4 905,00
	Assignment of gross wages and benefits to production		

5.3 Sello's annual productive hours

Number of hours per year	52 weeks x 8 hours x 5 days	2 080
Less: Annual leave	3 weeks x 8 hours x 5 days	(120)
Less: Public holidays	12 days x 8 hours	(96)
Less: Normal idle time *	3 hours x (52 – 3) weeks	(147)
Annual productive hours of Mercury		1 717

*	Training	2 hours
	Administration	1 hour
	Total normal idle time per week worked	3 hours

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LEARNING UNIT 7: ASSIGNMENT OF PRODUCTION OVERHEADS

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- determine the fixed and variable cost elements of mixed costs
- assign production overheads according to predetermined rates

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- assign manufacturing overheads by means of primary and secondary allocation processes in a traditional costing system
- calculate the overhead absorption rate per production department
- calculate over- and under-applied overheads

OVERVIEW

This learning unit is divided into the following sections:

7.1 Introduction
7.2 Budgeting for production overheads
7.3 Apportioning production overheads
7.4 Correlation of variables and relevant range
7.5 Methods of separating mixed costs

7.1 INTRODUCTION

We divide direct costs into the cost of direct materials and the cost of direct labour. These costs *belong* to the goods being produced, and we can trace them directly to the goods. Generally, it is easy to establish the direct costs of each product. For example, a pillow is made with two pieces of fabric (each measuring 75 cm x 40 cm) and 500 grams of duck feathers. If the fabric is 78 cm wide and it costs R100 per metre, and the feathers cost R170 per kilogram, you will agree that it is easy to trace the cost of the direct materials in the quantities mentioned directly to the cost of each pillow. Similarly, if it takes a seamstress 30 minutes to stitch and fill one pillow and her hourly wage is R80, it is easy to trace the cost for half an hour's labour to the cost of each pillow. However, we cannot trace production overheads directly to the products manufactured. For example, how much of the rent for the factory building should we charge to the cost of each pillow that is made?

In learning units 4 and 6, we considered the actual (historical) costs incurred for materials and labour. We recorded the actual cost of materials purchases by debiting the relevant materials inventory control account and crediting either bank or trade payables; we recorded the actual labour cost by debiting the wages clearance account and crediting, amongst others, the wages payable account. You will also recall that we assigned the cost of *direct materials* to the units being produced by debiting the work-in-progress account and crediting the inventory of materials control account as soon as the materials were issued to production. We assigned the cost of *direct labour* to the units being produced by debiting the work-in-progress account and crediting the wages clearance account.

It is important to understand that we literally assign the direct material and direct labour costs that are debited to the work-in-progress account to the actual units of production to which these costs apply. For example, if a factory that manufactures canned foods makes only cans of pilchards in week 1, then the direct material costs and direct labour costs debited to the work-in-progress account in week 1 will be assigned to those cans of pilchards. None of the direct costs for week 1 will be assigned to the cans of corned beef that will be manufactured in week 2. The direct material and direct labour costs transferred to the work-in-progress account in week *2* will be assigned to the cost of the cans of corned beef.

In learning unit 3, we saw that there are three alternative bases that we can use for assigning the costs of direct materials, direct labour and production overheads to production, namely actual costing, normal costing and standard costing. Actual costing is used primarily in companies manufacturing only one product and where all production costs (direct materials, direct labour and production overheads) can be traced directly to that single product. Actual costing is not an appropriate basis for measuring input costs where multiple products are produced. Consider our example of the company that manufactures canned foods again: we cannot assign all the overheads incurred in week 1 to the pilchards produced in week 1 only. Suppose the company paid the annual insurance premium, the monthly rent and the monthly electricity account for the factory in week 1. You will agree that it would be ludicrous to assign all these overheads to the cost of the pilchards that were manufactured in week 1.

Overheads are not incurred evenly throughout the year (i.e. overheads are not more or less the same every week). If a manufacturer of multiple products wanted to assign actual overheads to production, they would have to wait until the end of the year before they will know for sure what the actual cost of overheads was. Unfortunately, by then it would be too late to assign the costs to production, since many of the goods produced during the year would have been sold already. It therefore makes sense to apply a normal costing basis for assigning input costs to production. Normal costing assigns direct material and direct labour costs to production at actual (historical) cost; it also assigns production overheads to all the products manufactured at a predetermined rate that will distribute overheads fairly.

We could determine and apply a single predetermined rate for all departments, which is called a plant-wide rate, or a predetermined rate per department. The latter is more appropriate in a process costing system. In a standard costing system, we will determine separate rates for fixed and variable overheads.

7.2 BUDGETING FOR PRODUCTION OVERHEADS

In learning unit 2, we defined cost drivers as factors that cause a change in the cost of something. For example, the number of units produced will drive the total cost of direct material and direct labour. Therefore, the greater the number of pillows made, the more the pieces of fabric and the feathers that will be used and the longer the seamstress will have to work. All of these contribute to a higher total cost of direct materials and direct labour.

When the management accountant prepares the budget of the company, it is important that he or she is aware of the drivers of the different costs. Information such as historical data, agreements with suppliers, agreements with trade unions and economic forecasts will assist the accountant in budgeting for the direct material and direct labour costs per unit for the coming year. The accountant should also recognise that the total number of units produced drives the cost of direct materials and direct labour.

We already know that production overheads are also product costs and must be included in the production budget. The management accountant of a company must therefore also know what the drivers of overheads are. Once these drivers are known, the accountant can decide on fair bases on which to assign the overheads to production.

The drivers that drive the cost of production overheads will be any of a number of levels of activity. These levels of activity could include the total number of units produced, machine hours or direct labour hours worked and the total weight of direct materials converted. The driver of indirect materials will be total production, while the driver of the cost of electricity will probably be machine hours. Every cost is analysed in terms of its own cost driver. It is therefore important to establish what driver causes a cost to increase or decrease.

In learning unit 2, we learnt that we classify product costs, amongst others, according to their *behaviour.* Cost behaviour refers to how a cost behaves at different levels of activity. We classify product cost as a variable cost, a fixed cost or a mixed cost (i.e. a mix of fixed costs and variable costs). Total variable costs and the variable portion of mixed costs will increase with an increase in activity; total fixed costs and the fixed portion of mixed costs will remain constant regardless activity levels (within the relevant range, of course; see section 7.4).

Direct material and direct labour costs are classified as variable costs: the total cost of direct materials and the total cost of direct labour vary in proportion to the number of units produced. Overheads consist of variable, fixed and mixed costs. For planning purposes, especially for the preparation of a flexible budget, it is important to separate mixed overheads into their variable and fixed components. (In section 7.5, we will look at methods used to separate mixed costs into their fixed and variable components.) A flexible budget can be adjusted for changes in the level of activity, for example the number of units sold, the number of units produced, etc.

Example 7.1

Windhoek Limited manufactures quality fold-up foam mattresses. These mattresses are very popular for camping holidays. The following is an extract from the flexible production overheads budget of the company for the year at production levels 10 000, 20 000 and 40 000:

Number of mattresses produced	10 000	20 000	40 000
Variable overheads at R150	1 500 000	3 000 000	6 000 000
Fixed overheads (R)	1 500 000	1 500 000	1 500 000
Total overheads (R)	3 000 000	4 500 000	7 500 000
Production overheads per mattress	R300,00	R225,00	R187,50
Fixed overheads per mattress	R150,00	R75,00	R37,50
Variable overheads per mattress	R150,00	R150,00	R150,00

Production levels of 10 000, 20 000 and 40 000 all fall within the relevant range (see section 7.4). The total overheads per mattress decreases as the number of mattresses manufactured increases: R300,00; R225,00; and R187,50. This is because fixed costs (R1 500 000) are spread over more units: R1 500 000 / 10 000 = R150,00; R1 500 000 / 20 000 = R75,00; and R1 500 000 / 40 000 = R37,50. The variable cost per unit remains the same at R150,00 per unit.

Variable overheads consist of the costs incurred for indirect materials and labour, repairs and maintenance of manufacturing equipment, electricity (variable component), etc. The total cost of variable overheads varies with the production activity of the company, although not to the same extent as the total direct material and direct labour cost.

Fixed overheads consist of the costs incurred for salaries paid to factory supervisors and security staff, depreciation of manufacturing equipment and the factory building, municipal rates, insurance of factory facilities, electricity (fixed component), etc. In the short to medium term, the total cost of fixed overheads does not vary with manufacturing activity within the relevant range.

Under absorption costing, we assign the cost of fixed and variable overheads to the cost of goods manufactured. In budgeting for production overheads, the management accountant will do the following:

- budget for total production overheads
- separate the budget into variable and fixed overheads
- identify an appropriate driver/basis for assigning the overheads to production
- determine the rate to be used to apportion the overheads to the units of production

The apportionment rates are also called recovery or absorption rates. We will now take a closer look at the processes followed in budgeting for *variable* production overheads and *fixed* production overheads respectively.

7.2.1 Budgeting for variable production overheads

Behaviour of variable production overheads

Although we have mentioned only a few examples of variable overheads above, in practice there can literally be hundreds of variable overheads items. All variable overheads items does not vary at the same rate with changes in activity levels, neither do they vary with the same activity levels: some costs may vary with changes in machine hours, some with changes in direct labour hours and others with changes in number of units manufactured.

You will recall that Woodpecker (Pty) Limited uses varnish (indirect material) in its manufacturing process. The amount of varnish used will increase with every piece of furniture (unit) produced, because every unit is painted with varnish. Figure 2.3 of learning unit 2 depicts the cost behaviour of the varnish graphically. Woodpecker also uses oil and grease (consumables) to lubricate the manufacturing equipment. However, the equipment may require lubrication only after every 10 000 units produced. Figure 2.5 of learning unit 2 depicts the cost behaviour of the oil and grease graphically.

Appropriate bases for applying variable costs to cost objects

We now know that the different items of variable production overheads display different consumption patterns. However, since it would be impractical to use a different basis for assigning the cost of each of the many variable cost items, most companies select a single measure for assigning variable overheads to production. The most commonly used bases are the number of units produced, the number of direct labour hours and the number of machine hours. Direct labour hours are more appropriate in a labour-intensive environment, while machine hours will be more appropriate in a more automated environment where machines rather than people perform the majority of the manufacturing tasks.

Determining a variable production overhead absorption (recovery) rate

The master budget of a company is compiled from several other budgets, amongst others, the sales budget, the production budget and the production overheads budget. The sales budget is typically prepared first, because we have to know how many units of each product the company plans to sell before we can prepare a production budget to ensure that sufficient units of the products will be available for sale. Similarly, we need to know what we plan to produce in order to budget for the production overheads that will be incurred at the budgeted production levels. (See example 7.1)

The overheads budget is to a large extent prepared from information obtained from previous years' actual results. Also taking into account factors like planned production levels, inflation, trade agreements and economic forecasts, the management accountant estimates the total variable overheads that will be incurred at different levels of production. Assume that direct labour hours is chosen as the basis for allocating variable overheads to production; then the total estimated variable overheads are divided by the total estimated direct labour hours to determine a rate for apportioning variable overheads to production.

Let's return to example 7.1 for a moment. In this example, the variable overheads per unit is estimated at R150. Let's assume that variable overheads were apportioned on the basis of direct labour hours (DLH). It is very important that you understand that the R150 is the overhead rate *per unit of production* and NOT the direct labour rate *per hour*. The two rates are different and are calculated as follows:

Direct labour rate = total *direct labour cost* ÷ total DLH
Variable overheads rate per DLH = total *variable overheads* ÷ total DLH

If variable overheads are apportioned on the basis of direct labour hours, the accountant must first determine how many labour hours are required to produce one unit before he can determine the overheads per unit. Assume that the overheads rate per direct labour hour is R75 and that it takes two hours to produce one unit; then the overheads per unit is R150 (2 hours x R75 per direct labour hour).

7.2.2 Budgeting for fixed production overheads

In terms of IAS 2.12, the cost of fixed production overheads must be included in the cost of finished goods. IAS 2:13 further states the following:

The allocation of fixed production overheads to the costs of conversion is based on the normal capacity of the production facilities. Normal capacity is the production expected to be achieved on average over a number of periods or seasons under normal circumstances, taking into account the loss of capacity resulting from planned maintenance.

Capacity can be expressed as machine hours, units produced, quantity of direct materials converted, etc. We distinguish between the following different levels of capacity in a manufacturing environment, among others:

Theoretical capacity is a factory's capacity based on the assumption of 100% efficiency all the time.

Practical capacity is a factory's capacity where the theoretical capacity has been reduced by expected interruption in production, such as planned maintenance.

Normal capacity is a factory's average level of activity for meeting the company's production demands, taking into account expected interruptions and seasonal fluctuations. Normal capacity is a realistic measure of what the company is *likely* to produce, rather than what it *can* produce.

Budgeted capacity is the anticipated use of available capacity based on planned production levels.

Within the relevant range, we assume that fixed costs will remain the same regardless of the level of activity. In example 7.1, production activity levels of 10 000, 20 000 and 40 000 all fall within the relevant range, hence the fixed overheads remained the same ("fixed"). The relevant range is likely to fall within the normal and budgeted capacity. Therefore, the numerator (total fixed costs) used in calculating an absorption rate will remain the same regardless of the denominator (capacity level) used for calculating an absorption rate. Because there is no cause and effect relationship between fixed costs and capacity levels, the larger the denominator, the smaller the amount of fixed overheads that will be allocated to each unit of activity:

Units of production	10 000	20 000	40 000
Fixed cost (R)	1 500 000	1 500 000	1 500 000
Fixed overheads per unit	R150,00	R75,00	R37,50
Calculations	1 500 000 / 10 000	1 500 000 / 20 000	1 500 000 / 40 000

From your school mathematics, you will recall that numbers can be whole numbers (also called integers) or fractional numbers. Integers can be positive or negative whole numbers like 1, 7, 12, -5, -16, etc. Fractions are numbers that contain "parts" of whole numbers and they are written like division sums, for example, ½ and ¾ are fractions; ½ means 1 ÷ 2 and ¾ means 3 ÷ 4. Fractional numbers can also be written as decimals, so instead of writing ½ we can also write 0,5 (because 1 ÷ 2 = 0,5), and instead of ¾, we can also write 0,75 (because 3 ÷ 4 = 0,75). Fractions can also be positive or negative.

The top number in a fraction is called the numerator, while the bottom number is called the denominator: $\frac{numerator}{denominator}$ Therefore, if total fixed production overheads is R1 500 000 and the activity level is 20 000, then R1 500 000 is the numerator and 20 000 is the denominator: $\frac{\text{R1 500 000}}{20\,000}$ = R75 per unit.

Activity 7.1

1 Explain cost drivers.
2 What is an overhead absorption rate?
3 Explain what capacity means.
4 How is an overhead absorption rate determined?

Feedback on activity 7.1

1 Cost drivers are those activities for which an increase in the level of the activity will lead to an increase in the total of that variable cost and a decrease in the activity level will lead to a decrease in the total of that variable cost. Therefore, a cause-and-effect relationship exist between the level of activity and total variable cost: the level of activity (the cause) has the effect of a change in the total variable cost.
2 An overhead absorption rate, also called an overhead recovery rate, is a predetermined rate used to assign the cost of production overheads to the units produced fairly.
3 The capacity of a factory relates to production output. *Theoretical capacity* refers to the maximum output that can be achieved if the equipment runs at 100% efficiency all the time. *Practical capacity* is a factory's theoretical capacity adjusted for realistically expected interruptions in production. *Normal capacity* is how much the company is *likely* to produce realistically in the short to medium term rather than what it *can* produce. *Budgeted capacity* refers to the anticipated use of available capacity based on planned production levels in the budget of the company.
4 In determining the overhead absorption rate, total overheads is used as the nominator, while the total of the selected activity level is used as the denominator.

7.3 APPORTIONING PRODUCTION OVERHEADS

In learning units 4 and 6, we saw that production overheads (indirect materials and indirect labour) are debited to the production overheads clearance account (not the work-in-progress account). The word "clearance" in the production overheads clearance account is important. It indicates that the account is a temporary account where the actual costs incurred can be "parked" until they can be transferred elsewhere. After the final transfer, the balance of the clearance account must be nil.

The actual costs of direct materials and direct labour are debited to the work-in-progress account when the costs are incurred. We do this because we can trace direct production costs directly to the units of production. The actual cost of indirect materials issued to production and of indirect labour and other production overheads (e.g. the cost to rent the factory) are debited (or "parked") in the production overheads clearance account until they are apportioned to production.

We use the predetermined absorption rate to assign overheads to the units of production. We then credit the production overheads clearance account and debit the work-in-progress account. The balance of the work-in-progress account will then reflect the total cost of unfinished units in respect of actual direct material and direct labour costs as well as the apportioned production overheads. Consider transaction K in example 2.3 of learning unit 2 for the activity that follows.

Activity 7.2

1 Explain the purpose of a clearance account. Mention examples of clearance accounts found in the general ledger.
2 How do production overheads flow through the accounting records?

Feedback on activity 7.2

1 A clearance account is a temporary account in which costs are held until they can be transferred to another account. At the end of the accounting period, the balance of the clearance account should be nil. Examples of clearance accounts are the following:

- the production overheads clearance account, where actual costs incurred for overheads are debited and held until the overheads are assigned and transferred to the work-in-progress account
- the wages clearance account, where total actual gross wages and employer contributions to employee benefits are debited and held until allocated to either the work-in-progress account or the production overheads clearance account

2 The cost of production overheads flows through the accounting records as follows:

- When *actual* overheads are incurred, the production overheads clearance account is debited and the inventory/wages clearance/bank/trade payables account is credited with the *actual* (historical) cost of the transaction.
- When overheads are *apportioned to production* (based on predetermined rates), the work-in-progress account is debited and the production overheads clearance account is credited with an amount determined by multiplying the predetermined rate by an actual measure of output (e.g. actual direct labour hours or actual machine hours).

The production overheads clearance account will thus reflect the following entries:

Production overheads clearance account

	R		R
Materials inventory (indirect materials)	xxxx	Work-in-progress (apportionment)	xxxx
Wages clearance (indirect labour)	xxxx		
Bank/Payables (rent, insurance, etc)	xxxx		

We can apportion fixed and variable overheads to production separately by applying different absorption rates. This will especially be the case with standard costing. Fixed and variable overheads can also be apportioned by applying the same predetermined absorption rate.

The predetermined absorption rates can be a single rate or multiple rates. A single rate (plant-wide rate) is determined for the entire plant. Multiple rates are determined for each production department and is used in process costing.

7.3.1 Single absorption rate

Earlier, we saw that IAS 2.12 states that the *costs of conversion of inventories include … a systematic allocation of fixed and variable production overheads ….*

IAS 2.13 further states that the *allocation of fixed production overheads … is based on the normal capacity of the production facilities*.

We also indicated earlier that we can use several capacity bases to assign overheads to units produced. The bases can be volume or cost-based. All these bases refer to the capacity of the factory. Therefore, we can measure total capacity by, amongst others, the total units produced, the total machine hours or total direct labour hours worked, the total value of direct materials converted, etc. We will discuss capacity in detail later on in this learning unit.

A single rate (or plant-wide rate) is sometimes used for apportioning production overheads to production output (the units produced). This approach is suitable when the company manufactures similar products where all overheads are driven by approximately the same measure of capacity, for example machine hours. We calculate the single rate by dividing the total budgeted production overheads by the capacity basis selected for the absorption of overheads (e.g. machine hours).

Example 7.2

Gaborone makes a variety of hand-crafted items. Because the production process is labour intensive, total direct labour hours will be used as the denominator in determining an overheads absorption rate. The factory budgeted for total production overheads of R600 000 and 5 000 direct labour hours (DLH) in the current financial year to achieve its target production levels.

The single rate that will be used to absorb the overheads into the cost of units produced is R600 000 ÷ 5 000 hours = R120 per direct labour hour. Assume that the actual production output of Gaborone was as follows:

Hand-crafted item produced	Total units completed	Total DLH
Fairies	500	1 500
Squirrels	300	1 200
Vases	2 000	3 000

To determine the overheads apportioned to each unit produced, we must first calculate the total overheads apportioned to the different products and then divide the total overheads by the number of units produced:

Total overheads apportioned

Item produced	Calculation	Total overheads apportioned
Fairies	1 500 direct labour hours x R120 per DLH	R180 000
Squirrels	1 200 direct labour hours x R120 per DLH	R144 000
Vases	3 000 direct labour hours x R120 per DLH	R360 000

Overheads absorbed per unit of production

Item produced	Calculation	Overheads per unit
Fairies	R180 000 / 500 units produced	R360
Squirrels	R144 000 / 300 units produced	R480
Vases	R360 000 /2 000 units produced	R180

You probably noticed that the total overheads actually apportioned to production amounted to R684 000 (180 000 + 144 000 + 360 000). This is more than the total budgeted overheads of R600 000. Let's assume that the actual total overheads incurred were R712 500. We now have three figures, all of which are relating to the same cost, namely total production overheads:

Budgeted overheads	R600 000
Absorbed overheads	R684 000
Actual overheads	R712 500

It is very important that you understand that the budget is *not* a part of the formal accounting records (general ledger) of the organisation; therefore, the budgeted overheads of R600 000 will not flow through the general ledger accounts of Gaborone at all. Only actual transactions are recorded in the accounting records. The actual overheads of R712 500 will flow into the general ledger (production overheads clearance account), and the absorbed overheads of R684 000 will flow out of the general ledger (production overheads clearance account).

It is also important that you understand that a budget is merely a best estimate of what will occur in the forthcoming year. We prepare a budget for future production. As you know, no one can predict the future with certainty. The management accountant uses all relevant information available to *estimate* what will happen in the future (i.e. the forthcoming financial year). What actually transpires during that year is seldom, if ever, exactly according to the budget. There are several reasons why budgeted overheads are different from the actual overheads, for example unexpected price increases or decreases, inefficiencies or better than expected efficiencies, etc.

Let's now have a closer look at the amounts that affect the accounting records. You will recall that the production overheads clearance account is used to record production overheads. In our example above, the production overheads clearance account will appear as follows:

Production overheads clearance account

	R		R
Bank/Payables etc. (actual overheads)	712 500	Work-in-progress (absorbed overheads)	684 000

Earlier, we said that a clearance account is a temporary account into which costs are held until they can be transferred, at which point the balance of the account must be nil. However, after we have transferred the cost in our example, a debit balance of R28 500 (712 500 – 684 000) remains. This means that the actual overheads were more than the overheads absorbed in production. We call this an *under absorption* of overheads: we absorbed too little overheads into the cost of production. Had the actual overheads been less than the overheads absorbed, we would have had an *over absorption* of overheads.

What do we do with the balance of R28 500 to get this clearance account to a nil balance? We now know that the actual cost of overheads was R712 500 and that the actual labour hours were

5 700. An absorption rate based on these actual figures would have been R712 500 / 5 700 = R125 per labour hour. However, based on budgeted figures, we used an absorption rate of R120 per labour hour (i.e. R5 per labour hour was under absorbed).

Let's assume that there were no inventories on hand at the beginning of the year, but that 100 fairies, 20 squirrels and 400 vases were left in inventory at the end of the year. That means that 400 (500 – 100) fairies were sold, 280 (300 – 20) squirrels were sold and 1 600 (2 000 – 400) vases were sold. Let's see where the under absorption occurred:

	Actual labour hours (ALH)	Total under absorption : ALH x R5 A	Total units produced B	Units sold C	Units in inventory D	Under absorbed in sold units (C / B) x A	Under absorbed in units in inventory (D / B) x A
Fairies	1 500	7 500	500	400	100	6 000	1 500
Squirrels	1 200	6 000	300	280	20	5 600	400
Vases	3 000	15 000	2 000	1 600	400	12 000	3 000
		R28 500				R23 600	R4 900

Explanation of calculations (fairies only):

Total under absorbed cost (A) R7 500
Therefore, under absorption in:
sold units (400 / 500 x R7 500) R6 000
inventory (100 / 500 x R7 500) R1 500

Alternative calculation:
Under absorption per unit produced = R7 500 ÷ 500 = R15
Under absorption in:
sold units (400 x R15) R6 000
inventory (100 x R15) R1 500

The total under absorption of overheads in units sold is R23 600, and the total under absorption of overheads in units still in inventory is R4 900. That means that cost of sales is understated by R23 600, and that inventory is understated by R4 900. Strictly speaking, we should adjust cost of sales by R23 600 and inventory by R4 900. However, because the R4 900 is considered an immaterial amount, the full R28 500 will be adjusted against the cost of sales account, which will clear the production overheads clearance account:

Production overheads clearance account

	R		R
Bank/Payables (actual overheads)	712 500	Work-in-progress (absorbed overheads)	684 000
		Cost of sales (under absorption)	28 500
	712 500		712 500

Example 7.3

The following information pertains to the fixed production overheads budget of Harare Limited for production outputs within the relevant range:

	R
Salaries and benefits:	
Supervisor	360 000
Quality controllers	600 000
Wages and benefits:	
Cleaning staff	240 000
Security staff	480 000
Insurance premium:	
Factory plant	150 000
Factory equipment	100 000
Property rates	60 000
Fixed portion of electricity	120 000
Depreciation of factory equipment	300 000
Total	2 410 000

Cleaning and security staff are employed on a shift basis. Each staff member works an eight-hour shift per day, for which they receive a fixed wage per week. The cleaning and security staff are not expected to work overtime. Therefore, their wages and benefits are considered as fixed costs. Because the total cost is not dependent on any variable level of activity and production is within the relevant range, the wages will be the same (fixed) regardless of the number of units produced.

The following are the normal annual production capacity levels of Harare:

Total units produced	920 000
Total machine hours	85 000
Total direct labour hours	350 000
Total kilogram of direct materials converted	240 000

Required

Calculate an absorption rate for fixed overheads using each of the above capacity levels as denominator.

Answer

The numerator in each instance is the total budgeted fixed production overheads of R2 410 000, while the denominator is one of the capacity levels:

Numerator	A	R2 410 000	R2 410 000	R2 410 000	R2 410 000
Denominator	B	920 000 units	85 000 machine hrs	350 000 DLH	240 000 kg
Allocation rate	A/B	R2,6196 per unit produced	R28,3529 per machine hour	R6,8857 per DLH	R10,0417 per kg converted

Assume that Harare Limited produces standard umbrellas and that there is very little difference between the different types of umbrellas produced. It would then make sense for Harare to use units of production as denominator in determining an overheads apportionment rate. Where more than one type product is manufactured, an apportionment rate based on units of production may not be fair.

Activity 7.3

Use the information provided in example 7.3. Assume that Harare Limited produces two very different types of umbrellas: an umbrella that could double as a walking stick, and an umbrella that can fold up and fit into a handbag. The following information pertains to the production budget of Harare Limited for the year ending 30 September:

	Large umbrella	Fold-up umbrella	Total
Budgeted units of production	370 000	550 000	920 000
Budgeted machine hours	25 000	60 000	85 000
Budgeted direct labour hours	110 000	240 000	350 000
Budgeted kilograms of direct materials converted	142 000	98 000	240 000

Using the fixed overheads (FOH) absorption rates for each of the four possible denominators determined in activity 7.3, for each umbrella type calculate the budgeted fixed production overheads per unit as well as the total fixed overheads budget.

Feedback on activity 7.3

		Calc	Rate per activity 7.3	Umbrella type		Total FOH apportioned
	Apportionment basis↓		R	Large R	Fold-up R	R
	Completed units					
A	Units of production			370 000	550 000	
	Apportionment rate		2,6196			
	Total FOH apportioned	*A x rate*		*969 252*	*1 440 780*	*2 410 032*

		Calc	Rate per activity 7.3	Umbrella type		Total FOH apportioned
	Apportionment basis↓		R	Large R	Fold-up R	R
	Machine hours					
B	Total machine hours			25 000	60 000	
C	Machine hours per unit	B/A		0,0676	0,1091	
D	Fixed overheads per unit	C x rate	28,3529	1,9157	3,0930	
	Total FOH apportioned	*A x D*		*708 823*	*1 701 174*	*2 409 997*
	Labour hours					
E	Total direct labour hours			110 000	240 000	
F	Direct labour hours per unit	E/A		0,2973	0,4364	
G	Fixed overheads per unit	F x rate	6,8857	2,0471	3,0047	
	Total FOH apportioned	*A x G*		*757 427*	*1 652 568*	*2 409 995*
	Materials converted					

H	Materials consumption			142 000	98 000	
I	Kilogram per unit	H/A		0,3838	0,1782	
J	Fixed overheads per unit	I x rate	10,0417	3,8538	1,7892	
	Total FOH apportioned	*A x J*		*1 425 921*	*984 087*	*2 410 008*

Explanation

Allocation base: completed units

The allocation rate of R2,6196 is already per unit of production. Therefore, we multiply the budgeted units of production per product (type of umbrella) by the rate per unit.

Apportionment base: machine hours

The absorption rate is provided per machine hour. We therefore need to first calculate the machine hours required for each unit of production (total machine hours ÷ total units of production). We can then multiply the machine hours per unit by the rate per machine hour to obtain the fixed overheads per unit (umbrella) produced.

Apportionment base: direct labour hours

The absorption rate is provided per direct labour hour. We therefore need to first calculate the direct labour hours required for each unit of production (total direct labour hours ÷ total units of production). We then multiply the direct labour hours per unit by the rate per direct labour hour to obtain the fixed overheads per unit.

Apportionment base: direct materials converted

The absorption rate is provided per kilogram converted. We therefore need to first calculate the kilograms required for each unit of production (total kg ÷ total units of production). We then multiply the kilogram per unit by the rate per kilogram to obtain the fixed overheads per unit.

The small difference between the total fixed overheads apportioned (see last column) for each of the four bases and the actual fixed overheads of R2 410 000 is the result of rounding.

Because the units are not of the same manufacturing standards, it may not be fair to allocate the fixed overheads based on completed units. Let's assume that the variable costs per umbrella are as follows:

	Large	**Fold-up**
	R	**R**
Direct materials cost per unit	171	79
Total variable conversion cost per unit	69	90
Direct labour cost per unit	24	35
Variable overheads per unit	45	55
Total variable cost per unit	240	169
The following is the potential cost apportioned per umbrella (see activity 7.4):		
Completed units	2,6196	2,6196
Machine hours	1,9157	3,0930
Direct labour hours	2,0471	3,0047
Materials used	3,8538	1,7892

Although the materials cost of the large umbrella is more than double that of the fold-up umbrella, the conversion cost of the fold-up umbrella is more than 30% higher than that of the

large umbrella. In the case of umbrellas, it is likely that all the direct materials are added to production right at the beginning of the manufacturing process. In addition, overheads are conversion costs. Therefore, it would make sense to apportion fixed overheads on a basis consistent with the conversion of each product. We could consider either machine hours or direct labour hours as a basis for the apportionment of fixed overheads. If we assume that the production process is more labour intensive, we will select direct labour hours as the basis for the apportionment of fixed production overheads. Therefore, the total budgeted unit cost of production will be as follows:

	Large	**Fold-up**
	R	**R**
Direct materials cost per unit	171,00	79,00
Total variable conversion cost per unit	69,00	90,00
Direct labour cost per unit	24,00	35,00
Variable overheads per unit	45,00	55,00
Total variable cost per unit	240,00	169,00
Fixed overheads per unit	2,05	3,00
Total budgeted unit cost	240,05	172,00

We have now seen how we can use a single absorption rate to apportion production overheads to production output. We have also seen that we can use several capacity activity levels as the denominator to determine the apportionment rate, and that each activity level will yield a different result. When considering which activity level to apply, we must bear in mind that the resulting overheads assigned should reflect the cost of each product fairly.

As mentioned, a single rate is suitable for smaller companies that manufacture similar products or companies that use the job-costing method for assigning production costs. A single rate would be inappropriate for companies that manufacture a diverse range of products – often in more than one department – and use equipment of varying sophistication, like in a process costing system. These companies would apply an overhead rate per production department.

7.3.2 Assigning overheads to departments

In most manufacturing environments, direct materials undergo a process of conversion in more than one production department. In order for us to include production overheads in the total cost of production, we must determine the cost of production overheads incurred by each production department.

A typical factory set-up will have production departments as well as service departments, which render essential services to the production departments. All the manufacturing activities required to convert direct materials into finished goods take place in the production departments. The activities of services departments do not convert direct materials into finished goods. However, service departments render essential services that enable the production departments to perform their activities. (Note that service departments can also render services to other service departments.) Since the goods manufactured receive an indirect benefit from the activities of service departments, we must add the total costs of service departments to the total production overheads and ultimately apportion these costs to the goods produced. For this purpose, we must divide the costs incurred by service departments between the production departments on a reasonable basis. The steps followed for the distribution of production overheads are the following:

Step 1: primary allocation and apportionment

We also refer to this step as the departmentalisation of overheads. It involves the *allocation* of overheads (e.g. indirect salaries) that we can trace directly to production as well as service departments. It further involves the *apportionment* of common overheads (e.g. rent) on suitable bases to both the production and service departments.

Step 2: secondary apportionment

During this step, we reapportion the costs of service departments to production departments. The different methods for apportioning service department costs to production departments include the following:

Direct method

This method apportions the costs of service departments directly to production departments; however, it ignores the fact the service departments also render services to other service departments.

Step method

Also called the sequential method, this method apportions the costs of service departments on a one-by-one basis to production and other service departments. This method recognises the fact the service departments also render services to other service departments, but ignores the fact that services departments render reciprocal services (i.e. services to each other). Under this method, we first apportion the costs of the department that provides most services to other departments to the other service departments and the production departments. Then we apportion the costs of the service department that provides the second most services, and so forth until we apportion the costs of the last service department to the production departments.

Reciprocal method

This method recognises that services departments also render services to each other. For example, a canteen in the factory will render a service to the factory administration, and the factory administration will also render a service to the canteen. Under the reciprocal method, we must apportion some costs of the canteen to the administration department and some costs of the administration department to the canteen. Since this method of apportionment can become very complicated and require software to perform the intricate calculations, it falls beyond the scope of this learning unit.

Step 3: absorption rates

The final step involves determining the absorption rates (recovery rates) for apportioning the overheads to units of production. We distinguish between the allocation and apportionment of production overheads:

Allocation

When we assign overheads directly to a department, we say we *allocate* them to that department. In the example of Woodpecker (Pty) Limited, we can allocate the salaries of canteen staff directly to the canteen. Allocation does not require any calculations.

Apportionment

When we cannot assign overheads directly, we must *apportion* them to the departments using one or more arbitrary bases. For example, we can apportion rent and insurance cost based on the floor space occupied by each department. Apportionment requires calculations.

We will explain the allocation and apportionment of production overheads to production and service departments and the further apportionment of the costs of service departments to production departments by means of example 7.4.

Example 7.4

Maputo Limited is a manufacturing company with two production departments, namely P1 and P2. The company also has two service departments, namely S1 and S1 that provide services to the production departments and each other. S2 provides the most services to the other departments. The management accountant is finalising the budget for next year. She has budgeted for total production overheads of R960 000 for the year. She must apportion this cost in the ratio 35:25:20:20 to P1, P2, S1 and S2 respectively, using the step method. Overhead absorption rates are based on machine hours. It is estimated that P1 and P2 will work 12 000 and 6 000 machine hours respectively.

Apportion the budgeted production overheads and determine an overhead absorption rate per production department.

		P1	**P2**	**S1**	**S2**
	Apportionment ratio →	35	25	20	20
Initial apportionment	960 000 / (35 + 25 + 20 +20) = 9 600				
	9 600 x 35; 9 600 x 25; 9 600 x 20; 9 600 x 20	336 000	240 000	192 000	192 000
Apportionment S1	192 000 / (35 + 25 + 20) = 2 400				
	2 400 x 35; 2 400 x 25; 2 400 x 20	84 000	60 000	48 000	(192 000)
Sub-total		420 000	300 000	240 000	
Apportionment S2	240 000/(35 + 25) = 4 000				
	4 000 x 35; 4 000 x 25	140 000	100 000	(240 000)	
Total overheads per production department		560 000	400 000		
Total machine hours budgeted		12 000	6 000		
Absorption rate per machine hour: 560 000 / 120 00; 40 000 / 6 000		46,667	66,667		
Rounded		R47	R67		

Activity 7.4

In this activity, we will expand on the information provided in example 2.2. The factory of Woodpecker (Pty) Limited is organised into eight departments. The production departments directly involved in the manufacturing of furniture are as follows:

Preparation – cuts wood, bends metal frames and prepares upholstered panels

Assembly – assembles components from Preparation into chairs, tables and cabinets

Finishing – applies varnish

The service departments are as follows:

Administration (manager, supervisors, security and quality control)

Maintenance

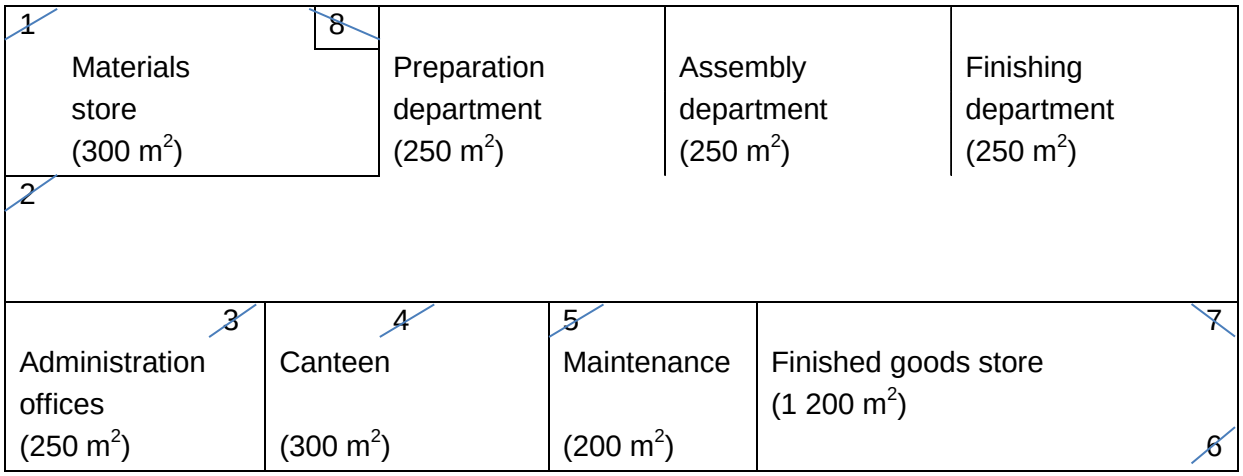
Canteen

Materials store

Finished goods store

Figure 7.1

A basic floor plan of the factory of Woodpecker is as follows:



Solid lines indicate physical walls, and diagonal lines indicate door entrances. Broken lines between the three production departments indicate that no physical walls separate the departments; this allows for the unhindered movement of work-in-progress from one department to the next. The floor space occupied by each department is indicated in brackets.

Deliveries of materials from suppliers are received at door 1. Stores personnel also use this door to enter the stores. Only the store personnel have keys and are allowed to enter through this door. Door 2 has appropriate security and provides general access for all staff working at the plant. Only administration staff have keys for door 3. Only canteen staff have keys for door 4. Only maintenance and cleaning staff have keys for door 5. Sold goods leave the finished goods store through door 6. Proper controls ensure that only authorised goods leave the store. Finished goods enter the finished goods store through door 7. Door 7 have proper access control. Materials are issued to the preparation department through door 8. Proper controls ensure that only authorised materials leave the store.

Woodpecker uses the following equipment in the manufacturing process: panel dividing saws, beam saws, circular saws, spindle moulders, surface planers, thickness planers, band saws, edge banding machines, processing and finishing machines. The carrying value of the equipment invested in each of the production departments is as follows:

Preparation	R7 000 000
Assembly	R2 000 000
Finishing	R1 000 000

In example 2.2, we saw that these departments employ the following staff members (excluding technicians):

Materials stores	3	(manager + 2)
Finished goods store	5	(manager + 4)
Preparation	2	(1 supervisor + 1 quality controller)
Assembly	2	(1 supervisor + 1 quality controller)
Finishing	2	(1 supervisor + 1 quality controller)

Administration	10	(factory manager + PA + 2 cleaners + 6 security guards)
Canteen	4	(manager + 3)
Maintenance	2	(as stated in example 2.2)

The budget for the production overheads of Woodpecker for the forthcoming year is as follows:

	R
Indirect materials and consumables	
Glue	15 000
Staples	20 000
Varnish	50 000
Oil and grease	10 000
Diesel for generator used to drive equipment	365 000
Indirect labour*	
Factory management	380 000
Supervisors and quality controllers[#]	1 200 000
Maintenance	280 000
Cleaning and security	686 000
Stores	1 000 000
Canteen	294 000
Factory overheads	
Rent and insurance	840 000
Depreciation of manufacturing equipment	1 500 000
Electricity	210 000
Refreshments (canteen)	650 000
Total budgeted production overheads	7 500 000

*Note that the salaries of the technicians are excluded, because they are direct labour costs.
[#]Assume all quality controllers and supervisors are paid the same salary.

The total direct machine hours budgeted for each production department are as follows:

Preparation	18 000
Assembly	14 000
Finishing	8 000

Required

1 Allocate the overheads that can be traced directly to the production and service departments of Woodpecker (Pty) Limited.
2 Using suitable bases, apportion common overheads to the production and service departments.
3 Apportion the costs of service departments to the production departments according to the following:
3.1 direct method
3.2 step method
4 Determine a suitable absorption rate for each production department.

Feedback on activity 7.4

We will now explain the allocation and apportionment of the production overheads of Woodpecker (Pty) Limited. Please take note that although the materials store and the finished goods store are physically removed from each other and are accounted for as two separate departments, we will treat them as a single department for the purposes of the allocation and apportionment of overheads in this example.

1 Step 1: primary allocation of overheads that can be traced directly to departments

Identify the costs that can be traced directly to departments:

Salaries can be traced directly to departments.

Indirect materials can be traced directly to departments: glue and staples are used for putting the different parts of the furniture together; therefore, only the assembly department will consume glue and staples. Varnish is applied in the finishing department only. Refreshments are used in the canteen only.

Allocate the costs that can be traced directly to departments:

	Total	Prep	Assembly	Finish	Stores	Admin	Maint	Canteen
	R	R	R	R	R	R	R	R
Glue	15 000		15 000					
Staples	20 000		20 000					
Varnish	50 000			50 000				
Salaries:								
Manager	380 000					380 000		
Sup & QA	1 200 000	400 000	400 000	400 000				
Maint.	280 000						280 000	
Clean & sec	686 000					686 000		
Stores	1 000 000				1 100 000			
Canteen	294 000							294 000
Refreshm.								650 000

2 Step 1 (continued): apportionment of common overheads to departments

The remaining common overheads that must be apportioned to the departments are the following:

	R
Rent and insurance	840 000
Depreciation of manufacturing equipment	1 500 000
Diesel for generator	365 000
Electricity	210 000
Oil and grease	10 000

We now have to identify suitable bases for apportioning these overheads. From the available information, we can use four possible bases to apportion the common overheads to departments: floor space, number of employees, number of machine hours and value of equipment.

We summarise these bases per department below:

	Floor space m^2	Employees	Machine hours	Equipment value (R)
Preparation	250	2	18 000	7 000 000
Assembly	250	2	14 000	2 000 000
Finishing	250	2	8 000	1 000 000
Stores	1 500 (300 + 1 200)	8 (3 + 5)		
Administration	250	10		
Maintenance	300	2		
Canteen	200	4		
Total	3 000	30	40 000	10 000 000

The most appropriate bases for the allocation of the common overheads would be the following:

Rent and insurance – rent and insurance payments based on the size of the factory plant; therefore, *floor space* is the most appropriate of the bases available.

Depreciation of manufacturing equipment – the *value of equipment* in use will be the most appropriate basis.

Diesel for generator – the generator is used to power the manufacturing equipment; therefore, machine hours will be the appropriate basis.

Electricity – since equipment is powered by diesel, machine hours will be an inappropriate apportionment basis for the absorption of electricity costs; instead, we will use the number of employees in this example.

Oil and grease (used for lubricating the manufacturing equipment) – the more the machines are used, the higher the quantity of grease will be. Machine hours would therefore be appropriate as a basis for apportionment.

Apportioning common overheads to departments using appropriate bases

	Total	Prep	Assembly	Finish	Stores	Admin	Maint	Canteen
	R	R	R	R	R	R	R	R
Glue	15 000		15 000					
Staples	20 000		20 000					
Varnish	50 000			50 000				
Salaries:								
Manage	380 000					380 000		
Sup & QA	1 200 000	400 000	400 000	400 000				
Mainten	280 000						280 000	
Clean & sec	686 000					686 000		
Stores	1 000 000				1 100 000			
Canteen	294 000							294 000
Refreshm	650 000							650 000
Rent & ins	840 000	70 000	70 000	70 000	420 000	70 000	84 000	56 000
Depr	1 500 000	1 050 000	300 000	150 000				
Electricity	210 000	14 000	14 000	14 000	56 000	70 000	14 000	28 000
Diesel	365 000	164 250	127 750	73 000				
Oil & grease	10 000	4 500	3 500	2 000				
	7 500 000	1 702 750	950 250	759 000	1 476 000	1 206 000	378 000	1 028 000

Calculation

	Total	Prep	Assembly	Finish	Stores	Admin	Maint	Canteen
Rent & ins	840 000	70 000	70 000	70 000	420 000	70 000	84 000	56 000
840 000 / 3 000 x		250	250	250	1500	250	300	200
Depr	1 500 000	1 050 000	300 000	150 000				
1 500 000 / 10 x		7	2	1				
Electricity	210 000	14 000	14 000	14 000	56 000	70 000	14 000	28 000
210 000 / 30 x		2	2	2	8	10	2	4
Diesel	365 000	164 250	127 750	73 000				
365 000 / 40 x		18	14	8				
Oil & grease	10 000	4 500	3 500	2 000				
10 000 / 40 x		18	14	8				

Explanation of calculation

Rent: Total rent = R840 000, and total square metres are 3 000 m^2. Therefore, rent per square metre = R840 000 / 3 000. Preparation occupies 250 m^2; therefore, rent for Preparation = R840 000 / 3 000 x 250 = R70 000.

Depreciation: Total depreciation is R1 500 000, and total value of equipment = R10 000 000. Therefore, depreciation per R1 of equipment value = R1 500 000 / 10 000 000. The value of equipment in Preparation is R7 000 000; therefore, depreciation for Preparation = R1 500 000 / 10 000 000 x 7 000 000 = R1 050 000, OR R1 500 000 / 10 x 7 = R1 050 000.

	R		**R**
Preparation	7 000 000	÷ 1 000 000 =	7
Assembly	2 000 000	÷ 1 000 000 =	2
Finishing	1 000 000	÷ 1 000 000 =	1
	10 000 000		10

We have now allocated and apportioned the total budgeted production overheads to the production and service departments and can now apportion the cost of the service departments to the production departments.

3 Step 2: secondary apportionment

We can re-apportion the service department costs based on either the direct method or the step method.

3.1 Re-apportionment based on the direct method

According to this method, we re-apportion the overheads accumulated in the service departments to the production departments on bases that reflect the service provided by the service department concerned. This method ignores the fact that service departments render services to other service departments. An advantage of this method is its simplicity, although it may not necessarily produce the same accurate results as the other methods.

In our example, we will apply the following bases for the re-apportionment:

Canteen: we will use the number of employees as basis for re-apportionment, as the canteen provides service to the employees of the different departments. For this re-apportionment, we will include direct labour employees, as the technicians will also make use of the service offered by the canteen. Therefore, the employees per production department are as follows: Preparation – 9 + 2 = 11; Assembly – 7 + 2 = 9; Finishing – 4 + 2 = 6

Maintenance: the function of the maintenance department is to service and repair manufacturing equipment. The assumption is that the more the machines are used, the more the maintenance and repairs will be. Therefore, we will use machine hours as a basis for re-apportioning the maintenance overheads.

Administration: the administration department is the home department of one factory manager, one PA, two cleaners and six security guards. Since the service rendered by cleaning and security is based largely on the space occupied, we will use square meters as a basis for re-apportionment.

Stores: the service provided by the materials store is to issue materials to Preparation, while the finished goods store renders the service of receiving finished goods from Finishing. However, the materials issued to production move through all three manufacturing departments before the completed goods are sent to the finished goods store. For the purposes of this example we will re-apportion the stores' overheads to the production departments in equal measures.

Re-apportioning service department costs to production departments using the direct method

	Basis	**Total**	**Prep**	**Assembly**	**Finish**
		R	**R**	**R**	**R**
Total primary allocation – see above		3 412 000	1 702 750	950 250	759 000
Stores	Equal	1 476 000	492 000	492 000	492 000
Administration	Floor space	1 206 000	402 000	402 000	402 000
Maintenance	Machine hours	378 000	170 100	132 300	75 600
Canteen	Employees	1 028 000	434 923	355 846	237 231
Total overheads		7 500 000	3 201 773	2 332 396	1 965 831

Calculation

		Total	**Prep**	**Assem**	**Finish**
Stores (R1 476 000 / 3 = 492 000)	R492 000 x A	1 476 000	492 000	492 000	492 000
	A: equal measure →		1	1	1
Admin (R1 206 000 / 750 = 1 608)	R1 608 x B	1 206 000	402 000	402 000	402 000
	B: floor space →		250	250	250
Maintenance (378 000 / 40 = 9 450)	R9 450 x C	378 000	170 100	132 300	75 600
	C: machine hours →		18	14	8
Canteen (1 028 000 / 26 = 39 538,5)	R39 538,5 x D	1 028 000	434 923	355 846	237 231
	D: employees →		11	9	6

3.2 Re-apportionment based on the step method

Under this method, we re-apportion the costs of the service department that provides most services to other departments to the other service and production departments first.

Let's take a closer look at the service departments: administration (factory manager, cleaners and security) and the canteen provide services to all the departments; the stores and maintenance departments provide services to the production departments only. The service department with the highest cost usually provides most of the services based on the assumption that services drive the costs. We will first re-apportion the costs of the departments that render services to all departments and thereafter the costs of the departments that render services to the production departments only. Based on the assumed extent of services rendered, we will re-apportion the costs in the following order:

Administration	R1 206 000	on the basis of floor space
Canteen	R1 028 000	on the basis of number of employees
Stores	R1 476 000	in equal proportions
Maintenance	R378 000	on the basis of machine hours

	Preparation	Assembly	Finishing	Stores	Admin	Maintenance	Canteen
	R	R	R	R	R	R	R
Primary all	1 702 750	950 250	759 000	1 476 000	1 206 000	378 000	1 028 000
Admin	109 637	109 637	109 637	657 819	(1 206 000)	131 562	87 708
Sub-total	1 812 387	1 059 887	868 637	2 133 819	0	509 562	1 115 708
Canteen	340 911	278 927	185 951	247 935		61 984	(1 115 708)
Sub-total	2 153 298	1 338 814	1 054 588	2 381 754		571 546	0
Stores	793 918	793 918	793 918	(2 381 754)			
Maint	257 196	200 041	114 309			(571 546)	
Total	3 204 412	2 332 773	1 962 815	0		0	

Calculations

Administration is re-apportioned to other departments based on floor space. The other departments occupy the following floor space:

	Total	**Prep**	**Assembly**	**Finish**	**Stores**	**Maint**	**Canteen**
Floor space	2 750	250	250	250	1 500	300	200

Total cost of Administration was R1 206 000; therefore, R1 206 000 / 2 750 = R438,5454 per square metre. Therefore, the amounts re-apportioned to other departments are as follows:

	Total	**Prep**	**Assembly**	**Finish**	**Stores**	**Maint**	**Canteen**
Floor space	2 750	250	250	250	1 500	300	200
x R438,5454	R1 206 000	R409 437	R109 437	R109 437	R657 819	R131 563	R87 708

Canteen is re-apportioned to other departments based on the number of employees. The number of employees per department is as follows:

	Total	**Prep**	**Assembly**	**Finish**	**Stores**	**Maint**
Employees	36	11	9	6	8	2

The total cost of Canteen was R1 115 708; therefore, R1 115 708 / 36 = R30 991,8889 per employee. Therefore, the amounts re-apportioned to other departments are as follows:

	Total	**Prep**	**Assembly**	**Finish**	**Stores**	**Maint**
Employees	36	11	9	6	8	2
x R30 991,8889	R1 115 708	R340 911	R278 927	R185 951	R247 935	R61 984

The only service departments remaining are Maintenance and Stores. These departments do not render any services to each other, and therefore we re-apportion to production departments only.

Maintenance is re-apportioned to production departments based on the number of machine hours. Machine hours in the production departments were 18 000, 14 000 and 8 000 respectively. To simplify the calculations, we divide the machine hours for each department by 1 000:

	Total	**Prep**	**Assembly**	**Finish**
Machine hours	40	18	14	8

Whether we use 18 000:14 000:8 000 or 18:14:8, the ratio remains the same.

The total cost of Maintenance was R571 546; therefore, R571 546 / 40 = R14 288,65 per machine hour. Therefore, the amounts re-apportioned to other departments are as follows:

	Total	**Prep**	**Assembly**	**Finish**
Machine hours	40	18	14	8
x R14 28865	R571 546	R257 196	R200041	R114 309

Stores are re-apportioned to the production departments in equal measure. The total cost of Stores was R2 381 754; therefore, R793 918 per production department.

We have now re-apportioned the total budgeted production overheads to the production departments as follows:

Preparation	R3 204 412
Assembly	R2 332 773
Finishing	R1 962 815
	R7 500 000

4 Step 3: absorption rates

In this step, we have to determine absorption rates for apportioning the overheads to units of production. We will assume that machine hours are the most appropriate capacity basis for an absorption rate. Columns A and B below show the apportionment rate based on the step method, while columns C and D show the apportionment rate based on the direct method:

	A Step method rate per machine hour	B Calculation	C Direct method rate per machine hour	D Calculation
Preparation	168,653	3 204 412 / 19 000	168,514	3 201 773 / 19 000
Assembly	155,518	2 332 773 / 15 000	155,493	2 332 396/ 15 000
Finishing	218,091	1 962 815 / 9 000	218,426	1 965 831 / 9 000

Activity 7.5

The following information relates to DEF Production:

Direct materials issued to production	R650 000
Indirect materials issued to production	R120 000
Consumables issued to production	R35 000
Direct labour cost incurred	R890 000
Indirect labour cost incurred	R745 000
Factory overheads incurred	R910 000
Production overheads assigned to production	R1 800 000
Value of work-in-progress at the end of the year	R230 000

There was no work-in-progress at the beginning of the year. There were no finished goods in inventory at the beginning or the end of the year.

Required

Based on the information above, prepare the following general ledger accounts:

(a) Work-in-progress account
(b) Production overheads clearance account (POCA)
(c) cost of sales account

Feedback on activity 7.5

(a) Work-in-progress account

Inventory: direct materials	650 000	Inventory: finished goods[1]	3 110 000
Wages clearance: direct labour	890 000	Balance c/f	230 000
POCA: apportioned overheads	1 800 000		
	3 340 000		3 340 000
Balance b/d	230 000		

(b) Production overheads clearance account (POCA)

Inventory: indirect materials	120 000	Work-in-progress	1 800 000
Inventory: consumables	35 000	Cost of sales: under absorption[2]	10 000
Wages clearance: indirect labour	745 000	of overheads	
Payables: factory overheads	910 000		
	1 810 000		1 810 000

(c) Cost of sales account

Finished goods: cost of goods sold[1]	3 110 000
POCA: under absorption[2]	10 000
	3 120 000

[1] The difference between amounts debited to work-in-progress and the closing value of work-in-progress represents the value of goods completed and transferred to finished goods. There was no opening or closing inventory of finished goods; therefore, all goods completed during the period have been sold.

[2] The balance remaining on the production overheads clearance account represents an under absorption of overheads; the apportioned overheads were less than the actual overheads.

7.4 CORRELATION OF VARIABLES AND RELEVANT RANGE

7.4.1 Correlation of variables

A *variable* is a figure that can increase or decrease over time. In cost accounting, the number of units produced, direct labour hours worked, machine hours worked, quantity of direct materials used, cost of direct materials used and the cost of production are all examples of variables. *Correlation* ("co-relation") expresses the interdependence or relationship between two variables (i.e. it tells us how dependent one variable is on another variable). The variable that is dependent on the other is called the *dependent variable*, while the other variable is called the *independent variable*. Let's look at the following two variables:

Variable 1: quantity of units produced
Variable 2: total cost of direct materials used

Which of these variables would you consider the *dependent variable,* and which would you consider the *independent variable*? How do you determine the quantity of units produced? Well, you count them. How do you determine the total cost of direct materials used? You have to multiply the *materials cost per unit* by the *quantity of units produced*. Clearly, we need to know the quantity of units produced before we can calculate the total cost of direct materials used. In this relationship, the total cost of direct materials used *depends* on the total quantity of units produced. Therefore, variable 2 (total cost of direct materials used) is the dependent variable, and variable 1 (quantity of units produced) is the independent variable. We also say that the independent variable (quantity of units produced) *drives* the dependent variable (total cost of direct materials used).

In statistics, we express the correlation between two variables as a *correlation coefficient*. The correlation coefficient lies between -1,0 and +1,0. A correlation coefficient of +1 indicates a perfect positive correlation. A *perfect positive correlation* exists between two variables when one variable moves a given amount and the second variable moves proportionally in the *same* direction. A correlation coefficient of -1 indicates a perfect negative correlation. A *perfect negative correlation* exists between two variables when one variable moves a given amount and the second variable moves proportionally in the *opposite* direction. A correlation coefficient of 0 indicates that there is no correlation between the two variables.

The correlation grows stronger as the correlation coefficient approaches +1 or -1. The closer the correlation coefficient is to +1 or -1, the more closely the two variables are related. A correlation coefficient approaching +1, for example a coefficient of between +0,5 and +0,9 indicates a positive correlation, which means as the one variable increases (or decreases), the other variable also increases (or decreases) in the same direction, but not proportionally. A correlation coefficient approaching -1, for example a coefficient of between -0,5 and -0,9 indicates a negative correlation, which means as the one variable increases (or decreases), the other variable decreases (or increases) in the opposite direction, but not proportionally.

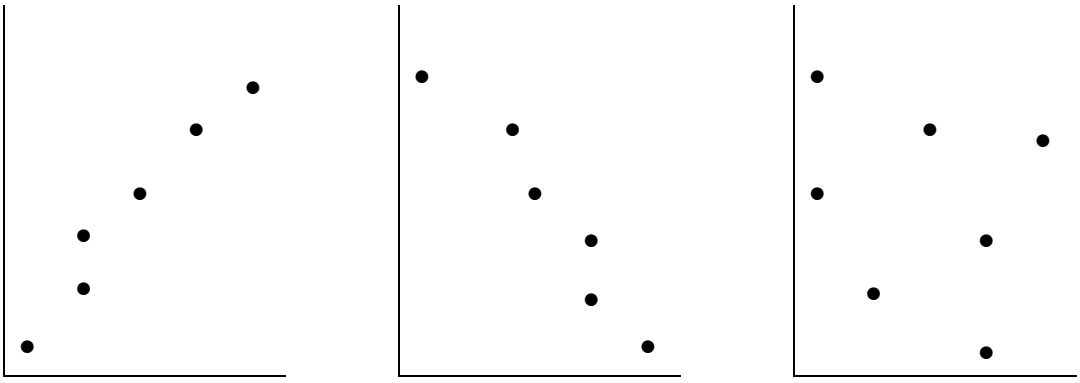
When we plot the values of the two variables on a graph, the points on the graph will appear as indicated in figure 7.2 on the next page.

A perfect positive correlation exists between the two variables *quantity of units produced* and *total cost of direct materials*, because when one variable (quantity of units produced) moves a given amount, the second (total direct materials cost) moves proportionally in the same direction. One could expect the correlation coefficient of *quantity of units produced* and *total direct materials cost* to be +1. See figure 7.2, where the coefficient equals +1.

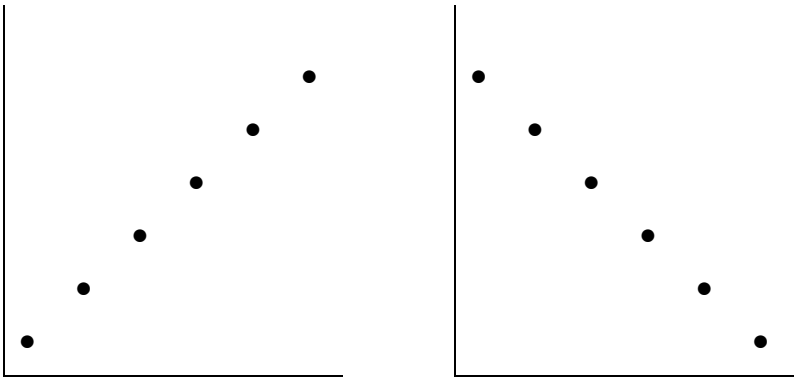
There is a non-perfect positive correlation between the *quantity of units produced* and the *total cost of indirect materials used*, because when the quantity of units produced moves a given amount, the total cost of indirect materials moves in the same direction, albeit not proportionally. One would expect the correlation coefficient of *quantity of units produced* and *total indirect materials cost* to approach +1, perhaps to be between +0,5 and +0,9.

In learning unit 4, we saw that there is an inverse relationship between ordering costs and holding costs: as the total ordering costs increase (due to more orders), the total holding costs decrease. Also, as the total ordering costs decrease (due to fewer orders), the total holding costs increase. The variable *total number of orders placed* will be the independent variable, and the variables *total ordering costs* and *total holding costs* will be dependent variables. We say there is a positive correlation between the variables *total ordering costs* and *total number of orders placed*, and there is a negative correlation between the variables *total holding costs* and *total number of orders placed.*

Figure 7.2



Positive correlation	Negative correlation	No correlation
Coefficient approaching +1	Coefficient approaching -1	Coefficient = 0



Perfect positive correlation
Coefficient = +1

Perfect negative correlation
Coefficient = -1

Before we discuss methods of separating mixed costs, it is necessary to take a closer look at the behaviour of costs again. In learning unit 2, we saw that a cost can be classified as fixed, variable or mixed, depending on the behaviour of the cost at different levels of activity. (You will recall that cost drivers are activity levels that cause a change in the cost of something.) In learning unit 2, we said the following:

- Total variable costs will increase with the number of units produced, but variable cost per unit will remain unchanged regardless of the number of units produced.
- Total fixed costs will remain unchanged regardless of the number of units produced, but the fixed cost per unit produced will decrease as more units are produced.
- Mixed costs contain a fixed element as well as an element that varies with the number of units produced; therefore, the total mixed costs will increase with the number of units produced (caused by the variable component), and the cost per unit will decrease as more units are produced (caused by the fixed component).

Some mixed costs demonstrate behaviour referred to as either *step variable cost* or *step fixed cost*. Step variable costs are predominantly variable in nature, while step fixed costs are predominantly fixed. For example, suppose that one quality inspector is required for every 50 000 units produced. At a production range of between 0 and 50 000 units, one inspector will be required; at a production range of between 50 001 and 100 000 units, two inspectors will be required etc. The salary cost of one inspector is fixed for a production range of 0 to 50 000 units, but increases to the salaries for two inspectors and remains fixed again for a production range of 50 001 to 100 000 units, etc.

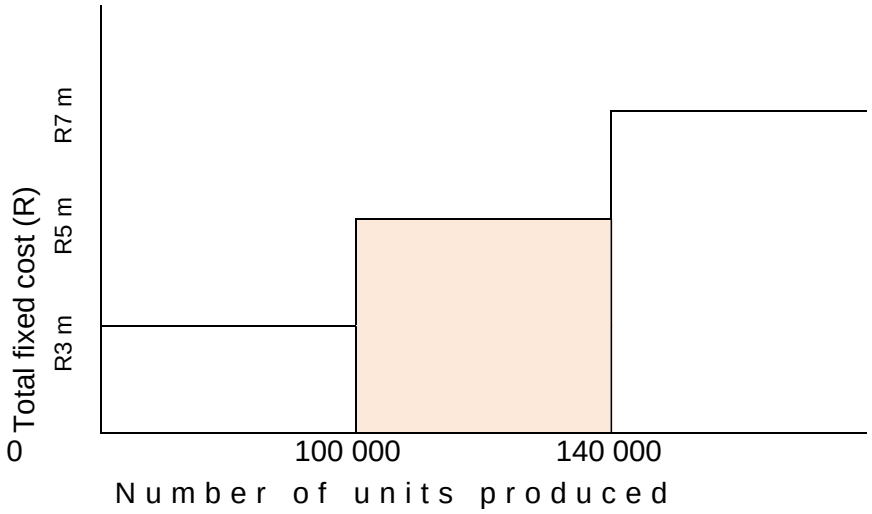
Earlier in this learning unit, we said that normal capacity refers to a factory's *average level of activity* for meeting the company's production demands when taking into account expected interruptions and seasonal fluctuations. However, what would happen if the *average level of activity* increased significantly? It may result in the need to purchase additional manufacturing equipment leading to additional depreciation charges (i.e. increased fixed costs). At higher levels of production, more overtime work may also be required, while the unit cost of direct materials may decrease as a result of larger quantities purchased. This brings us to the concept of *relevant range*.

7.4.2 Relevant range

Relevant range refers to the activity level at which our assumption about the behaviour of costs remains valid. Suppose, for example, that a company's normal production capacity is between 100 000 and 140 000 units. At this capacity range, fixed costs of R5 million in respect of rent, insurance, depreciation as well as salaries for supervisors and quality inspectors remain fixed at R5 million. Should production fall below 100 000 units, the company may have to retrench some supervisors and quality inspectors or even reduce the space rented for the factory operations. At production levels of higher than 140 000 units, the company would incur additional fixed costs for more inspectors, space, etc. We therefore say that the *relevant range* of activity is between 100 000 and 140 000 units produced at a fixed cost of R5 million. (The fixed costs are relevant for a production range of between 100 000 and 140 000 units.)

When the accountant prepares a flexible budget, the possible sales and production levels must fall within this relevant range. This relevant range is depicted by the shaded area in the graph in figure 7.3.

Figure 7.3



Activity 7.6

1 Explain by means of examples what is meant by the following in respect of two variables:
   - a positive correlation
   - a negative correlation
   - no correlation

2 Explain what is meant by relevant range.

Feedback on activity 7.6

1 An example of a positive correlation is the correlation between school fees payable and the number of your children attending school; the more children you have at school, the higher the school fees will be.

An example of a negative correlation is the correlation between levels of alertness and quantities of alcohol consumed; the more alcohol is consumed, the lower the level of alertness will be.

An example of no correlation is the correlation between the intelligence quotient (IQ) and shoe size; there is no correlation.

2 Relevant range refers to activity levels that fall within a minimum and a maximum level of activity. Within the boundaries of the minimum and maximum activity levels, fixed costs are expected to remain fixed at the same amount. Activity levels that fall outside the minimum and maximum of the relevant range will effect changes to fixed costs.

7.5 METHODS FOR SEPARATING MIXED COSTS

We can use several methods to try to predict the portion of mixed costs that will be variable and the portion that will remain fixed within the relevant range of activity levels. We will look at the high-low method, the scatter diagram method and the least squares method. All three methods are based on the equation for a straight line.

From your school mathematics, you will recall that if you know the value of any two points on a straight line, you can determine the slope (i.e. the steepness) of the line. The slope or steepness of the line is also called the gradient. The equation for a straight line is $y = a + bx$, where

a is the y-intercept (i.e. where the line cuts through the *y*-axis); and
b is the slope of the line; and
bx means *b* multiplied by *x*.

If we apply this equation to separate mixed costs, the slope of the line (*b* in the equation) represents the variable cost per unit, while the *y*-intercept (*a* in the equation) represents the total fixed costs. We will demonstrate the application of this equation by first considering variable costs only.

Example 7.5

Maseru Limited manufactures a range of coffins. The direct materials used to make a simple coffin are six pine wood boards cut into different sizes, two metres of velvet for lining the coffin, six bronze handles and four hinges. It takes two workers 2½ hours to make one pine wood coffin. Each worker is paid R90 per hour. The direct cost to manufacture one coffin is therefore as follows:

One set of six pine wood boards	R500
Two metres of velvet	R350
Six bronze handles at R120 each	R720
Four hinges at R25 each	R100

Total direct material cost of one coffin: R1 670

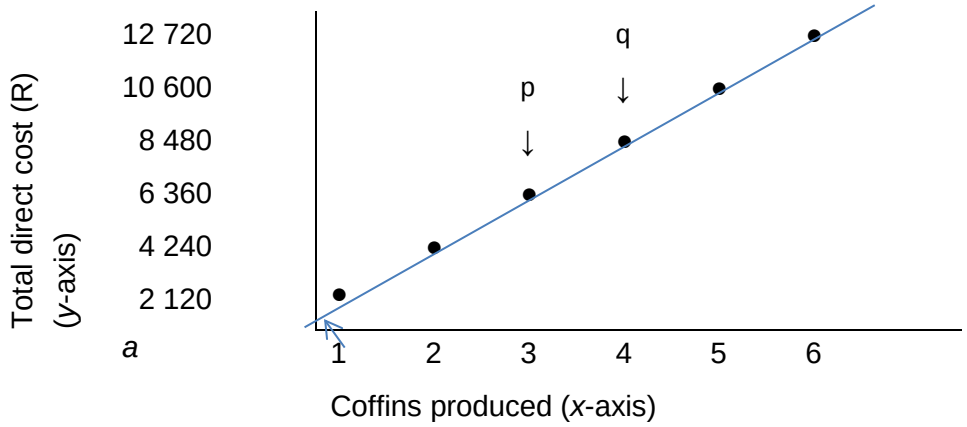
The direct labour cost per coffin is R450 (R90 x 2½ hours x 2 workers).

At different levels of production, the behaviour of the direct cost (i.e. variable costs) to manufacture the coffins will be as follows:

Number of coffins produced →	(A)	1	2	3	4	5	6
		R	R	R	R	R	R
Direct material cost		1 670	3 340	5 010	6 680	8 350	10 020
Direct labour cost		450	900	1 350	1 800	2 250	2 700
Total direct costs	(B)	2 120	4 240	6 360	8 480	10 600	12 720
Direct cost per unit	(B/A)	2 120	2 120	2 120	2 120	2 120	2 120

We can plot this information on a graph. The number of coffins produced is the independent variable, which is shown on the *x*-axis. The total direct cost is the dependent variable, which is shown on the *y*-axis. We make a dot where one coffin is made at a cost of R2 120; a dot where two coffins are made at a cost of R4 240, a dot where three coffins are made at a cost of R6 360 etc until we have made a dot where six coffins are made for R12 720. We can now connect the dots with a straight line and extend the line so that it cuts through the *y*-axis (point *a* as indicated by the arrow).

Figure 7.4



You will notice that the line cuts the y-axis at 0. This is because we are showing variable cost only. At zero production, the total variable cost will be zero.

You can solve the equation $y = a + bx$ by first selecting the coordinates at any two points along the line. Coordinates indicate the position of every point on the line, much like you can pinpoint the location of Unisa by putting its coordinates into your global positioning system (GPS). Coordinates are written in the format (x_1,y_1) and (x_2,y_2).

Say we select the points where three coffins and four coffins are made (marked p and q); we write the coordinates of points p and q as (x_3,y_{6360}) and (x_4,y_{8480}). We can now determine the slope of the line, i.e. how much the line rises from point p to point q (or how much the line falls from point q to point p) by means of the equation for a straight line: $y = a + bx$. The value of y is the difference in the value of y in the two selected coordinates (i.e. the value of y at point p, and

the value of *y* at point q); the value of *x* is the difference in the value of *x* in the two selected coordinates (i.e. the difference in the value of *x* at point p, and the value of *x* at point q). Therefore, the value of *y* = (8 480 – 6 360) = 2 120, and the value of *x* = (4 – 3) = 1. The value of *a* is 0.

If $y = a + bx$
then 2 120 = 0 + *b* multiplied by 1
∴ 2 120 = *b*

Therefore, the slope of the line (and the variable cost per unit) is 2 120 or R2 120.

Let's choose two different coordinates: (x_5,y_{10600}) and (x_2, y_{4240}). Therefore, the value of *y* = 6 360 (10 600 – 4 240) and the value of *x* = 3 (5 – 2).

If $y = a + bx$
then 6 360 = 0 + 3*b*
∴ 6 360 = 3*b* OR 3*b* = 6 360 (see information box below)
∴ *b* = 2 120 (We divide both sides of the equation 3.)

Again, we find that the slope of the line, and therefore the variable cost per unit, is R2 120. It does not matter which two coordinates on the straight line you choose – the answer in solving the equation $y = a + bx$ for *b* is the same: the slope of the line (*b*) = 2 120 (i.e. the variable cost per unit = R2 120).

We will now consider three methods we can use to predict the portion of mixed costs that will be variable and the portion that will remain fixed within the relevant range. All three methods entail the analysis of mixed costs at different activity levels over several past periods.

7.5.1 High-low method

In using this method, we select the periods of highest and lowest activity levels as coordinates and use the changes in cost and activity to determine the variable cost per unit. The high-low method is based on the assumption that the total fixed costs will be the same at both the highest and the lowest activity level, and that the change in the total cost at the two activity levels represents the total change in variable costs.

Example 7.6

The following information relates to those mixed production overheads (POH) of Mbabane Limited where production output is the driver of the cost:

Month	Units	POH (R)	Month	Units	POH (R)
1	18 512	443 008	7	36 537	718 557
2	15 224	462 799	8	33 492	691 763
3	21 313	508 470	9	31 053	652 751
4	19 486	515 899	10	29 494	634 043
5	28 620	670 815	11	16 996	484 067
6	25 576	585 806	12	23 103	557 351

We will apply the high-low method to establish the variable cost per unit of production and the total fixed costs.

Identify the periods of highest and lowest activity levels: month 2 had the lowest activity level (only 15 224 units produced), and month 7 had the highest activity level with 36 537 units produced. You will recall that total production overheads is the dependent variable, because total cost depends on the number of units produced. If you were to prepare a graph from the information provided above, you would show the total cost on the *y*-axis.

	Total POH (*y*)	**Units produced (*x*)**
High (month 7)	R718 557	36 537
Low (month 2)	R462 799	15 224
Difference	R255 758	21 313

The high-low method assumes the variable portion of the costs causes the difference in the total costs, because fixed costs are assumed to be the same at all levels of activity within the relevant range. The variable cost per unit (*b* in the equation) is therefore R12,00009 (R255 758 ÷ 21 313).

We can now apply the equation $y = a + bx$ to determine total fixed costs:

Total fixed cost, based on month 7

$y = a + bx$

718 557 = a + (12,00009 x 36 537)

718 557 = a + 438 447

$\therefore a$ + 438 447 = 718 557

a + 438 447 – 438 447 = 718 557 – 438 447

$\therefore a$ = R280 110

Total fixed cost, based on month 2

$y = a + bx$

462 799 = a + (12,00009 x 15 224)

462 799 = a + 182 689

462 799 – 182 689 = a + 182 689 – 182 689

$\therefore a$ = R280 110

The formula $y = a + bx$ is known as an equation. An equation indicates the relationship of two expressions on either side of the equals sign (=), for example 3 x 4 = 6 x 2. Since 3 x 4 = 12 and 6 x 2 = 12, it is true that 3 x 4 = 6 x 2. To solve an equation that contains an unknown element, we need to isolate the unknown element on one side of the equals sign. (Many people prefer to have the unknown element in the equation to the left of the equals sign as in the calculation of fixed costs for month 7 above.) One of the rules in solving an equation is that whatever you do on the one side of the equals sign, you must also do on the other side. In this way, the relationship between the two expressions is maintained.

Consider example 7.5 in respect of month 7 when $y = a + bx$ is applied:

The first step is to replace any unknown elements for which we already know the values. Thus, we replace *y* (total cost) with R718 557, being the total cost for month 7, and *b* and *x* with R12,00009 (unit variable cost) and 36 537 (total units produced in month 7) respectively:

R718 557 = a + (R12,00009 x 36 537)

In order to find the value of the one remaining unknown element, which is *a* to the left of the equals sign, we switch the equation around so that what was previously on the left of the equals sign now appears on the right, and what was previously on the right side of the equals sign, now appears on the left. This does not affect the relationship between to two expressions at all. (Consider: 3 x 4 = 6 x 2 is exactly the same as 6 x 2 = 3 x 4.)

a + R438 447 = R718 557

The next step is to isolate the unknown *a*. This is achieved by deducting R438 447 on both sides of the equation:

a + R438 447 – R438 447 = R718 557 – R438 447

Therefore, *a* = R280 110.

Activity 7.7

An analysis of the production and accounting records of Namaqua Limited for the past financial year revealed that the lowest level of production activity occurred in March and the highest in October. The total mixed costs incurred in these two months were as follows:

	Total mixed costs (R)	**Total production (units)**
March	128 000	8 000
October	160 000	12 000
Difference	32 000	4 000

Required

Determine the variable cost per unit and the total fixed costs.

Feedback on activity 7.7

The high-low method assumes that the increase in cost of R32 000 is the result of the variable costs of the additional units produced (i.e. 4 000 units). We therefore assume that the variable cost per unit is R32 000 ÷ 4 000 units = R8 per unit. Let's apply this assumption to the information for March using the formula *y = a + bx:*

If *y* = *a* + *bx*, then
R128 000 = *a* + (R8 x 8 000), which is the same as
a + (R8 x 8 000) = R128 000.
Then *a* + R64 000 = R128 000,
and *a* = R128 000 – R64 000
∴ *a* = R64 000

Let's now accept a fixed cost of R64 000 and a variable cost per unit of R8 for October when production was 12 000 units:

October

		R	
Variable cost (12 000 x R8)	=	96 000	
Fixed cost	=	64 000	
Total cost	=	160 000	(as indicated above)

In the activities and examples so far, we have used units produced as the cost driver of the production overheads. You will recall that cost drivers are activities that cause a change in the cost of that activity. Therefore, in practice, different activities will be driving different costs. For example, the cost driver that drives the cost of indirect materials will be total production, but the cost driver that drives the cost of electricity may be machine hours. In preparing a budget, we will analyse each major cost in terms of its own cost driver.

Activity 7.8

The total cost of electricity of Kongamato Limited in April was R18 000, when the machines were operated for 120 000 hours in total. (We say total machine hours were 120 000.) In June, the total cost of electricity was R16 000, and total machine hours were 100 000. Use the high-low method to establish the total fixed costs and the variable cost per machine hour.

Feedback on activity 7.8

	Total electricity cost (R)	Total machine hours
High (April)	18 000	120 000
Low (June)	16 000	100 000
Difference	2 000	20 000

If we assume that variable cost is R0,10 (R2 000 / 20 000) per machine hour, total fixed costs are as follows:

Based on April

$y = a + bx$

18 000 = a + (0,10 x 120 000)

18 000 = a + 12 000

18 000 – 12 000 = a + 12 000 –12 000

$\therefore a$ = R6 000

Based on June

$y = a + bx$

16 000 = a + (0,10 x 100 000)

16 000 = a + 10 000

16 000 – 10 000 = a + 10 000 –10 000

$\therefore a$ = R6 000

7.5.2 Scatter diagram method

In using the scatter diagram method, the total cost at each activity level is plotted on a graph. Total cost (dependent data, because the total cost is dependent on its driver) is represented on the *y*-axis, and activity levels (independent data, i.e. the driver of the costs) are represented on the *x*-axis. We follow the four steps below to prepare a scatter diagram:

Step 1: prepare the scatter diagram

Plot data (make dots) on the scatter diagram for the activity level (e.g. number of units, machine hours etc) along the x-axis and total cost along the y-axis. If the dots rise from left to right, the

slope of the line is positive, and there is a positive correlation between the two variables. If the dots fall from left to right, the slope of the line is negative, and there is a negative correlation between the two variables. If the dots are all over the area, making it impossible to draw a regression line, there is no correlation between the two variables (see figure 7.2).

Step 2: draw a regression line

Inspect the data points (dots) plotted to establish a trend. Draw the regression line over the scatter diagram in such a way that you minimise the total vertical distance between the line and all the points. (Each vertical distance between the line and a data point represents an estimation error.) Now extend the line to the y-axis.

Step 3: establish the total fixed cost

You will find the total fixed cost at the y-intercept of the regression line (i.e. the point where the line cuts the y-axis).

Step 4: establish the variable cost per unit

The variable cost per unit is equal to the slope (or gradient) of the line. We determine the slope by taking any two data points on the line, expressed as (x_1,y_1) and (x_2,y_2), and apply the following formula: $(y_2 – y_1) \div (x_2 – x_1)$

Let's consider the information for Maseru in example 7.5 again.

Example 7.7

Number of coffins produced →	(A)	1	2	3	4	5	6
		R	R	R	R	R	R
Direct material cost		1 670	3 340	5 010	6 680	8 350	10 020
Direct labour cost		450	900	1 350	1 800	2 250	2 700
Total direct costs	(B)	2 120	4 240	6 360	8 480	10 600	12 720
Direct cost per unit	(B/A)	2 120	2 120	2 120	2 120	2 120	2 120

We will now plot this data on a scatter diagram (figure 7.5):

Figure 7.5

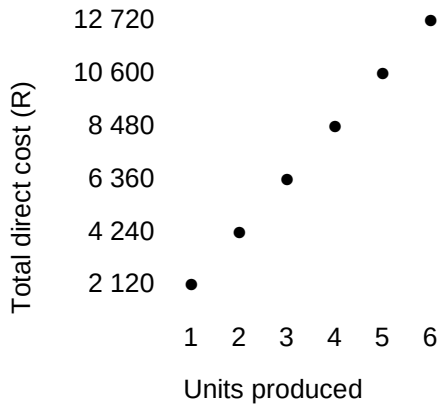
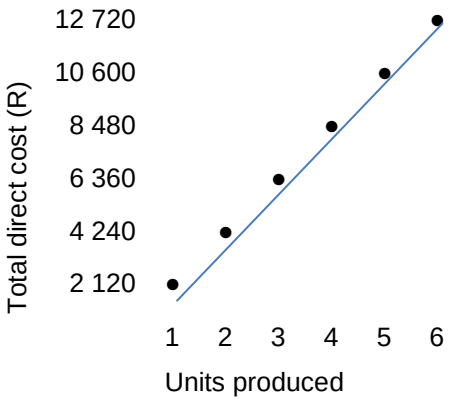


Figure 7.6



You will notice that in figure 7.5, the dots rise from left to right on the scatter diagram in a perfect straight line. This means there is a perfect positive correlation between the two variables. If we draw a regression line to *minimise the total vertical distance between the line and all the points*, you will notice (figure 7.6) that the regression line cuts through all the points (dots). This is because there is a perfect correlation (in this case positive) between the two variables. Remember that a perfect positive correlation exists when one variable moves a given amount and the second variable moves proportionally in the *same* direction. In this example, for every one upward movement of the number of coffins produced, the total direct cost moves up by R2 120. However, in this example, the dependent variable (the total direct cost) contains only the variable costs. If we added fixed costs, the correlation would no longer be perfect, because for every one upward movement of the number of coffins produced, the total fixed cost would reduce, while the total variable cost would increase in tandem with the units produced.

Example 7.8

The following report of maintenance cost and machine hours is an extract from the records of Lusaka Limited:

Month	Machine hours	Maintenance cost (R)	Month	Machine hours	Maintenance cost (R)
1	400	1 000	6	250	700
2	250	900	7	200	600
3	100	500	8	500	1 200
4	400	1 200	9	300	900
5	350	800	10	150	400

We will prepare a scatter diagram following the steps set out above.

We indicate the values for maintenance cost on the *y*-axis and the values for machine hours on the *x*-axis.

We first plot the points in the table on the graph (e.g. for month 1, the cost is R1 000, and the activity level is 400 hours). We label this data point "q" in the graph. In month 5, the cost is R800, while the activity level is 350 hours. We label this data point "s".

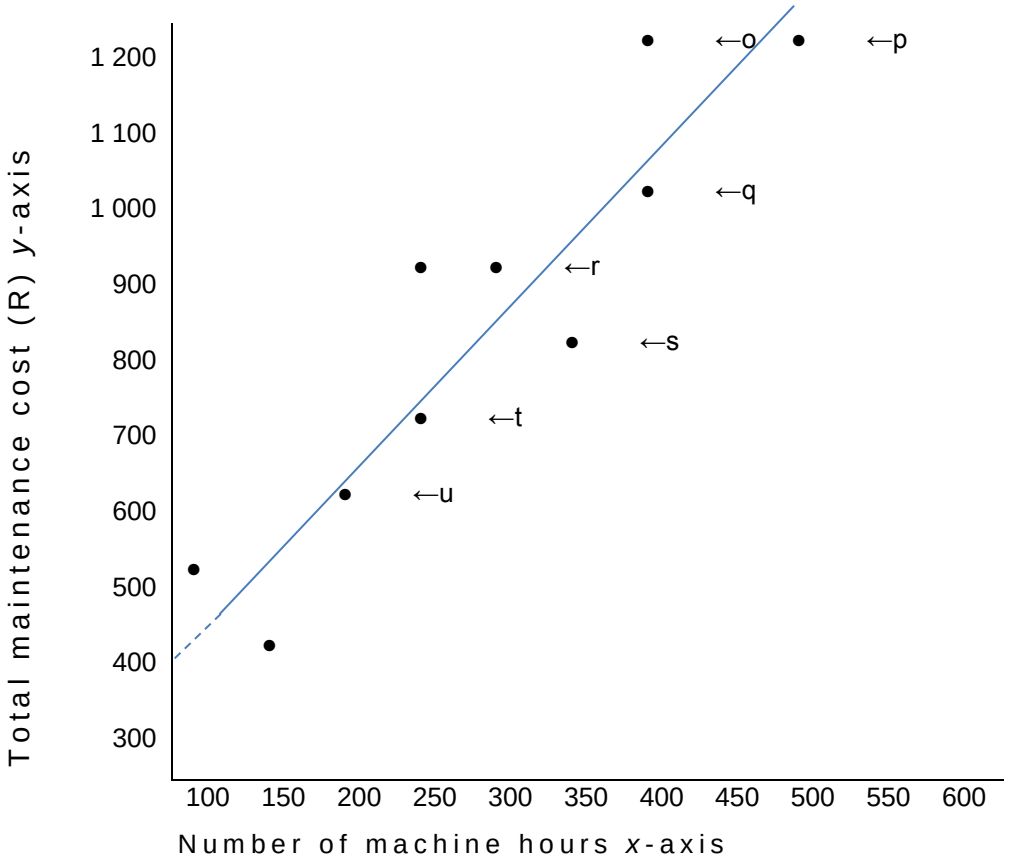
Inspect the scatter diagram to identify the trend that the data points reveal. Note that the dots rise from left to right. This indicates a positive correlation between the number of machine hours (driver and independent variable) and the total cost of maintenance (the dependent variable). However, the correlation is not perfect, as the dots do not form a straight line.

Draw a line through these data points, minimising the total vertical distance between the line and all the points. You will notice that points p, q, r, t and u are approximately the same distance from the straight line; therefore, we have minimised the total vertical distance between the line and all the points.

Extend the regression line to the *y*-axis (see broken line).

The point where this extended line intercepts the *y*-axis indicates the total fixed cost, which is R400.

Figure 7.7



We can now determine the variable cost per unit as follows:

Select any two coordinates (x_1,y_1) and (x_2,y_2) on the line. Let's take month 4, represented by point o (x_{400},y_{1200}) and the *y*-intercept (x_0,y_{400}).

Calculate the variable cost: the difference between the *y*-values (1 200 – 400) divided by the difference between the x-values (400 – 0) = 800 ÷ 400 = R2,00 per machine hour.

Activity 7.9

Select another two coordinates from figure 7.6 and determine the variable portion of the maintenance cost per machine hour.

Feedback on activity 7.9

Let's we use points p and u: (x_{500},y_{1200}) and (x_{200},y_{600})

Variable cost = (1 200 – 600) ÷ (500 – 200) = 600 ÷ 300 = R2,00 per machine hour.

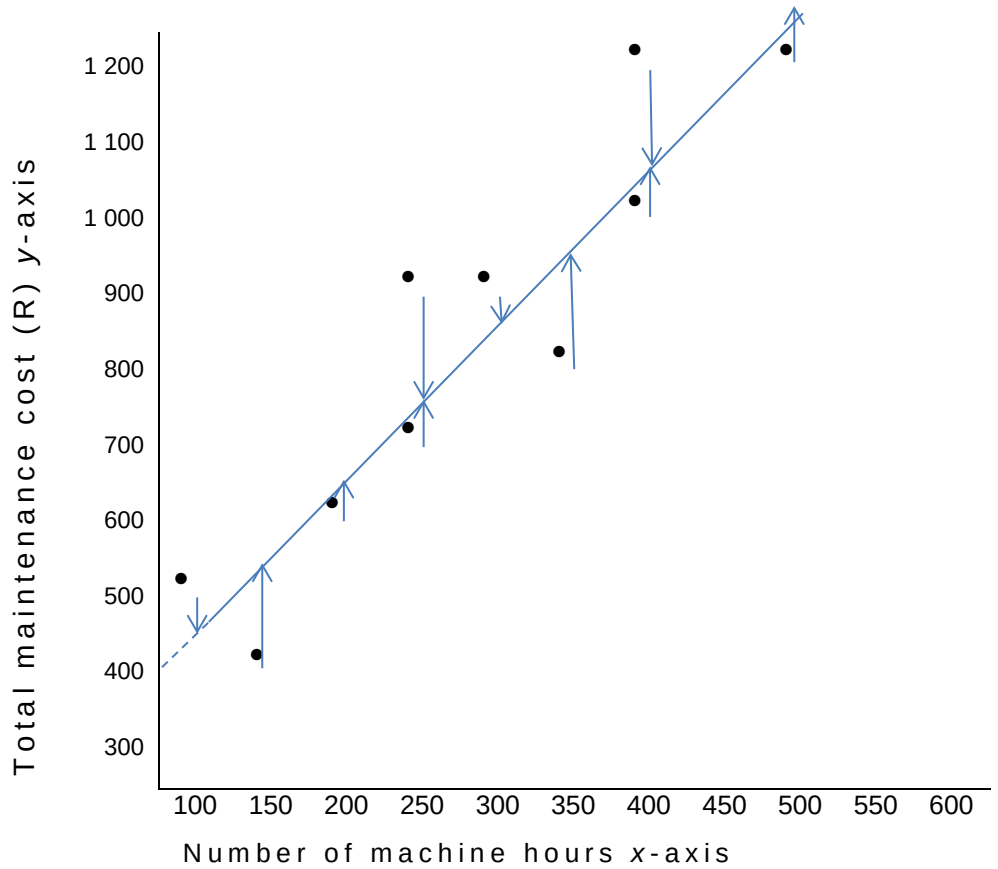
7.5.3 Least squares (regression analysis)

The least squares method is also called regression analysis and is based on past information as well. It aims to estimate changes in a dependent variable (e.g. cost of maintenance) that has one or more independent variables (e.g. machine hours). When there is only one independent variable, we refer to a simple regression analysis; when there are two or more independent variables, it is a multiple regression analysis. We will consider only simple regression analysis.

Consider the line we drew through the data points on the scatter diagram in figure 7.6. Remember that we prepared the scatter diagram so we could *estimate* the fixed cost component. If you look at figure 7.6, you will notice that there is a distance, however small, between each data point (dot) and the line. These distances exist because the correlation between the two variables is not perfect. Each vertical distance between a data point and the line represents an *estimation* error. We indicate these vertical distances (or estimation errors) with arrows in figure 7.7 below. The least squares method (regression analysis) minimises the *sum of the squares* of these estimation errors. The "sum of the squares" means that every estimation error (represented by an arrow in figure 7.7) is squared (multiplied by itself) and then added together. Fortunately, we will not have to measure each distance (arrow), because we can use formulae to determine the least squares, as you will see just now.

Like the scatter diagram, the least squares method is based on fitting a straight line on the plotted data. The least squares method is based on the principle that the sum of the squares of the vertical errors of a *particular* straight line is less than the sum of the squares of the vertical errors of any other straight line that may be drawn on the same scatter diagram.

Figure 7.8



By now, you should be familiar with the equation for a straight line: $y = a + bx$. This equation can also be written as $a + bx = y$ and restated as follows: $a = y – bx$ (by deducting bx on both sides of the equals sign).

The least squares method is also based on this equation. In order to minimize the sum of the squares, we use the following equations to calculate the

slope of the line (variable cost per unit of activity) $b = n(\Sigma xy) – (\Sigma x)(\Sigma y) \div n(\Sigma x^2) – (\Sigma x)^2$

y-axis intercept (fixed costs) $a = \Sigma y – b(\Sigma x) \div n$

In these equations, the various symbols have the following meanings:

- X = the level of activity, i.e. the independent variable (driver), for example, machine hours or units of production
- Y = the total mixed cost, i.e. the dependent variable (e.g. total cost of maintenance or total cost of electricity)
- A = the total fixed cost (the y-axis intercept)
- B = the variable cost per unit of activity (the slope of the line)
- N = the number of observations (e.g. the number of months for which data is presented)
- Σ (pronounced sigma) means "the sum of"; Σy means the sum of all the observations for y
- x^2 (pronounced "x squared") means x multiplied by x
- $b(\Sigma x)$ means b multiplied by Σx. Similarly $n(\Sigma xy)$ means n multiplied by Σxy, etc.

Using the information in example 7.7, we will now prepare a table of all the values we require to solve these equations.

Before we apply the least squares method, we must first plot the data to determine if a linear regression line is plausible for the particular data. We have already plotted the data in example 7.8 and determined that a regression line is plausible.

Example 7.9

N	***x***	***Y***	***x²***	***xy***
Month	**Machine hours**	**Maintenance cost**	**Machine hours squared**	**Machine hours multiplied by the maintenance cost**
1	400	1 000	160 000	400 000
2	250	900	62 500	225 000
3	100	500	10 000	50 000
4	400	1 200	160 000	480 000
5	350	800	122 500	280 000
6	250	700	62 500	175 000
7	200	600	40 000	120 000
8	500	1 200	250 000	600 000
9	300	900	90 000	270 000
10	150	400	22 500	60 000
$\Sigma \rightarrow$	2 900	8 200	980 000	2 660 000

We can now solve the two equations as follows:

$b = n(\Sigma xy) - (\Sigma x)(\Sigma y) \div n(\Sigma x^2) - (\Sigma x)^2$
$= [10(2\ 660\ 000) - (2\ 900)(8\ 200)] \div [10(980\ 000) - (2\ 900)^2]$
$= (26\ 600\ 000 - 23\ 780\ 000) \div [9\ 800\ 000 - (2\ 900 \times 2\ 900)]$
$= (26\ 600\ 000 - 23\ 780\ 000) \div (9\ 800\ 000 - 8\ 410\ 000)$
$= 2\ 820\ 000 \div 1\ 390\ 000$
$= 2{,}028777$

Therefore, the variable portion of maintenance cost is R2,03 (rounded) per machine hour.

$a = \Sigma y - b(\Sigma x) \div n$
$= [8\ 200 - 2{,}028777(2\ 900)] \div 10$
$= (8\ 200 - 5\ 883{,}45) \div 10$
$= 2\ 316{,}55 \div 10$
$= 231{,}66$

Therefore, the total fixed cost portion of maintenance cost is R231,66 (rounded).

Let's compare the results of the least squares method with the results of the scatter diagram in example 7.7:

	Total fixed cost (R)	**Variable cost per machine hour (R)**
Scatter diagram	400,00	2,00
Least squares metod	231,66	2,03

If we apply these calculated costs to an activity level of 300 machine hours, we find the following:

At 300 machine hours		**Scatter diagram**	**Least squares method**
Fixed cost	as calculated in above examples	400,00	231,66
Variable cost	[300 x 2,00] [300 x 2,03]	600,00	609,00
Total cost		1 000,00	840,66
Actual total cost		900,00	900,00

These differences occur because the correlation between the two variables in this example is not perfect. Remember that the high-low method, the scatter diagram and the least squares are *estimation* techniques and not exact science.

Activity 7.10

Refer to the information in example 7.8 and use the high-low method to establish the total fixed costs and the variable cost per machine hour. Apply your answers to an activity level of 300 machine hours.

Feedback on activity 7.10

	Total maintenance cost (R)	Total machine hours
Highest activity level: month 8	1 200	500
Lowest activity level: month 3	500	100
Difference	700	400

Variable cost per machine hour is assumed to be R700 / 400 = R1,75.

$y = a + bx$	$y = a + bx$
1 200 = a + 1,75 x 500	500 = a + 1,75 x 100
1 200 – 875 = a	500 – 175 = a
a = 325	a = 325

At an activity level of 300 machine hours:

Total variable cost (300 x R1,75)	R525
Fixed cost	R325
Total maintenance cost	R850
Actual total maintenance cost	R900

Again, there is a difference because the correlation between the two variables is not perfect.

In our examples, we used only one manufacturing cost at a time (e.g. maintenance cost). Of course, there are many costs with different cost drivers. We will have to consider all these different costs when preparing the manufacturing budget. In practice, if mixed costs form a very small percentage of total costs, the organisation may assign all step variable costs as variable costs and all step fixed costs as fixed costs. Fortunately, sophisticated computer programs are available that allow even small businesses to apply these and other techniques for separating fixed and variable costs.

---oOo---

The names used in the examples in this learning unit are those of the capitals of the Southern African Development Community (SADC) countries geographically closest to South Africa:

Windhoek is the capital of Namibia.
Gaborone is the capital of Botswana.
Harare is the capital of Zimbabwe.
Maputo is the capital of Mozambique.
Maseru is the capital of Lesotho.
Mbabane is the capital of Swaziland.
Lusaka is the capital of Zambia.

7.6 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 We can calculate the cost of materials used as opening inventory of materials plus purchases of materials less closing inventory of materials.

1.2 Absorption costing absorbs the total costs of the company into the units of production.

1.3 A plant-wide rate refers to a single rate per production department according to which production overheads are apportioned to units of production.

1.4 For external financial reporting purposes, production overheads must be assigned to inventory of finished goods as well as work-in-progress.

1.5 The factory maintenance department and the factory administration department are examples of production departments.

1.6 Practical capacity refers to the output levels at which the factory usually operates.

1.7 Only a standard costing basis uses a predetermined rate to apportion overheads to production.

1.8 We always adjust the over and under absorption of overheads against cost of sales.

1.9 Prime costs are variable costs.

1.10 Mixed costs are costs that contain elements that vary with levels of activity and elements that are fixed.

QUESTION 2

This question consists of eight multiple-choice questions. Carefully read the information provided and select only the most correct option as your answer.

2.1 An increase in production levels within the relevant range will result in … .

(a) an increase in variable costs per unit
(b) an increase in total variable costs
(c) an increase in total fixed costs
(d) an increase in both total variable and total fixed costs

2.2 The flexible budget of Juba Limited indicates that the cost of one unit of production is R29,90 when 13 000 units are produced and R39 when only R7 800 units are produced. The total amount of fixed costs in the budget is … .

(a) R177 450
(b) R70 980
(c) R118 300
(d) R90 640

2.3 When we use the high-low method, we determine the variable cost per unit by … .

(a) performing a regression analysis on the associated cost and cost driver database
(b) subtracting the fixed cost per unit from the total cost per unit based on either the highest or lowest observation of the cost driver
(c) using the difference between the highest and lowest observations of the cost driver as nominator and the difference between costs associated with the highest and lowest observations of the cost driver as denominator
(d) using the difference between the highest and lowest observations of the cost driver as denominator and the difference between costs associated with the highest and lowest observations of the cost driver as nominator

Use the information below to answer questions 2.4 to 2.6.

The budget of African Dream Limited provides for the production of 150 000 components that are used in the construction industry. Production overheads are budgeted at R3 000 000 for the year. It takes 2,5 direct labour hours to produce one component. Production overheads are apportioned to production based on direct labour hours.

2.4 During March, the company produced 12 000 components, and actual production overheads amounted to R250 000. Direct labour hours recorded for March were 31 000. Which of the following statements is correct?

(a) The overheads absorption rate is R8 per component produced.
(b) Overheads apportioned in March were R249 000.
(c) Overheads apportioned in March were R250 000.
(d) Overheads apportioned in March were R248 000.

2.5 During April, the company produced 13 000 components, and actual production overheads amounted to R289 940. Direct labour hours recorded for April were 35 130. Which of the following statements is correct?

(a) Under-absorbed overheads in April were R3 200.
(b) Over-absorbed overheads in April were R3 200.
(c) Under-absorbed overheads in April were R8 900.
(d) Over-absorbed overheads in April were R8 900.

2.6 The actual results of Africa Dream for the year revealed that the company produced 157 000 components and that total production overheads were R3 300 000. Total direct labour hours recorded were 445 000. Which of the following statements is correct?

(a) Overheads of R10 400 were under absorbed and should be debited to cost of sales.
(b) Overheads of R10 400 were under absorbed and should be prorated across cost of sales and inventory of finished goods.
(c) Overheads of R260 000 were over absorbed and should be prorated across cost of sales, inventory of finished goods and Inventory of work-in-progress.
(d) Overheads of R10 400 were over absorbed and should be debited to cost of sales.

Use the following information to answer questions 2.7 and 2.8: Impundulu Limited budgeted for production overheads of R3 850 000. The plant-wide overhead recovery rate is R42,50 per machine hour.

2.7 What were the total budgeted machine hours?

(a) 163 625 000
(b) 3 850 000
(c) 42 500
(d) 90 600

2.8 Production overheads of R63,75 is apportioned to each unit manufactured. How many machine hours are spent on the production of one unit?

(a) 1 hour 40 minutes
(b) 1 hour 30 minutes
(c) 1 hour
(d) 2 hours

QUESTION 3

Differentiate between budgeted production overheads, actual production overheads and apportioned production overheads.

QUESTION 4

Explain the over absorption and under absorption of production overheads.

QUESTION 5

Sundown Limited manufactures a single product in three production departments: P1, P2 and P3. Two departments, S1 and S2, provide a range of services to the production departments. S2 renders no service to S1, but S1 renders service to S2. You are the management accountant of Sundown Limited, and are preparing a flexible budget for the company. You have prepared the table below using past records of the company as a basis.

Month	Units	Production overheads (R)
July	10 000	215 000
August	10 200	218 000
September	10 260	218 900
October	10 360	220 400
November	10 400	221 000
December	10 300	…

The direct labour hours that will apply for apportionment purposes are as follows: P1 (15 000), P2 (10 000), P3 (5 000) and S1 (1 000).

Required

5.1 Use the high-low method to determine the variable cost per unit and the total fixed overheads per month.

5.2 Use the equation for a straight line and determine the amount of total overheads the company should budget for in December.

5.3 Apportion the overheads for December to all the departments using the following apportionment basis: P1 (40%), P2 (20%), P3 (20%), S1 (10%) and S2 (10%). Then use the step method to apportion the overheads for December to the production departments based on labour hours. Round off your answers to the nearest R1.

5.4 Use direct labour hours as basis and determine an absorption rate per production department based on the calculations for December. Round off your answers to the nearest cent.

QUESTION 6

The following information pertains to Pirates Limited:

	Units produced	**Total production overheads**
January	450	8 600
February	600	10 200
March	700	11 000
April	650	10 300
May	600	10 100
June	550	9 600
July	550	9 300
August	500	8 800
September	500	9 100
October	450	8 600
November	450	8 400
December	400	8 000

Required

Use the least squares method to determine the fixed cost per month and the variable overheads per unit.

---oOo---

7.7 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 T

1.2 F Only product costs are absorbed into the cost of units of production.

1.3 F A plant-wide rate refers to a single rate for the *factory*. A rate per production department would imply that multiple rates are used.

1.4 T

1.5 F The factory maintenance department and the factory administration department are examples of *service* departments.

1.6 F *Normal* capacity refers to the output levels at which the factory usually operates.

1.7 F Both normal costing and standard costing use a predetermined rate for apportioning overheads to production.

1.8 F Where the amount for the over or under absorption of overheads is material, we must adjust cost of sales, finished goods and work-in-progress proportionally.

1.9 T

1.10 T

QUESTION 2

2.1 (b)

2.2 (a)

2.3 (d)

2.4 (d)

2.5 (c)

2.6 (c)

2.7 (d)

2.8 (b)

2.2 Applying the high-low method, the total costs are (29,90 x 13 000) = R388 700 and (39 x 7 800) = R304 200.

The difference between 13 000 and 7 800 units = 5 200 units, and the difference in total costs = R84 500 (388 700 – 304 200). 84 500 ÷ 5 200 = R16,25 variable cost per unit.

	13 000 units	7 800 units
Total cost	R388 700	R304 200
Variable costs: 13 000 x 16,25	211 250	
: 7 800 x 16,25		126 750
∴ Fixed costs	R177 450	R177 450

2.3 Using the difference between the highest and lowest observations of the cost driver as denominator and the difference between costs associated with the highest and lowest observations of the cost driver as nominator means the following: difference in cost ÷ difference in units. In 2.2 above, the cost driver is the units produced, while the costs associated with the driver are the total costs. Hence, *the difference between costs associated with the highest and lowest observations of the cost driver* = R84 500 (nominator), and *the difference between the highest and lowest observations of the cost driver* = 5 200 units (denominator); thus, 84 500 / 5 200.

2.4 It takes 2,5 direct labour hours (DLH) to produce one component; therefore, 150 000 components will take (150 000 x 2,5) = 375 000 hours. The predetermined apportionment rate is thus R3 000 000 / 375 000 = R8 per DLH. DLH for March were 31 000; therefore, total overheads apportioned in March was (31 000 x 8) = R248 000. Note that the apportionment rate is R8 per *DLH* and *not* per unit produced, hence (a) is incorrect.

2.5 Total overheads absorbed in April: 35 130 DLH x R8 = R281 040. Actual overheads for April = R289 940. Therefore, R289 940 – R281 040 = R8 900 means that too little overheads were absorbed (i.e. under absorption of R8 900 in April).

2.6 Total overheads absorbed during the year was R3 560 000 (445 000 x R8), and actual overheads were R3 300 000. More overheads were absorbed; therefore there was an over absorption of R260 000. The over absorption is approximately 8% of actual overheads incurred and could be considered material; therefore, the values of components in inventories and components sold need to be adjusted.

2.7 The budgeted machine hours were R3 850 000 / R42,50 ≈ 90 588. Budgets are prepared in rounded figures, hence we would use 90 600 hours: R3 850 000 / 90 600 = R42,49448, i.e. R42,50 rounded.

2.8 R63,75 / R42,50 = 1,5. Thus 1,5 machine hours are spent on the production of one unit.

QUESTION 3

We estimate budgeted production overheads at the beginning of the accounting period. Budgeted figures does not form part of the formal accounting records of the company.

Actual production overheads represent the historical cost of overheads, and we can only determine the total actual production overheads at the end of the accounting period. Actual production overheads flow through the accounting records of the company.

Apportioned production overheads represent actual activity levels measured at a predetermined rate. Production overheads are apportioned throughout the accounting period and flow through the accounting records of the company.

QUESTION 4

In normal costing, the actual overheads incurred are seldom, if ever, the same as the overheads apportioned to production. Over absorptions occur when the apportioned amount exceeds the actual amount, while under absorptions occur when the apportioned amount falls short of the actual amount.

QUESTION 5

5.1 High-low method

	Units	**Production overheads (R)**
Highest activity: November	10 400	221 000
Lowest activity: July	10 000	215 000
Difference	400	6 000

The variable cost per unit is the difference between the costs associated with the highest and lowest observations of the cost driver (R6 000), which is the nominator, and the difference between the highest and lowest observations of the cost driver (400), which is the denominator. Therefore, we calculate the variable cost per unit as follows: R6 000 / 400 = R15. In July, total variable overheads is therefore calculated as R15 x 10 000 = R150 000. Therefore, the cost of fixed overheads is R215 000 – R150 0000 = R65 000.

5.2 Determining total overheads for December by applying the equation for a straight line

y = *a* + *bx;* where *y* = total overheads, *a* = fixed overheads, *b* = units produced and *x* = variable cost per unit

y = 65 000 + 10 300 (15)
y = R219 500

5.3 Apportioning December production overheads

		P1	**P2**	**P3**	**S1**	**S2**
December overheads apportioned	a	87 800	43 900	43 900	21 950	21 950
Apportion S2 per DLH*	b	10 620	7 081	3 540	708	(21 950)
Apportion S1 per DLH*	c	11 329	7 553	3 776	(22 658)	-
Total overheads R219 500		R109 750	R58 534	R51 216	-	

Workings

a	R219 500 / 100 = R2 195	2 195 x 40	2 195 x 20	2 195 x 20	2 195 x 10	2 195 x 10
b	21 950 / 31 000 = 0,708065	15 000 x 0,708	10 000 x 0,708	5 000 x 0,708	1 000 x 0,708	-
c	22 658 / 30 000 = 0,755267	15 000 x 0,755	10 000 x 0,755	5 000 x 0,755	-	-

The first apportionment (a) is based on the ratio 40:20:20:10:10. The second and third apportionments (b and c) are based on direct labour hours (DLH).

5.4 Determining absorption rates per production department based on labour hours

	P1	**P2**	**P3**
Total overheads from 5.3	R109 750	R58 534	R51 216
÷ total direct labour hours (DLH)	15 000	10 000	5 000
= absorption rate per DLH	R7,32	R5,85	R10,24

QUESTION 6

	x	***y***	***xy***	***x*²**
January	450	8 600	3 870 000	202 500
February	600	10 200	6 120 000	360 000
March	700	11 000	7 700 000	490 000
April	650	10 300	6 695 000	422 500
May	600	10 100	6 060 000	360 000

		x	y	xy	x^2
June		550	9 600	5 280 000	302 500
July		550	9 300	5 115 000	302 500
August		500	8 800	4 400 000	250 000
September		500	9 100	4 550 000	250 000
October		450	8 600	3 870 000	202 500
November		450	8 400	3 780 000	202 500
December		400	8 000	3 200 000	160 000
n = 12 observations	$\Sigma \rightarrow$	6 400	112 000	60 640 000	3 505 000

Variable cost (b) per unit

$b = n(\Sigma xy) – (\Sigma x)(\Sigma y) \div n(\Sigma x^2) – (\Sigma x)^2$
$= 12(60\ 640\ 000) – (6\ 400)(112\ 000) \div 12(3\ 505\ 000) – (6\ 400)^2$
$= (727\ 680\ 000 – 716\ 800\ 000) \div (42\ 060\ 000 – 40\ 960\ 000)$
$= 10\ 880\ 000 \div 1\ 100\ 000$
$= 9{,}89090909$
= R9,891 rounded

Fixed costs (a) per month

$a = \Sigma y – b(\Sigma x) \div n$
$= [112\ 000 – (6\ 400 \times 9{,}890909)] \div 12$
$= [112\ 000 – 63\ 302] \div 12$
$= 48\ 698 / 12$
= R4 058 per month (rounded)

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LEARNING UNIT 8: PRODUCT COST ACCUMULATION FOR INVENTORY VALUATION AND PROFIT CALCULATION

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- calculate the cost of goods manufactured in a traditional absorption costing system
- calculate the cost of goods sold in a traditional absorption costing system

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- determine the cost of goods manufactured
- prepare a statement of goods manufactured and sold
- prepare journal entries relating to the manufacturing process
- record the journal entries in the appropriate ledgers of the manufacturing entity
- prepare a statement of profit or loss and other comprehensive income for a manufacturing entity

OVERVIEW

This learning unit is divided into the following sections:

8.1 Introduction
8.2 Job costing
8.3 Process costing
8.4 Statement of cost of goods manufactured and sold

8.1 INTRODUCTION

In learning unit 3, we discussed the six elements of a cost accounting system (shown in *italics* below). We said that we would use the following in these learning units:

- normal costing as *the basis for measuring input costs of production*
- absorption costing as *the method for valuing finished goods*
- the traditional *method for apportioning overheads to production*
- the FIFO and weighted average *methods (assumptions) of how and when costs flow*
- both the periodic and perpetual inventory systems to show the *capability of the system to report the levels and cost of inventory at any time*
- job costing as well as process costing as *methods for the accumulation of product costs*

The purpose of this learning unit is, amongst others, to explore further the last element mentioned, namely methods for the accumulation of product costs. Product costs (or input costs) are the same regardless the method we apply to accumulate costs and always include direct materials and direct labour costs and production overheads. The two most widely used methods of cost accumulation are job costing and process costing. The method we select for the accumulation of costs will depend to a large extent on the following:

- *The product.* If the product is unique, then job costing would be appropriate; if the product is homogeneous (i.e. many quantities of the same product are produced) process costing would be more appropriate.
- *Production.* If production is specialised, then job costing would be appropriate; if production is a continuous process, then process costing would be more appropriate.
- *The market.* If the product is produced for a specific customer, then job costing would be appropriate; if the product is produced for the general consumer market, then process costing would be more appropriate.

Therefore, job costing tracks costs to a product or customer level, while process costing determines an average unit cost for the many homogeneous products that are manufactured. Job costing requires much more data input than process costing and therefore is a far more expensive system.

8.2 JOB COSTING

Job costing accumulates and assigns costs to jobs or customers. Therefore, cost is computed per job or customer, and not per period. A job can consist of a single product, a batch of similar products or a special order. Examples where a job-costing system would apply are ship building, portrait painting, printing, etc. Job-costing systems are also used for tenders and other special orders.

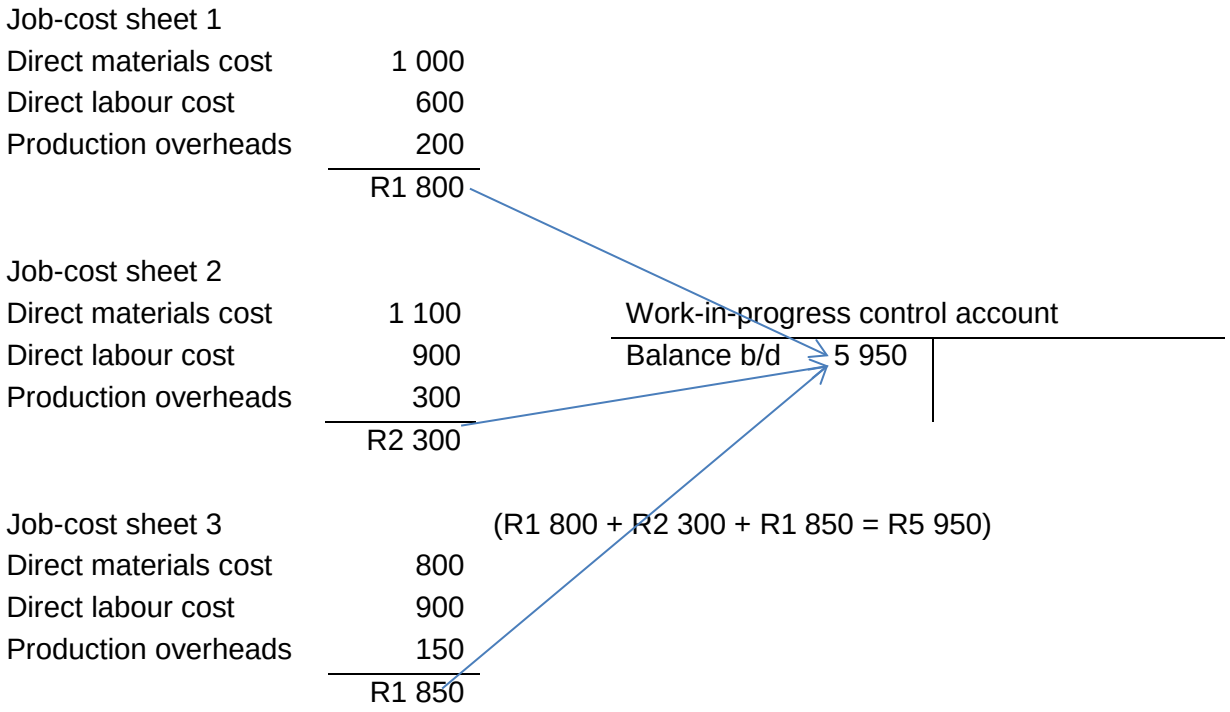
Document flow in job costing

- A requisition is issued, requesting the opening of a job cost sheet (also called a job card) for a specific job.
- A job cost sheet is opened for the job.
- Materials requisitions are issued for materials required for the job, and the cost of the materials are accumulated on the job cost sheet.
- Direct labour costs are assigned from the payroll and accumulated on the job cost sheet.
- Production overheads are assigned to the job according to predetermined rates and are accumulated on the job cost sheet.
- Once the job is finished, the total accumulated cost is used to determine the cost of the job as a whole or per unit (depending on the nature of the job) and the value of the finished goods inventory and cost of sales.

Every job-cost sheet represents a subsidiary work-in-progress account. The total accumulated costs on all the job-cost sheets of unfinished jobs must equal the balance of the inventory of work-in-progress control account in the general ledger.

Example 8.1

Subsidiary cost ledger **General ledger**

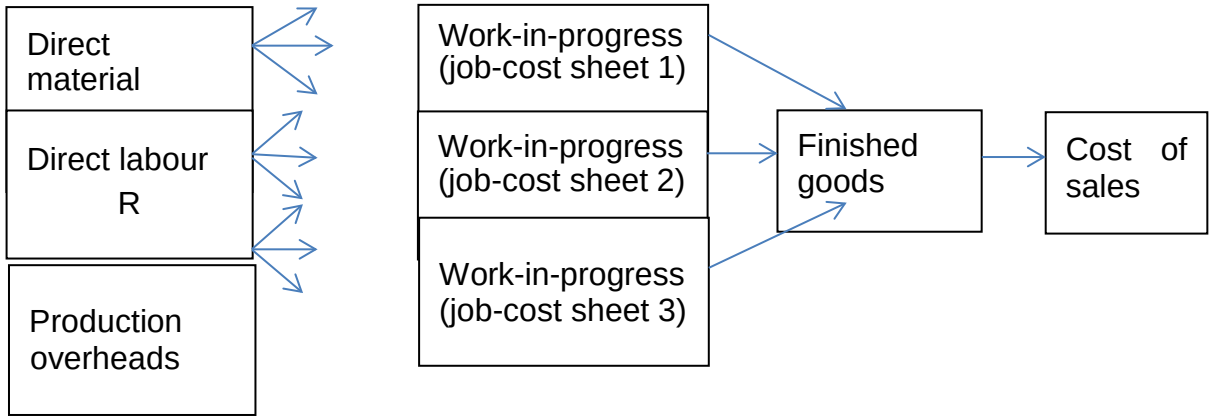


As accounting systems become more and more integrated with all information contained in a single database, the subsidiary ledger is likely to be produced in a report format rather than in the format of a separate ledger.

Cost flows in job costing

- We charge the cost of direct materials issued to production to individual jobs when issued. We charge direct labour cost to individual jobs.
- We charge allocated and apportioned overheads to individual jobs.
- Product costs accumulated on the individual job-cost sheets represent the value of work-in-progress until the job is completed.
- When a job is completed, the job-cost sheet is closed and the total accumulated cost for that job is transferred from work-in-progress to finished goods.
- When the goods are sold, the cost attached to the sold units is transferred from the finished goods inventory to cost of sales.

Figure 8.1



The job-cost sheets are part of the accounting records of the company; they are individual work-in-progress accounts in the subsidiary cost ledger. Example 8.2 on the next page demonstrates the flow of product costs through the general ledger and subsidiary cost ledger where a job-costing method is used to accumulate product costs.

Example 8.2

ACCOUNTS IN THE GENERAL LEDGER

Materials inventory account

	R		R
Balance b/d	9 000	WIP [3]	5 000
Payables [1]	4 000	POCA [4]	800
		Balance c/d	7 200
	13 000		13 000
Balance b/d	7 200		

Work-in-progress control account (WIP)

	R		R
Opening balance	8 490	Finished goods [9]	7 930
Direct materials [3]	5 000	Balance c/d	13 060
Wages clearance [5]	5 500		
POCA [7]	2 000		
	20 990		20 990
Balance b/d	13 060		

Wages clearance account

Wages payable [1]	6 500	WIP [5]	5 500
		POCA [6]	1 000
	6 500		6 500

Finished goods inventory

Balance b/d	3 300	COS [10]	8 540
WIP [9]	7 930	Balance c/d	2 690
	11 230		11 230
Balance b/d	2 690		

Production overheads clearance account (POCA)

Payables [2]	1 100	WIP [7]	2 000
Materials [4]	800	COS [8]	900
WagesClearance [6]	1 000		
	2 900		2 900

Cost of sales account (COS)

FinishedGoods [10]	8 540	Balance cd	9 440
POCA [8]	900		
	9 440		9 440
Balance bd	9 440		

ACCOUNTS IN THE SUBSIDIARY COST LEDGER

Job sheet 1

	R		R
Opening balance	4 340	Balance c/d	7 140
Direct materials [3]	1 200		
Wages clearance [5]	1 300		
POCA [7]	300		
	7 140		7 140
Balance b/d	7 140		

Job sheet 2

Opening balance	2 130	Finished goods [9]	7 930
Direct materials [3]	2 500		
Wages clearance [5]	2 700		
POCA [7]	600		
	7 930		7 930

Job sheet 3

Opening balance	2 020	Balance c/d	5 920
Direct materials [3]	1 300		
Wages clearance [5]	1 500		
POCA [7]	1 100		
	5 920		5 920
Balance b/d	5 920		

Explanation of cost-flow transactions (double entries shown for [3] to [10] only)

[1] Materials purchases on account and gross wages for the month
[2] Factory overheads incurred
[3] Direct materials issued to production
[4] Indirect materials issued to production
[5] Direct labour assigned to production
[6] Indirect labour assigned to production
[7] Production overheads allocated and apportioned to production
[8] Under absorption of overheads adjusted against cost of sales
[9] Job 2 completed during the month and transferred to finished goods inventory
[10] Cost of goods sold during the month transferred from finished goods inventory to cost of sales

Reconciliation of WIP control account

	R
Job sheet 1	7 140
Job sheet 3	5 920
Balance per WIP control account	13 060

(See information box in section 4.1.)

Reconciliation of clearance accounts

Wages clearance account

Balance should be R nil because clearance accounts are temporary accounts (See section 7.3.)

Production overheads clearing account

Activity 8.1

African Sunset manufactures custom-made sofas on order only. The highly qualified craftsmen use only high quality materials. On 1 April, no jobs were outstanding. During April, job numbers 12 and 13 were started. Job number 12 was completed during April, but job number 13 was still unfinished at the end of the month. There were no sales during the month. The following are the costs for the month:

Direct materials issued to production:

Requisition 129 to job 12 – R3 000
Requisition 130 to job 13 – R4 000
Requisition 131 to job 13 – R19 000
Requisition 132 to job 12 – R12 000
Requisition 133 to job 13 – R7 000
Requisition 134 to job 12 – R5 000

Direct labour costs at a direct labour rate of R300 per hour:

Time ticket 26: 8 hours for job 12; 20 hours for job 13
Time ticket 31: 44 hours for job 12; 54 hours for job 13
Time ticket 40: 14 hours for job 12; 12 hours for job 13

Production overheads are apportioned to jobs at R100 per direct labour hour.

Required

Prepare the job-cost sheets for jobs 12 and 13 for April and indicate how inventory will be disclosed in the statement of financial position at the end of April.

Feedback on activity 8.1

Job-cost sheet

Job number: 12 | Date started: 4 April
Description: Bushveld sofa | Date completed: 29 April
Number of units: 5

Direct materials		Direct labour		Production overheads			
Requisition	**R**	**Time ticket**	**Hours**	**R**	**Hours**	**Rate**	**R**
129	3 000*	26	8	2 400^	8	100	800+
132	12 000*	31	44	13 200^	44	100	4 400+
134	5 000*	40	14	4 200^	14	100	1 400+

Cost summary	**R**
Direct materials cost	20 000*
Direct labour cost	19 800^
Production overheads	6 600+
Total cost	46 400

Job-cost sheet

Job number: 13
Description: Mountain sofa
Number of units: 10

Date started: 5 April
Date completed: in progress

Direct materials		Direct labour			Production overheads		
Requisition	**R**	**Time ticket**	**Hours**	**R**	**Hours**	**Rate**	**R**
130	4 000	26	20	6 000	20	100	2 000
131	19 000	31	54	16 200	54	100	5 400
133	7 000	40	12	3 600	12	100	1 200

Cost summary	**R**
Direct materials cost	30 000
Direct labour cost	25 800
Production overheads	8 600
Total cost	64 400

At the end of April, the inventory of finished goods will be disclosed at a value of R46 400, while the inventory of work-in-progress will be disclosed at R64 400 in the statement of financial position.

Activity 8.2

Refer to the information in activity 8.1. If three Bushveld sofas are sold for a total of R44 544, calculate the following:

- gross profit per sofa
- gross profit mark-up on cost

Feedback on activity 8.2

Gross profit per sofa

Total cost to manufacture five sofas per job sheet 12:	R46 400
Therefore, cost per single sofa:	R46 400 / 5 = R9 280
Selling price of three sofas given as:	R44 544
Therefore, selling price per single sofa:	R44 544 / 3 = R14 848

Selling price	R14 848
Cost per sofa	R9 280
Gross profit per sofa	R5 568

Gross profit mark-up on cost: 5 568 / 9 280 x 100 = 60%

Activity 8.3

Refer to the information in activity 8.1. Assume that the following production overheads were actually incurred during April and determine the over or under absorption of overheads:

	R
Indirect materials cost	2 100
Indirect labour cost	8 000
Depreciation of equipment	3 400
Electricity and rent	2 700
	16 200

Feedback on activity 8.3

Overheads apportioned to production:

	R
Job 12	6 600
Job 13	8 600
Total overheads apportioned	15 200
Total overheads actually incurred	16 200
Difference	1 000

The actual overheads were more than the apportioned overheads; therefore, there was an under absorption of overheads of R1 000.

Activity 8.4

Refer to the information in activities 8.1 and 8.3. If no sofas were sold during April, how would you treat the R1 000 under absorption of overheads in the accounting records of African Sunset?

Feedback on activity 8.4

If there were no sales during the period, the under absorption should not be expensed; it should be pro-rated on the basis of direct labour hours to work-in-progress and finished goods:

Finished goods (job number 12)	66	/ 152 hours x R1 000 =	434
Work-in-progress (job number 13)	86	/ 152 hours x R1 000 =	566
	152		R1 000

8.3 PROCESS COSTING

Process costing accumulates and assigns costs to departments or processes. Cost is computed per department and not per job or customer. In a process costing system, the processing department carries out the same conversion activities for all the units being converted in that department; in a job-costing system, there are different conversion activities for the same job. The output of a processing department is homogeneous (e.g. if cans of pilchards are being produced, all the cans of pilchards will be the same). The output of a job may or may not be identical, depending on the type of goods being produced. Examples where a process costing system would apply are the manufacturing of pharmaceuticals, canned foods, cold drinks, flour, etc.

Whether job costing or process costing is used, the input costs are always the cost of direct materials, direct labour and production overheads added together. In job costing, these costs are accumulated per job, while in process costing, these costs are accumulated per department.

In a job-costing system, where input costs are accumulated per job, direct materials are issued for conversion to each job. In a process costing system, where input costs are accumulated per department, it is possible to issue direct materials to some departments only (or even to the first department only), while other departments add only conversion costs. Consider our example of making pillows. The factory making the pillows may have three departments: cutting, stitching and filling. The cutting department will cut the fabric in 75 cm x 40 cm pieces and pass the pieces on to the stitching department. The stitching department will not add any further direct materials, but will only stitch three sides of two pieces of the fabric together. The stitched blocks are then transferred to the filling department, where further direct materials (feathers) are added through the opening (fourth side) left unstitched by the stitching department. The filled pillows are transferred back to the stitching department so they can complete the stitching on the remaining open side.

Depending on the type of product, production can occur in a single or in multiple departments.

8.3.1 Single department process costing

In a process costing system, the cost of each unit produced is determined by dividing the total accumulated production cost by the total number of units produced. We can then use this cost per unit to determine the value of the units in inventory and the value of the units sold, which must be transferred to cost of sales. Cost accumulation in a single department is very similar to cost accumulation in a job-costing system.

Activity 8.5

Mary's Cakes produces fruitcakes in a single process. The following information relates to May:

	R
Direct materials cost (flour, eggs, mixed fruit)	120 000
Direct labour cost	60 000
Production overheads	40 000
Total input cost	220 000

During May, Mary's Cakes made 2 000 fruitcakes. There was no work-in-progress at the beginning or the end of May. What is the cost to produce one fruitcake?

Feedback on activity 8.5

Production cost per unit equals total accumulated production cost ÷ total number of units produced.

Therefore, R220 000 / 2 000 = R110 per cake.

8.3.2 Multiple-department process costing (no work-in-progress)

In a single department, all direct materials are added and conversion occurs in one department, and therefore the total cost of production accumulates in that one, single department. In the case of consecutive departments, the process is started when direct materials are issued to department 1. Conversion costs are added in department 1, and at some point, the units are transferred from department 1 to department 2. We say the *output* of department 1 becomes the *input* of department 2, and the cost accumulated to those units becomes input cost in department 2. In department 2, more direct materials may or may not be added, but additional conversion will take place.

Activity 8.6

Mary's Cakes produces fruitcakes in three consecutive processes: mixing and baking; icing; and packing. The following information relates to May:

	Mixing and baking	Icing	Packing
	R	R	R
Direct materials cost (flour, eggs, mixed fruit)	120 000		
Direct materials cost (icing sugar)		8 000	
Direct materials cost (cartons)			10 000
Direct labour cost	60 000	20 000	15 000
Production overheads	40 000	6 000	3 000
Total input cost	220 000	34 000	28 000

During May, 2 000 fruitcakes were made. There was no work-in-progress at the beginning or the end of May. What is the cost to produce one fruitcake?

Feedback on activity 8.6

	Mixing and baking	Icing	Packing	Finished goods
	R	R	R	R
Cost of previous department	-	220 000	254 000	282 000
Direct materials cost	120 000	8 000	10 000	138 000
Direct labour cost	60 000	20 000	15 000	95 000
Production overheads	40 000	6 000	3 000	49 000
Total input cost	220 000	254 000	282 000	
Total cakes made	2 000	2 000	2 000	2 000
Cost per cake	110	127	141	141

Note that the cost of the production output of *Mixing and baking* (R220 000) becomes an input cost in *Icing*; the output cost of *Icing* becomes an input cost of *Packing*. *Packing* is the last process, from where completed goods (cakes) are transferred to inventory of finished goods. The value of finished goods is the same as the value of the output of the final process (i.e. R282 000). The cost of finished goods comprises of the following:

Direct materials cost (120 000 + 8 000 + 10 000)	=	R138 000
Direct labour cost (60 000 + 20 000 + 15 000)	=	R95 000
Production overheads (40 000 + 6 000 + 3 000)	=	R49 000
		R282 000

The cost per unit (cake) is determined by dividing the total production cost of the department by the total output (units) of the department. The cost per cake increases as production progresses through the various departments. Assume that no cakes had been transferred to packaging by the end of the month; then inventory (work-in-progress) would have been valued at R127 per cake, which would give a total of R254 000.

8.3.3 Multiple-department process costing (with work-in-progress)

Most of the examples, activities and self-assessment questions in this learning unit deals with a process costing system where there is a single production department. In activity 8.7, we will look at some of the challenges involved in the case of more than one production department and work-in-progress at the end of an accounting period.

Activity 8.7

African Pride manufactures T-shirts in two production departments: *patterning and cutting*, and *stitching*. All direct materials required for making the T-shirts are added at the beginning of the patterning and cutting process. One shirt requires three hours of labour before it can be transferred to stitching. Overheads are apportioned at 100% of labour cost. On 1 August, there were 200 shirts in progress in the patterning and cutting department, and accumulated costs were as follows:

Direct materials cost	R10 000
Direct labour cost	R4 500
Production overheads	R4 500
	R19 000

African Pride began work on another 150 T-shirts during August. The total costs incurred by the patterning and cutting department during the month were as follows:

Direct materials cost	R7 500
Direct labour cost	R9 000
Production overheads	R9 000
	R25 500

During August, the patterning and cutting department completed its work on 250 shirts and transferred them to the stitching department. What is the total cost of the 250 shirts that the patterning and cutting department will transfer to the stitching department?

Feedback on activity 8.7

At the end of August, the patterning and cutting department must account for 350 units (200 shirts in progress at the beginning of August plus 150 shirts started during August); it must also account for total costs of R44 500 (R19 000 + R25 500).

Let's look at the 200 units that were in progress at the beginning of the month. We know African Pride will not incur any further direct materials cost for these shirts, because all the materials were added right at the beginning of the patterning and cutting process. However, the patterning and cutting department had to add further labour (and overheads) to the 200 shirts before they were ready for transfer to the stitching department. During August, labour cost to the amount of R9 000 was added. However, this labour cost was incurred to finish the 200 shirts and to start another 150 shirts, of which 50 were also completed during August. We can now distinguish between three batches of shirts:

- 200 shirts in progress at the beginning of the month and completed during the month
- 50 shirts started and completed during the month
- 100 shirts started during the month, but still in progress at the end of the month

350 shirts that must be accounted for

We know that the R7 500 materials cost incurred during August relate to the 150 shirts started in August, because all direct materials are added at the beginning of the patterning and cutting process. However, how do we split the labour and overheads between the 350 shirts that we have to account for?

We know that it takes three hours to complete one T-shirt before it can be transferred to the stitching department. Let's assume that the 200 shirts in progress at the beginning of August each require a further one hour labour to complete, and that the 100 shirts in progress at the end of August each require a further two hours labour (i.e. only one hour labour has been completed so far). The 50 shirts started and completed will of course have involved three hours labour each. Therefore, the total hours worked in the patterning and cutting department during August were as follows:

200 shirts at one hour each to complete:	200 x 1 =	200 hours
50 shirts started and completed:	50 x 3 =	150 hours
100 shirts started and only one hour each so far:	100 x 1 =	100 hours
Total hours worked		450 hours

Therefore, the labour cost per hour is R9 000 ÷ 450 hours = R20.

The total cost at which the 200 shirts in progress at the beginning of August will be transferred will therefore be:

Accumulated cost at the beginning of August	R19 000
Additional labour cost August: 200 hours x R20	4 000
Overheads apportioned August (100% of labour cost)	4 000
Total	R27 000

The 50 shirts started and completed will be transferred at:

Direct materials cost (R7 500 ÷ 150 x 50)	R2 500
Direct labour cost (R20 x 3 hours x 50 shirts)	R3 000
Overheads	R3 000
Total	**R8 500**

The value of the 100 shirts in progress at the end of August will be:

Direct materials cost (R7 500 ÷ 150 x 100)	R5 000
Direct labour cost (R20 x 1 hours x 100 shirts)	2 000
Overheads apportioned in August (100% of labour cost)	2 000
Total	**R9 000**

We have now accounted for 27 000 + 8 500 + 9 000 = **R44 500**.

Cost of work-in-progress at the beginning of the month	R19 000
Cost added during the month	R25 500
Total cost to be accounted for	**R44 500**

8.3.4 Recording process cost flows in the accounting records

The cost flows in process costing and job costing systems are the same, except for the following: in a process costing system, every department or process represents a separate work-in-progress account, whereas in a job- costing system, every job represents a separate work-in-progress account. In example 8.3, we will use the same basic information as in example 8.2 to illustrate this difference.

Example 8.3

A C C O U N T S I N T H E G E N E R A L L E D G E R

Materials inventory account

	R		R
Balance b/d	9 000	WIP [3]	5 000
Payables [1]	4 000	POCA [4]	800
		Balance c/d	7 200
	13 000		13 000
Balance b/d	7 200		

Work-in-progress control account (WIP)

	R		R
Opening balance	8 490	Finished goods [9]	7 930
Direct materials [3]	5 000	Balance c/d	13 060
Wages clearance [5]	5 500		
POCA [7]	2 000		
	20 990		20 990
Balance b/d	13 060		

Wages clearance account

Wages payable [1]	6 500	WIP [5]	5 500
		POCA [6]	1 000
	6 500		6 500

Finished goods inventory

Balance b/d	3 300	COS [10]	8 540
WIP [9]	7 930	Balance c/d	2 690
	11 230		11 230
Balance b/d	2 690		

Production overheads clearance account (POCA)

Payables [2]	1 100	WIP [7]	2 000
Materials [4]	800	COS [8]	900
Wages clearance [6]	1 000		
	2 900		2 900

Cost of sales account (COS)

Finished gds [10]	8 540	Balance c/d	9 440
POCA [8]	900		
	9 440		9 440
Balance b/d	9 440		

ACCOUNTS IN THE SUBSIDIARY COST LEDGER

WIP dept 1

	R		R
Opening balance	4 340	Trfd to dept 2	1 000
Direct materials [3]	1 200	Balance c/d	6 140
Wages clearance [5]	1 300		
POCA [7]	300		
	7 140		7 140
Balance b/d	6 140		

WIP Dept 2

Opening balance	2 130	Trfd to dept 3	4 000
Trfd from dept 1	1 000	Balance c/d	4 930
Direct materials [3]	2 500		
Wages clearance [5]	2 700		
POCA [7]	600		
	8 930		8 930
Balance c/d	4 930		

WIP Dept 3

Opening balance	2 020	Finished goods [9]	7 930
Trfd from dept 2	4 000	Balance c/d	1 990
Direct materials [3]	1 300		
Wages clearance [5]	1 500		
POCA [7]	1 100		
	9 920		9 920
Balance b/d	1 990		

Explanation of cost-flow transactions (double entries shown for [3] to [10] only)

[1] Materials purchases on account and gross wages for the month
[2] Factory overheads incurred
[3] Direct materials issued to production
[4] Indirect materials issued to production
[5] Direct labour assigned to production
[6] Indirect labour assigned to production
[7] Production overheads allocated and apportioned to production
[8] Over-absorption of overheads adjusted against cost of sales
[9] Completed goods transferred from final process to finished goods inventory
[10] Cost of goods sold during the month transferred from finished goods inventory to cost of sales
Note the transfers from one WIP account to the next in the subsidiary cost ledger.

Reconciliation of WIP Control	R
WIP dept 1	6 140
WIP dept 2	4 930
WIP dept 3	1 990
Balance per WIP control account	13 060

We can summarise the similarities between a job-costing and a process costing system as follows:

- Both job costing and process costing have as purpose the accumulation of production costs (material, labour and overheads) until goods have been completed and transferred to finished goods inventory.
- Both systems use the same inventory accounts: direct materials inventory; work-in-progress inventory (one per job or one per process); and finished goods inventory.
- Both systems accumulate overheads in the production overheads clearance account and assign overheads to work-in-progress.
- Cost flows in both systems are basically the same, except for the following:
    - in a process costing system, costs flow from the one work-in-progress account to the next and to finished goods from only the last departmental work-in-progress account
    - in a job-costing system, costs do not flow between jobs, but directly to finished goods from each job as it is completed

We can summarise the differences between the two systems as follows:

- Process costing is used when a single product is worked on continuously for a long period of time (e.g. the production of mealie meal). Job costing is used when different jobs with different production requirements are worked on in each period (e.g. printing jobs).
- Although both systems accumulate and assign costs to work-in-progress accounts, process costing accumulates and assigns costs per process (department) while job costing accumulates and assigns costs per job.
- Process costing computes the unit cost of production per department on a department production report, while job costing computes the unit cost of production per job on a job-cost sheet.
- There are slight differences in cost flows for the two systems, as indicated above.

8.4 STATEMENTS OF COST OF GOODS MANUFACTURED AND SOLD

You will recall that when management design a cost accounting system, they have to decide whether to implement a perpetual or periodic inventory system. In a perpetual inventory system, the value of inventory is updated after every inventory transaction, while in a periodic system, the values of the inventory accounts are updated only periodically – usually at the end of the financial period. In your financial accounting studies, you will have learnt that merchandisers keeping only inventory of merchandise and using a periodic inventory system will debit purchases of merchandise to a purchases account – not to the inventory of merchandise account. The format for determining the cost of goods sold is as follows:

Opening inventory of merchandise	Rxxx
Plus: Purchases of merchandise	Rxxx
Equals: Merchandise available for sale	Rxxx
Less: closing inventory of merchandise	(Rxxx)
Equals: Cost of merchandise sold	Rxxx

However, what happens when a manufacturer uses a periodic inventory system? A manufacturer does not have one inventory account only, but three: inventory of materials, inventory of work-in-progress and inventory of finished goods. The inventory of materials account is somewhat similar to an inventory of merchandise account in that both receive their inventory from external (outside) suppliers. It is therefore quite possible to maintain a purchases account for materials purchases. However, neither work-in-progress nor finished goods are

purchased; they are manufactured. You probably realised that the above format for determining the cost of goods sold in the case of a merchandiser will not do for a manufacturer. When we determine the cost of sales for a manufacturing company, we have to replace *Purchases of merchandise* in the format above with *Cost of goods manufactured.* In a manufacturing company, we first need to determine the cost of goods manufactured before determining the cost of goods sold.

It is important to understand that the cost of goods manufactured is not the same as the cost of goods sold. Theoretically speaking, there can be an amount for cost of goods manufactured in a month with zero sales. In certain months, the units sold may exceed the units produced, for example during December, because of Christmas shopping patterns. Simply put, the mix of products sold during a specific period will seldom, if ever, be the same as the mix of products manufactured during the same period.

The cost of goods manufactured statement for a specific period is based on the work-in-progress completed during that period. We calculate the cost of goods finished (i.e. manufactured) during the period as follows: the cost of opening inventory of work-in-progress, plus the cost of direct materials, direct labour and production overheads put into production during the period, minus the cost of closing inventory of work-in-progress. Therefore, we can say that the cost of goods manufactured statement provides a summary of the production costs flowing in and out of the work-in-progress account. We determine the number of units completed during the period in similar fashion: the number of units in progress at the beginning of the period, plus the number of units started during the period, minus the number of units in progress at the end of the period (see activity 8.7).

The company incurs many costs during the manufacturing process whilst performing many activities to achieve its planned production output. As part of the control responsibility of management, they will compare these costs and activities with the manufacturing budget and performance plan of the company. Additional planning will be required to compensate for deviation from the initial plan and budget. The management accountant will prepare a report of the cost of the goods manufactured and sold periodically to assist management with this responsibility. Therefore, a statement of cost of goods manufactured and a statement of cost of goods sold are often prepared for presentation to management, regardless of whether a periodic or perpetual inventory system is in place.

Usually, a statement of cost of goods manufactured is divided into sections to indicate the cost of direct materials put into production, the cost of direct labour and production overheads used to convert the direct materials and the total cost of production. The statement of cost of goods manufactured does not form part of the financial statements of the company, but is issued to management for internal use. The statement of cost of goods manufactured is presented for a period, and its heading will indicate the period it covers (like the heading of the statement of profit or loss.

The statement of cost of goods manufactured connects with the statement of cost of goods sold and the statement of profit or loss. Sometimes, the statement cost of goods manufactured and the statement of cost of goods sold are combined into a single statement of cost of goods manufactured and sold.

Example 8.4

African Dream uses a normal costing system. All production overheads are absorbed into the cost of production by means of a plant-wide rate of R200 per machine hour for assigning overheads to the single production department. The company uses a periodic inventory system and the FIFO method. Costs are accumulated in the production department by means of a process costing system.

At the beginning of June, the balances on the inventory accounts of African Dream were as follows:

Inventory of direct materials	R65 500
Inventory of indirect materials	R25 000
Inventory of work-in-progress	R100 000
Inventory of finished goods (27 000 units)	R135 000

During the month, direct materials costing R485 000 were purchased, and at the end of June, the value of the direct materials physically on hand was R55 000. Purchases of indirect materials amounted to R18 000, and the value of closing inventory of indirect materials was R13 000. There were 80 000 units in finished goods at the end of June.

Other costs incurred during the month were as follows:

Labour costs (of which 85% is direct labour)	R170 000
Further factory overheads debited to the production overheads clearance account	R35 000

During the month, 100 000 units were completed and transferred to finished goods inventory. At the end of June, the cost of work-in-progress was R30 000. A total of 450 machine hours were worked during the month.

Required

Prepare a statement of cost of goods manufactured and a statement of cost of goods sold.

Statement of cost of goods manufactured for June

	R	R	
Direct materials		495 500	(65 500 + 485 000 – 55 000)
Opening inventory	65 500		
Purchases	485 000		
Closing inventory	(55 000)		
Direct labour		144 500	(170 000 x 0,85)
Production overheads		90 000	(450 machine hours x R200)
Total input cost for June		730 000	
Opening inventory WIP		100 000	
Total manufacturing cost		830 000	
Closing inventory WIP		(30 000)	
Cost of goods manufactured		800 000	

Notes

- The *cost of goods manufactured* refers to the goods completed and transferred to the finished goods inventory.
- *Total manufacturing cost* refers to the total cost that must be accounted for, i.e. the cost of work-in-progress at the beginning of the period, plus the costs added during the period.
- *Total input cost* refers to the costs added during the period.

Statement of cost of goods sold for June

	R	Units	Unit cost (R)
Opening inventory finished goods	135 000	27 000	5
Cost of goods manufactured	800 000	100 000	8
Goods available for sales	935 000	127 000	
Closing inventory of finished goods	(640 000)	(80 000)	
Cost of goods sold	295 000	47 000	

Notes

- The columns for *units* and *unit cost* do not form part of the statement of cost of goods sold but we added them for explanatory purposes.
- The *cost of opening inventory of finished goods* was provided in the question.
- We obtained the *cost of goods manufactured* during the month from the statement of cost of goods manufactured. 100 000 units were completed during the month; therefore, the unit cost of each unit completed in June was R8.
- The company use FIFO method; therefore, they assume that the units in inventory at the beginning of June are sold first.
- The units in closing inventory will be valued at the most recent costs in (i.e. 80 000 units x R8 per unit).

Example 8.5

The information given in example 8.4 applies for this example. African Dream incurred the following period costs in June:

Selling and distribution expenses	R80 000
Administrative expenses	R130 000

The selling price of goods is R15 per unit.

Required

Prepare a statement of profit or loss.

Statement of profit or loss and other comprehensive income for June

	R
Revenue	705 000
Cost of sales	295 500
Gross profit	409 500
Operating expenses	210 000
Selling and distribution expenses	80 000
Administrative expenses	130 000
Net profit for June	199 500

Notes

- Revenue = number of units sold x selling price per unit = 47 000 x R15 = R705 000 (see cost of goods sold statement).
- Cost of sales:

Over or under absorption of production overheads:	**R**	**R**
Indirect materials		30 000
Opening inventory	25 000	
Purchases	18 000	
Closing inventory	(13 000)	
Indirect labour		25 500
Other factory overheads		35 000
Total actual production overheads		90 500
Overheads apportioned (cost of goods manufactured statement)		90 000
Under absorption of production overheads		500
Cost of sales (per cost of goods sold statement)		295 000
Cost of sales per statement of profit or loss		295 500

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8.5 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 In building a cost accounting system, management must decide whether FIFO or the weighted average method will apply as the basis for measuring the cost of production.

1.2 Job costing would be appropriate for cost accumulation in the production of fast-moving consumer goods.

1.3 In job costing, we can assign costs to jobs or customers.

1.4 In process costing, different production departments are responsible for different conversion processes.

1.5 Cost accumulation is basically identical in job costing and process costing, except that in job costing, only variable overheads are assigned to production, while process costing fully absorbs fixed production overheads as well.

1.6 The cost of foods manufactured statement for a specific period is based on the work-in-progress completed during that period.

1.7 The cost of goods manufactured statement is part of the financial statements and must therefore comply with IFRS requirements.

1.8 Manufacturers that use a periodic inventory system will prepare a cost of goods manufactured statement before they can determine the cost of sales.

1.9 The cost of goods manufactured will always be the same as the cost of goods sold.

1.10 Fixed overheads per unit will increase as activity increases within the relevant range.

QUESTION 2

This question consists of eight multiple-choice questions. Carefully read the information provided and select only the most correct option as your answer.

2.1 The accountant inadvertently debited insurance cost relating to administration to the production overheads clearance account. This inclusion will lead to an … .

(a) over apportionment of overheads to production
(b) overstatement of period costs in the statement of profit or loss
(c) understatement of cost of goods manufactured
(d) overstatement of cost of sales

2.2 Direct materials are issued to production, but the conversion process has not been completed by the end of the month. At the end of the month, the cost of the direct materials will be included in the closing balance of … .

(a) inventory of direct materials
(b) inventory of work-in-progress
(c) inventory of finished goods
(d) the production overheads clearance account, from where it will be written off to the cost of sales account

2.3 The cost of goods manufactured during the month was R80 000. The opening and closing balances of inventory of finished goods was R20 000 and R22 000 respectively. The cost of sales for the month was … .

(a) R80 000
(b) R100 000
(c) R42 000
(d) R78 000

2.4 Consider the information below and determine the amount that was apportioned to production as the cost of manufacturing overheads.

Opening balance of work-in-progress account	R120 000
Closing balance of work-in-progress account	R90 000
Cost of goods manufactured	R950 000
Cost of direct materials transferred to production	R220 000
Cost of direct labour charged to production	R300 000

(a) R860 000
(b) R400 000
(c) R980 000
(d) R460 000

2.5 The value of opening inventory of work-in-progress that will complete the statement of cost of goods manufactured below is … .

	R
Cost of direct materials transferred to production	80 000
Plus: Cost of direct labour charged to production	250 000
Plus: Production overheads apportioned to production	100 000
Equals: Total input costs	430 000
Plus: Opening balance of work-in-progress account	*x*
Total manufacturing costs	*y*
Less: Closing balance of work-in-progress account	70 000
Equals: Cost of goods manufactured	420 000

(a) R10 000
(b) R20 000
(c) R60 000
(d) R70 000

Use the following information to answer questions 2.6 to 2.8:

	Opening balance	**Closing balance**
	R	**R**
Direct materials	58 000	60 000
Work-in-progress	12 000	24 000
Finished goods	45 000	36 000

During the month, purchases of direct materials amounted to R26 000, and the cost of direct labour was R30 000. The total cost of overheads apportioned to production was R80 000.

2.6 Total input cost for the month was … .

(a) R134 000
(b) R84 000
(c) R114 000
(d) R146 000

2.7 Total cost of goods manufactured was … .

(a) R122 000
(b) R146 000
(c) R134 000
(d) R131 000

2.8 The cost of goods sold was … .

(a) R122 000
(b) R146 000
(c) R134 000
(d) R131 000

QUESTION 3

Ubuthongo (Pty) Limited produces a single type of wall clock. There were no inventories at the beginning of April. The following information pertains to the month of April:

Number of wall clocks put into production at the beginning of April	10 000 units
Number of wall clocks completed during the month	8 000 units
Number of wall clocks sold during the month	7 000 units

Direct materials required for producing one wall clock:

2 casings at R15 each
1 inserts at R25 each

During the month, the following purchases of direct materials were made:

23 000 casings
11 000 inserts

Total direct labour cost for April	R30 000
Total direct labour cost assigned to clocks completed during the month	R24 000
Total manufacturing overheads	R22 000
Total manufacturing overheads assigned to clocks completed during the month	R17 600

Required

Calculate the value at the end of April of the following:

3.1 direct materials inventory
3.2 work-in-progress
3.3 finished goods inventory

QUESTION 4

Ukwakhiwa Limited is a manufacturing company that mass produces a single product (NCV) in two production departments (P1 and P2). There is a single service department (S) providing essential administrative, supervisory, cleaning and maintenance services to the production departments. Departments P1 and P2 each occupy 2 000 m^2 floor space, and department S occupies 1 000 m^2. During December, a total of 1 760 and 1 440 direct labour hours were worked in departments P1 and P2 respectively. Machine hours worked were 1 300 in department P1 and 1 200 hours in department P2.

The company costs its products on a normal costing basis according to the full absorption costing method. Production overheads are apportioned to production at a plant-wide rate of R320 per direct labour hour. All inventories are held according to the perpetual system. The FIFO method is used. The cost of the company's contribution to staff benefits is considered indirect labour cost.

The last delivery of direct materials was made on 7 December and consisted of 25 000 units of kkk at R4 each and 35 000 units of mmm at R3 each. At the end of December, there were 20 000 units of kkk and 30 000 units of mmm on hand.

Opening inventory on hand on 1 December consisted of of the following:

	Units	**R**
Component kkk	15 000	57 000
Component mmm	5 000	13 750
Work-in-progress	3 000	277 900
Finished goods	7 000	382 900

The value of closing inventory of work-in-progress and finished goods was R231 650 and R367 200 respectively.

During March, a record number of 120 000 units of NCVs were produced. The worst production output for the year so far occurred in June, when only 106 000 NCVs were produced. The total electicity accounts for these months were R250 000 and R236 000 respectively. During December, 110 000 units of NCVs were produced.

Below is a list of amounts relating to transactions of Ukwakhiwa Limited for December:

	R
Direct materials purchases	
Component kkk (115 000 units)	480 000
Component mmm (135 000 units)	420 000
Indirect materials issued to production	40 000
Consumables issued to:	
Department P1	8 000
Department P2	6 500
Department S	1 500
Gross wages	
Department P1	290 000
Department P2	250 000
Department S	80 000
Company contribution to benefits	62 000
Maintenance and repairs of equipment	
Department P1	10 300
Department P2	5 890
Department S	3 700
Depreciation of equipment	
Department P1	28 000
Department P2	23 000
Department S	10 800
Rent and insurance of factory building	570 000
Electricity account	?
Sales and distribution costs	300 000
Management, administration and accounting	435 000

Required

4.1 Complete the grid below by identifying each cost as a prime cost **(PC)**, convertion cost **(CC)**, direct cost **(DC)**, overheads **(OH)**, fixed cost **(FC)**, variable cost **(VC)**, mixed cost **(MC)**, product cost **(PrC)** and/or period cost **(PeC)**. Insert a ✓ sign where applicable.

	PC	CC	DC	OH	FC	VC	MC	PrC	PeC
Direct materials									
Indirect materials									
Consumables									
Gross wages of departments P1 and P2									
Gross wages of department S									
Company contribution to benefits									
Maintenance and repairs of equipment									
Department P1									
Department P2									
Department S									
Depreciation of equipment									

	PC	CC	DC	OH	FC	VC	MC	PrC	PeC
Department P1									
Department P2									
Department S									
Rent and insurance of factory building									
Electricity and water account									
Sales and distribution costs									
Management, administration & accounting									

4.2 Apply the high-low method to separate electricity cost into its fixed and variable components and estimate the electricity cost for December.

4.3 Assign production overheads to departments P1, P2 and S. Allocate the company's contribution to staff benefits to departments in proportion to gross wages. Apportion the cost of indirect materials and the variable portion of the electricity cost to the production departments on the basis of machine hours worked only. Apportion all other common overheads on the basis of floor space occupied. Apportion the total cost of department S to the production departments on the basis of direct labour hours.

4.4 Prepare a statement of cost of goods manufactured for Ukwakhiwa Limited for the month of December.

4.5 Determine the amount by which production overheads was over or under absorbed in December.

4.6 Determine the total amount that will be disclosed as cost of sales for December.

4.7 Calculate the number of NCVs in the closing inventory of finished goods at the end of December.

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8.6 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 F The cost-flow assumption is one of the *methods* applied in determining the cost of goods manufactured. The *basis* of the cost accounting system is actual costing, normal costing or standard costing.

1.2 F In job costing, the goods manufactured must be markedly different from one another for cost assignment per job to be possible.

1.3 T

1.4 T

1.5 F Both job costing and process costing can use either marginal costing or absorption costing as a method of cost determination.

1.6 T

1.7 F The cost of goods manufactured statement is intended for internal use to assist management with their control responsibility.

1.8 T

1.9 F The cost of goods *manufactured* refers to the costs that flow *into* the finished goods account, and the cost of goods *sold* refers to the costs that flow *out of* the finished goods account.

1.10 F Fixed overheads *per unit* will *decrease* (not increase) as activity increases within the relevant range. Within the relevant range, *total* fixed overheads will remain unchanged regardless of activity level.

QUESTION 2

2.1 (d) see note 1

2.2 (b)

2.3 (d) see note 2

2.4 (b) see note 3

2.5 (c) see note 4

2.6 (a) see note 5

2.7 (a) see note 5

2.8 (d) see note 5

Notes

1 Apportionment of overheads from the production overheads clearance account occurs according to predetermined rates; therefore (a) is not correct.

Insurance costs relating to administration is a period cost, but because of the error, too little administration insurance expenses will be shown in the statement of profit or loss (i.e. the period cost will be *under*stated). Option (b) is therefore not correct.

We apportion overheads from the production overheads clearance account according to predetermined rates; therefore, the cost of goods manufactured will not be affected by the error, which renders option (c) incorrect.

We debit the actual overheads incurred to the production overheads clearance account and credit costs apportioned to production to the production overheads clearance account. A debit balance in the production overheads clearance account at the end of the period indicates an under absorption of overheads, while a credit balance in the

production overheads clearance account at the end of the period indicates an over absorption of overheads. We usually write off a balance in the production overheads clearance account to the cost of sales account. In this instance, "too much" actual cost was debited to the production overheads clearance account, leading to "too much" debit being transferred to cost of sales. Therefore, option (d), stating that cost of sales will be overstated is correct.

2

	R
Opening inventory of finished goods	20 000
Plus: Cost of goods manufactured	80 000
Equals: Goods available for sale	100 000
Minus: Closing inventory of finished goods	22 000
Equals: Cost of goods sold	78 000

3 In answering this question, you can prepare a cost of goods manufactured statement and insert the values that are known:

	R
Cost of direct materials transferred to production	220 000
Plus: Cost of direct labour charged to production	300 000
Plus: Production overheads apportioned to production	*x*
Equals: Total input costs	*y*
Plus: Opening balance of work-in-progress account	120 000
Total manufacturing costs	*z*
Less: Closing balance of work-in-progress account	90 000
Equals: Cost of goods manufactured	950 000

Working from the bottom, the value of *z* is determined as R1 040 000: *z* minus R90 000 = R950 000, and therefore R950 000 + R90 000 will be equal to *z*. We can now determine the value of *y* in similar fashion: R1 040 000 – R120 000 = R920 000. Then we determine the value of *x* as R920 000 – 300 000 – 220 000 = R400 000. Therefore:

	R
Cost of direct materials transferred to production	220 000
Plus: Cost of direct labour charged to production	300 000
Plus: Production overheads apportioned to production	400 000
Equals: Total input costs	920 000
Plus: Opening balance of work-in-progress account	120 000
Total manufacturing costs	1 040 000
Less: Closing balance of work-in-progress account	90 000
Equals: Cost of goods manufactured	950 000

4 Working from the bottom, the value of *y* is determined as R490 000 (420 000 + 70 000). Then *x* is determined as R60 000 (490 000 – 430 000).

5

	R
Opening balance of direct materials	58 000
Plus: Purchases of direct materials	26 000
Equals: Direct materials available for production	84 000
Less: Closing balance of direct materials	60 000
Equals: Direct materials used in production	24 000
Direct labour cost	30 000
Production overheads absorbed	80 000
Total input cost for the month	134 000
Plus: Opening balance of work-in-progress	12 000
Equals: Total manufacturing cost	146 000
Less: Closing inventory of work-in-progress	24 000
Equals: Cost of goods manufactured	122 000
Plus: Opening inventory finished goods	45 000
Equals: Goods available for sales	167 000
Less: Closing inventory finished goods	36 000
Equals: Cost of goods sold	131 000

QUESTION 3

3.1 Direct materials inventory

	R	R
Inventory at the beginning of April		0
Purchases during the month:		
Casings – 23 000 x R15 each	345 000	
Inserts – 11 000 x R25 each	275 000	620 000
Issued to work-in-progress for 10 000 clocks		
Casings – 10 000 x 2 x R15	300 000	
Inserts – 10 000 x 1 x R25	250 000	550 000 *
Inventory at the end of the month		
Casings – 3 000 x R15 each	45 000	
Inserts – 1 000 x R25 each	25 000	**70 000**

3.2 Work-in-progress inventory

	R	R
Inventory at the beginning of April (0 units)		0
Input costs for the month (10 000 units)		602 000
Direct materials cost (see* in 3.1 above)	550 000	
Direct labour cost	30 000	
Production overheads	22 000	
Completed and transferred to finished goods (8 000 units)		(481 600)
Direct materials cost	440 000	
(R550 000 ÷ 10 000 units started x 8 000 units completed)		
Direct labour cost (given in question)	24 000	
Production overheads (given in question)	17 600	
Inventory at the end of April (2 000 units)		**120 400**
Direct materials (R550 000 / 10 000 x 2 000)	110 000	
Direct labour (R30 000 – R24 000)	6 000	
Production overheads (R22 000 – R17 600)	4 400	

3.3 Finished goods inventory	R
Inventory at the beginning of April (0 units)	0
Cost of 8 000 units completed during the month (see 3.2)	481 600
Finished goods available for sales	481 600
Cost of goods sold (R481 600 / 8 000 x 7 000)	(421 400)
	60 200

You could also use the format of a statement of cost of goods manufactured and sold to answer this question. Answers to questions 3.1, 3.2 and 3.3 are indicated in **bold** type.

	R	R	Calculations
Direct materials		550 000	(620 000 – 70 000)
Opening inventory	0		
Purchases		620 000	(345 000 + 275 000)
Casings – 23 000 x R15 each	345 000		
Inserts – 11 000 x R25 each	275 000		
Closing inventory		**(70 000)**	(45 000 + 25 000)
Casings – 3 000 x R15 each	45 000		23 000 purchased – (2 x 10 000) issued to production for production of 10 000 units
Inserts – 1 000 x R25 each	25 000		11 000 purchased less 10 000 issued to production for production of 10 000 units
Direct labour		30 000	
Production overheads		22 000	
Total input cost for April		602 000	
Opening inventory WIP		0	
Total manufacturing cost		602 000	For 10 000 units ∴ 602 000 / 10 000 = R60,20 per unit
Closing inventory WIP		**(120 400)**	2 000 units (10 000 – 8 000) x R60,20
Cost of goods manufactured		481 600	
Opening inventory finished goods		0	
Available for sales		481 600	8 000 units ∴ R481 600 / 8 000 = R60,20
Closing inventory finished goods		**(60 200)**	1 000 units x R60,20
Cost of goods sold		421 400	7 000 units x R60,20

QUESTION 4

4.1

	PC	CC	DC	OHC	FC	VC	MC	PrC	PeC
Direct materials	✓		✓			✓		✓	
Indirect materials		✓		✓		✓		✓	
Consumables		✓		✓		✓		✓	
Gross wages of departments P1 and P2	✓	✓	✓			✓		✓	
Gross wages of department S		✓		✓	✓			✓	
Company contribution to benefits		✓		✓	✓			✓	
Maintenance and repairs of equipment									
Department P1		✓		✓			✓	✓	
Department P2		✓		✓			✓	✓	
Department S		✓		✓			✓	✓	
Depreciation of equipment									

	PC	CC	DC	OHC	FC	VC	MC	PrC	PeC
Department P1		✓		✓	✓			✓	
Department P2		✓		✓	✓			✓	
Department S		✓		✓	✓			✓	
Rent and insurance of factory building		✓		✓	✓			✓	
Electricity and water account		✓		✓			✓	✓	
Sales and distribution costs									✓
Management, administration and accounting									✓

4.2	**R**	**units**	
March	200 000	120 000	
June	186 000	106 000	
	14 000	14 000	Variable cost = R1 (R14 000 / 14 000)

y = *a* + *bx*: 200 000 = *a* + 1 x 120 000 and *a* = 200 000 – 120 000 = 80 000
Therefore, fixed cost = R80 000, and variable cost = R1 per unit produced.

Estimated cost for December:

	R	
Variable cost	110 000	110 000 units x R1 per unit
Fixed cost	80 000	As above
	190 000	

4.3	**P1**	**P2**	**S**
	R	**R**	**R**
Primary allocation of directly traceable overheads			
Consumables	8 000	6 500	1 500
Wages (wages for P1 and P2 are direct labour costs)	0	0	80 000
Company contribution to benefits (a)	29 000	25 000	8 000
Maintenance and repairs of equipment	10 300	5 890	3 700
Depreciation of equipment	28 000	23 000	10 800
Apportionment of common overheads (see (b))	260 000	260 000	130 000
Apportionment of common overheads (see (c))	78 000	72 000	0
			234 000
Secondary apportionment (service department) (see (d))	128 700	105 300	(234 000)
	542 000	497 690	

(a) Gross wages		Benefits apportioned	Benefits
290 000	Department P1	290 000 / 620 000 x 62 000 =	29 000
250 000	Department P2	250 000 / 620 000 x 62 000 =	25 000
80 000	Department S	80 000 / 620 000 x 62 000 =	8 000
R620 000			R62 000

(b) Apportionment of common overheads to all departments

	R
Rent and insurance of factory building	570 000
Electricity fixed cost element	80 000
	650 000

This amount must be apportioned on the basis of floor space occupied. Total floor space occupied is 2 000 (P1) + 2 000 (P2) + 1 000 (S) = 5 000 m^2, ∴ R650 000 ÷ 5 000 = R130 per m^2: P1 = 2 000 x R130; P2 = 2 000 x R130; C = 1 000 x R130

(c) Apportionment of common overheads to production departments only

	R
Indirect materials	40 000
Electricity variable cost element (see 4.2)	110 000
	150 000

This amount must be apportioned on the basis of machine hours worked. Total machine hours = 2 500 ∴ R150 000 ÷ 2 500 = R60 per machine hour: P1 (1 300 x R60); P2 (1 200 x R60).

(d)

Direct labour hours	Apportionment of department S costs	R
1 760	Department P1 (1 760 / 3 200 x R234 000)	128 700
1 440	Department P2 (1 440 / 3 200 x R234 000)	105 300
3 200		234 000

4.4 Statement of cost of goods manufactured for December

	R	R	
Direct materials issued to production		765 750	
Opening inventory	70 750		
Purchases	900 000		(480 000 + 420 000)
Closing inventory	(205 000)		(25 000 x R4 + 35 000 x R3)
Direct labour		144 500	(200 000 +250 000)
Production overheads		1 024 000	[R320 x (1 760 + 1 440) DLH]
Total input cost for December		2 329 750	
Opening inventory WIP		277 900	
Total manufacturing cost		2 607 650	
Closing inventory WIP		(231 650)	
Cost of goods manufactured		2 376 000	

4.5

		R
Actual overheads (see 4.3):	P1	542 000
	P2	497 690
		1 039 690
Overheads absorbed (see 4.4)		1 024 000
Overheads under absorbed		15 690

4.6

	R
Cost of goods manufactured (see 4.4)	2 376 000
Opening inventory of finished goods	382 900
Available for sales	2 758 900
Closing inventory of finished goods	(367 200)
Cost of goods sold per cost of goods sold statement	2 391 700
Under absorption of overheads (see 4.5)	15 690
Total cost of sales	2 407 690

4.7

Cost of goods manufactured (see 4.4)	R2 376 000
Number of NCVs manufactured	110 000 units
Cost per unit (R2 376 000 / 110 000)	R21,60
Value of closing inventory of finished goods	R367 200
Number of NCVs in inventory (367 200 ÷ R21.60)	17 000 units

The FIFO method determines that the unit cost of finished goods in inventory will be that of the most recent inventory manufactured.

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LEARNING UNIT 9: INTRODUCTION TO FINANCIAL MANAGEMENT

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- define financial management
- describe the role of the financial manager

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- describe the underlying concepts of financial management

OVERVIEW

This learning unit is divided into the following sections:

9.1 Introduction
9.2 Wealth creation
9.3 Fundamental concepts of financial management

9.1 INTRODUCTION

Financial management refers to the application of general management principles to the management of the financial resources of the company to ensure that the company achieves its goals and objectives. The financial manager is a member of the senior management of the company who is responsible for the planning, monitoring and control of the financial resources of the company.

A company does not carry on its business in isolation, but in the context of the prevailing economic and political climate. Furthermore, public companies must prepare their financial statements in accordance with IFRS. Therefore, the financial manager needs a thorough understanding of economic principles and financial reporting standards.

Financial planning entails an analysis of the current financial health of the company and using analysis techniques and other information to predict future cash flows, asset acquisitions and disposals, etc. The analyses performed include profit analyses, liquidity analyses, financial analyses, break-even analyses, etc. Most of these analyses are based on the financial statements of the company (see learning unit 11). The available financial resources of the company are allocated in the budgets of the company (see learning unit 13). The use of the financial resources is monitored and controlled through a comparison of actual spending with budgeted spending, managing of cash flows, granting of credit and credit collections, etc. Some of these aspects will be discussed in learning unit 12.

Since financial managers take responsibility for the financial health of the company, they must develop strategies and policies that are aligned to the long-term strategic plan of the company, while ensuring the long-term financial sustainability of the company. The financial manager must determine the financial needs of the company to give effect to the strategic plan, find the financial resources that are needed, allocate the financial resources between the various needs, pay shareholders for the use of shareholder funds and control the flow of cash into and out of the company. In essence, the financial manager must answer two basic questions: where will the money come from; and, where must the money go?

Let's consider the following sentence for a moment: financial management refers to the management of financial resources to ensure that the company achieves its goals and objectives. What would you consider the ultimate goal of any company?

Have you ever wondered (or dreamed of) what you would do if you received an unexpected cash windfall – perhaps a large inheritance from an uncle you never knew you had? You may wish to use the money to pay off debt and buy your parents or children something nice. If you still have money left, you would want to save it for the future. Whichever way you choose to save the money, you will expect that money to grow (i.e. to become more over time). If, for example, you put your money in a savings account with a bank, you will expect the bank to pay you interest on the money, and you may decide to use some of the interest to help pay for your living expenses. You can invest (save) your money for the future in a number of ways. One way is to buy shares in a company. Most people who buy shares in a company will have a dual expectation

- to receive regular payments (dividends) to help pay for living expenses
- to keep the shares as a long-term investment with the expectation that the shares will grow in value over time

That is the ultimate goal of a company. The company belongs to its shareholders, and the management of a company has an obligation to come up to the expectations of shareholders as far as possible. Therefore, the fundamental objectives of a company for meeting shareholders' expectations are profit maximisation (from which to pay dividends) and wealth maximisation (an increase in the value of the company's shares).

Profit maximisation means that income is maximised and expenses are minimised. If a company makes sufficient profits, it can pay dividends to shareholders, thereby coming up to the first expectation of shareholders. However, profit maximisation is a very short-term (even short-sighted) objective; it cannot be considered in isolation. All business decisions carry some degree of risk, and these risks have to be considered. Normally, the greater the potential profit, the higher the risk (see section 9.3.1). Furthermore, although the management of a company has a responsibility to its shareholders, it also has a responsibility to its employees, its customers, the government and society as a whole (see section 14.2). For example, although the company would strive to minimise expenses, its responsibility to its employees includes paying them a decent wage, and its responsibility to society includes not dumping toxic waste where it can contaminate the environment, etc.

The second expectation of shareholders is met through wealth maximisation. Wealth maximisation means that the net value of the company is maximised; this value is reflected in the market price of the company's shares on the stock exchange. Wealth maximisation considers future cash flows as more important than immediate profits.

We mentioned earlier that the financial manager must essentially answer two questions: where will the money come from; and, where must the money go? These two questions involve three very important decisions, namely the investment decision, the financing decision and the dividend decision, which we will discuss in section 9.2.

Activity 9.1

Explain what financial management is.

Feedback on activity 9.1

Financial management refers to the application of the general management principles of planning, monitoring and control to manage the company's financial resources and further to ensure the financial sustainability of the company and the achievement of its goals and objectives . Financial planning involves an analysis of the current financial health of the company and using analyses and other information to predict future cash flows, asset acquisitions and disposals, etc (i.e. where financial resources will come from and how the financial resources will be allocated).

9.2 WEALTH CREATION

The financial manager must explore available investment opportunities and select those that will ensure that the value of the company's shares is maximised. The company can invest in long-term assets (e.g. non-current assets like property, plant and equipment, and current assets). It can also invest in financial assets (e.g. buy equity shares in another company). We will now look at the three important decisions that the financial manager must make namely the investment decision, the financing decision and the dividend decision.

9.2.1 The investment decision

Management have several options for investing the funds of the company. They must select investments that will be most beneficial to achieving the goals of the company. The company must invest to acquire both non-current assets and current assets. We also call spending on non-current assets "capital spending", and the company provides for funds for capital spending in the capital budget. Once funds have been invested, those funds are no longer available for other projects or assets. Therefore, investment decisions require very careful consideration. Decisions about the investment of available funds will be affected, amongst others, by the following:

Return on the investment

The most important consideration is whether the asset will generate income for the company. Management will often have to choose between different investment opportunities and will have to consider the potential return on investment for the different options.

Cash flows of the assets

The company must always ensure that it will have sufficient cash available for its day-to-day operations. Any investment will require cash outflows. Therefore, it is important to assess the possible cash inflows an investment proposal will generate thoroughly before investing in the proposal.

Risk involved

Every investment opportunity will carry some degree of risk, and management must consider the level of risk that they are prepared to accept (see section 9.3.1).

Other considerations

Apart from the above, other considerations include the availability of the labour, expertise and technologies needed to put the acquired asset to use effectively.

9.2.2 The financing decision

Once management has decided in which asset to invest, they will have to decide how the company will finance the investment. The company may wish to use its own cash resources or to raise the money from elsewhere. It is possible to raise the required cash from several sources, for example by issuing additional shares or debentures, getting a loan, or any combination of these. Therefore, the company can use either owners' funds or borrowed funds for its investment. Decisions about financing will be affected by factors like the following:

Cost of raising the finance

The costs of issuing shares differ from the costs of obtaining a loan, for example. Shares issues involve costs like underwriters' fees and expenses on a prospectus, while the cost of raising a loan could be restricted to the legal fees for drafting of the loan agreement.

Cost of the finance itself

The cost attached to equity shares is the dividends paid to shareholders, and the cost of debt is the interest payable on the debt. The company also have to consider the fact that dividends and interest expenses are treated differently when calculating the taxable income of the company.

Risk involved

Borrowed funds will have fixed repayment terms and require the payment of interest. It therefore involves a degree of risk. There is no fixed commitment for the repayment of owners' funds or the payment of dividends.

The cash flow position of the company

Management must consider if the company will have sufficient cash to repay its loans and interest should they borrow funds. The company will still be responsible for its regular fixed operational costs such as rent and salaries.

9.2.3 The dividend decision

The dividend decision relates to the distribution of the net profit of the company. The company can pay out net profit to its equity shareholders as dividends, retain net profit for investment in assets or other projects, or pay out a portion of the net profit as dividends and retain the balance for other investments. Decisions about dividend payments will be affected by factors like the following:

growth plans and investment opportunities

growth and investment plans leading to smaller dividend payments

Profits

The company can pay dividends from the current year's profits as well as from profits retained from previous years. The more stable the profits of the company are from year to year, the higher the dividend payment is likely to be.

The cash flow position of the company

The payment of dividends means that cash will flow out of the company and will therefore depend on the availability of cash resources.

Dividend policy

Some companies have a stated dividend policy that provides shareholders with a measure of assurance of regular and stable dividend payments.

Cash means actual money in rands and cents that the company has in the bank; the company can withdraw the money from the bank at any time.

Cash flow means the movement of cash into and out of the company. Monitoring cash inflows and cash outflows is one of the most important responsibilities of the financial manager. Inflows of cash (i.e. money coming into the company) include money received from debtors, borrowed money received from lenders as well as interest and dividends received from investments. Outflows of cash (i.e. money going out of the company) include payments to creditors, payment of salaries and payment of dividends to shareholders.

Activity 9.2

Explain the decisions that the financial manager will face in the quest for wealth creation.

Feedback on activity 9.2

In the quest for wealth creation, the financial manager will face the following decisions:

- the investment decision (i.e. weighing up the different investments options and selecting an investment)
- the financing decision (i.e. deciding how to finance the chosen investment – with own funds or with debt)
- the dividend decision (i.e. paying out profits as dividends or retaining them for investment)

9.3 FUNDAMENTAL CONCEPTS OF FINANCIAL MANAGEMENT

9.3.1 Risk and return

Return is the total gain or loss on an investment over a given period. A gain is when the value of the investment has increased (appreciated). Let's look at an investment in a savings account at a reputable bank for example: if you invest R1 000 for one year at an interest rate of 10%, you will receive R1 000 + R100 interest at the end of the year; therefore, the investment has appreciated by R100. A loss is when the value of the investment has decreased (depreciated) for example: if you buy 500 shares at R2 each for R1 000 and the market value of the shares at the end of one year is R1 each, the value of your investment has depreciated by R500.

Risk is the probability that the actual outcome of an event will be different from the expected outcome. For example, in our scenario above, if you bought shares at R2 each with the expectation that the market value of the shares will be R3 per share after one year, the actual outcome (R1 per share) is different from the expected outcome (R3 per share).

When we want to invest money, we can choose between investments where the outcome can be predicted with certainty or investments with an uncertain outcome. The outcome of an investment in a savings account at 10% is certain, while the investment in shares has an uncertain outcome. When people choose investments where the outcome is uncertain, they do so because they expect a higher return than the return from an investment where the outcome is certain. People near retirement would be wise to take on investments with lower risk (and lower returns), because once retired, they do not have the time to make up any losses made on riskier investments.

Any company has a risk of failure. This risk is called *business risk* and revolves, amongst others, around the industry in which the company operates. Consider, for example, a furniture store and a grocery store: the furniture store will feel the effects of a recession more severely than the grocery store, because the consumer with limited disposable income will still spend money on food, but might cut back on spending money on furniture. The business risk of the furniture store could therefore be considered to be higher than the business risk of the grocery store. All the business decisions that a company makes to meet its business objectives (e.g. which new products to develop, which assets to invest in, etc) as well as other factors (e.g. labour relations) may affect the company's business risk.

When a company makes use of its owners' funds only, it will be exposed to business risk only. As soon as it makes use of borrowed funds, it is exposed to *financial risk* as well, because it will have to make interest payments and capital repayments in respect of the borrowed funds regardless of profits made and available cash flow.

Both lenders and shareholders face risks when they make funds available to a company. Lenders face the risk that the company will fail to make interest payments and loan repayments, while shareholders face the risk of reduced or no dividends, or even a drop in the market value of their investment (the company's shares).

As indicated earlier, there is a positive correlation between risk and expected return: the higher the risk of an investment, the higher the expected return. Because government bonds are considered a less risky investment, the interest paid on government bonds is lower than the interest paid on the debentures of some companies. Because of the higher risk associated with higher returns one should be very cautious when lured by investments offering abnormally high returns. In the past, many people, especially the elderly, have lost their life savings by "investing" in scams promising unrealistic returns. We often hear the warning: if it sounds too good to be true, it is too good to be true; in other words: stay away from it!

Although debt implies financial risk, it also provides an opportunity for increased benefits to the owners of the enterprise. When a company employs debt successfully (i.e. where the borrowed funds yield a higher return than the cost of the debt (interest)), returns to owners are increased.

People often confuse lend (or lender) and borrow (or borrower). To *lend* something means that you *give* something that belongs to you to someone else for a certain period, where after that something must be returned to you. To *borrow* something means that you *take* something that belongs to someone else (with permission) for a certain period (where after you must return that something to the owner). If you take out a book from the library, you borrow it, and the library lends the book to you. Therefore, you are the borrower, and the library is the lender; the library "gives" and you "take". If a company makes a loan from the bank, the company is the borrower (it borrows money from the bank), and the bank is the lender (lends money to the company). Therefore, the lender is the "giver" and the borrower is the "taker".

9.3.2 Time value of money

The time value of money refers to the principle that an amount of money is worth more today than the same amount of money will be worth in the future. There are two reasons for this: on the one hand, there is inflation – you may be able to buy a loaf of bread for R10 today, but by this time next year, R10 may not be enough to buy a loaf of bread. On the other hand, money can earn money – if you put R1 000 in the bank at an interest rate of 8% today, at the end of one year you will have R1 080, because your R1 000 would have earned interest of R80 (R1 000 x 8%). R1 080 is more than R1 000, therefore we say that R1 000 is worth more today than R1 000 will be worth a year from now: the *present value* of your money is R1 000, but its *future value* is R1 080. (The initial investment, in this case R1 000, is also referred to as the principal amount, or just the principal.)

Determining future value

When we consider the time value of money, it enables us to compare the value of future payments or returns on investments made in the present. These calculations involve the following four figures:

The present value (PV) of the investment
The interest rate (i)
The number of times that interest will be paid during the investment period (n)
The future value (FV) of the investment

In the above example, PV = R1 000, i = 8% per annum, n = 1 and FV = R1 080. The period of the investment was one year, and interest was paid once a year only, therefore the number of times that interest was paid during the investment period (n) was 1. What would the FV be if the investment was made for five years? Interest will be paid five times during the investment period of five years:

Year →	**1**	**2**	**3**	**4**	**5**
Present value beginning of the year	1 000	1 070	1 145	1 225	1 311
Interest (rounded)	70	75	80	86	92
Future value end of the year	1 070	1 145	1 225	1 311	1 403

The future value at the end of five years is R1 403. The interest paid at the end of year 1 is R70, at the end of year 2 it is R74,90, etc. The interest increases every year, because it is left in the bank. That means that interest is paid on interest (called compound interest).

We can also calculate the future value by means of the following formula: **$FV = PV (1 + i)^n$:**

FV $= 1\,000\ (1 + 0{,}07)^5$
$= 1\,000 \times 1{,}40255$
= R1 403 (rounded)

Take note we write the interest rate as a decimal (0,07) and not as 7% and that we add one to the interest to ensure that the principal is included in the answer. Let's assume an investment period of one year again. The formula for calculating the FV will be $FV = 1\,000\ (1 + 0{,}07)^1 = 1\,000 \times 1{,}07$ = R1 070. If we break this formula down, we can also say that $FV = 1\,000\ (0{,}07)^1 + 1\,000\ (1)$ = 70 (interest) + 1 000 (principal) = R1 070.

Determining present value

If we know what FV, i and n are, we can also determine PV by means of the following formula: **$PV = FV (1 + i)^{-n}$**, which we can also write as **$PV = FV \div (1 + i)^n$**.

PV $= 1\,403 \div 1{,}402552$
= R1 000 (rounded)

The time value of money and the concepts of present value and future value are very important when considering different investment options.

The power of a number tells you how many times to use the number in a multiplication sum. It is written as a small number in superscript, above and to the right of the base number. We write "two to the power of three" as 2^3, which means 2 x 2 x 2 = 8 (i.e. 2 is used three times in the calculation); likewise, 2^4 means 2 x 2 x 2 x 2 = 16 (i.e. 2 is used four times in the calculation). Similarly, $(1{,}07)^5$ means 1,07 x 1,07 x 1,07 x 1,07 x 1,07 = 1,402552 (i.e. 1,07 is used five times in the calculation).

You can also use a **financial calculator** to do these calculations. (Note that we use the decimal point (.) here instead of the normal decimal comma (,) to coincide with the use of the point on your calculator.) For example, on a Sharp EL-733A calculator, we do the calculation as follows:

Enter 1.07, press "**y^x**", enter "5", press "**=**"; then 1.402551731 will appear on the screen.

To determine the future value on a calculator, you must ensure that the calculator is set on FIN mode and that all functions are cleared. To do this, press "C-CE", press "2ndF" and press "C-CE".

To determine the future value, do the following: enter "1000", press "+/-", press "PV", enter "7", press "i", enter "5", press "n", press "COMP", press "FV" and 1402.551731 will appear on the screen.

To determine the present value: enter "1403", press "+/-", press "FV", enter "7", press "i", enter "5", press "n", press "COMP", press "PV" and 1000.31961 will appear on the screen.

Activity 9.3

Explain the role of the financial manager.

Feedback on activity 9.3

The role of the financial manager is to seek wealth-creating opportunities for the company and to find the funds to finance the investments made for wealth creation.

Activity 9.4

What are the underlying concepts of financial management?

Feedback on activity 9.4

The underlying concepts of financial management include concepts like risk and return, time value of money, present value and future value.

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9.4 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 The financial manager must have a reasonable understanding of economic principles and financial reporting standards.

1.2 Financial planning entails, amongst others, an analysis of the financial statements of the company.

1.3 The shareholders want the company to maximise profit and wealth.

1.4 Management should only consider the interest of the shareholders and should therefore pursue profit maximisation as a priority.

1.5 The investment decision will be affected by, amongst others, the cost of raising finance.

1.6 Financial risk refers to the risk attached to the use of shareholders' funds.

1.7 There is a positive correlation between the perceived risk attached to an investment and the required rate of return.

1.8 The time value of money refers, amongst others, to the principle that money can earn money.

QUESTION 2

This question consists of three multiple-choice questions. Carefully read the information provided and select only the most correct option as your answer.

2.1 Which of the following is a consideration in the dividend decision?

(a) net profit
(b) return on investment
(c) cost flows
(d) cost of raising finance

2.2 If PV = R5 000, i = 8% payable once a year and n = 4 years, what is FV?

(a) R6 600
(b) R6 802
(c) R7 346
(d) R6 298

2.3 If FV = R13 310, i = 10% payable once a year and n = 3, what is PV?

(a) R10 000
(b) R11 000
(c) R12 100
(d) R9 091

---oOo---

9.5 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 T
1.2 T
1.3 T
1.4 F Management must consider the interest of shareholders, but also the interest of employees, the government and the general public.
1.5 F The cost of raising finance will be considered in the *financing* decision.
1.6 F Financial risk refers to the risk of using debt to finance investments.
1.7 T
1.8 T

QUESTION 2

2.1 (a); note that (c) is incorrect: *cash* flows are also considered and not *cost* flows.
2.2 (b)
2.3 (a)

---oOo---

LEARNING UNIT 10: FINANCIAL STATEMENTS

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- identify the elements of the financial statements of significance in financial analysis

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- describe the purpose of the elements of the financial statements
- list the users of financial statements
- explain management stewardship

OVERVIEW

This learning unit is divided into the following sections:

10.1 INTRODUCTION

For financial accounting purposes, we classify costs as either assets (disclosed in the statement of financial position) or expenses (disclosed in the statement of profit or loss).

In learning unit 1, we mentioned that we use the trial balance as the basis for preparing the financial statements of a company. The trial balance contains the balances of all the accounts in the general ledger. The general ledger accounts can be divided into five classes of accounts: assets, liabilities, income, expenses and owners' equity.

Consider the table below, which summarises some essential characteristics of these accounts:

Table 10.1

Type of account	Nature of balance	Reported in
Assets	Debit	Statement of financial position
Liabilities	Credit	Statement of financial position
Owners' equity	Credit	Statement of financial position
Income	Credit	Statement of profit or loss
Expenses	Debit	Statement of profit or loss

- The balance of asset accounts is increased by debit entries and decreased by credit entries.
- The balance of expense accounts is increased by debit entries and decreased by credit entries.
- The balance of liabilities accounts is increased by credit entries and decreased by debit entries.
- The balance of owners' equity accounts is increased by credit entries and decreased by debit entries.
- The balance of income accounts is increased by credit entries and decreased by debit entries.

The statement of profit or loss only reports on income and expense accounts. If the company's income (credits) exceeded its expenses (debits), the company made a profit. If the company's expenses were more than its income, the company made a loss. We transfer the net profit or loss to owners' equity in the statement of financial position. If income was R500 000 and expenses were R400 000, we would represent this in the ledger account as follows:

Profit or loss account

	R		R
Expenses	400 000	Income	500 000
Owners' equity	100 000		
	500 000		500 000

Owners' equity

	Profit or loss account	100 000

A profit, being a credit, will increase owners' equity, while a loss, being a debit, will decrease owners' equity, because owners' equity has a credit balance.

Double entry system of accounting

In financial accounting, you learnt about the double entry system of accounting. For the double entry system, the recording of each transaction involves two or more accounts. The total debits of the transaction must always be equal to the total credits of the transaction. If a company buys merchandise on account, the inventory of merchandise account will increase (with the debit portion of the transaction), while the creditors account will increase also (with the credit portion of the transaction) – an asset account (inventory) is debited and increased, while a liability account (creditors) is credited and increased. If a company pays its telephone account, the telephone expense account will increase, and the bank account will decrease – an expense account was debited and increased, and an asset account was credited and decreased.

All transactions are recorded in terms of debits and credits. For each transaction, one or more accounts will be debited, while another one or more accounts will be credited. The total of the debits will be the same as the total of the credits. This means that the total of the balances of the asset and expense accounts (accounts with debit balances) will be equal to the total of the balances of the liability, owners' equity and income accounts (accounts with credit balances). We transfer the difference between the income accounts and the expense accounts (i.e. the profit or the loss) to owners' equity. After the transfer, the total assets will equal the total liabilities plus the total owners' equity. We can also express this as A = L + E, which is called the accounting equation.

10.2 FINANCIAL STATEMENTS OF COMPANIES

By now, you will have progressed with your financial accounting studies and will be familiar with the format of the financial statements of a company. In terms of IAS 1.9, *the objective of financial statements is to provide information about the* (a) *financial position,* (b) *financial performance and* (c) *cash flows of an entity that is useful to a wide range of* (d) *users in making economic decisions*. IAS 1.9 further states that *financial statements also show the results of the* (e) *management's stewardship of the resources entrusted to it*.

10.2.1 Financial position

Three types of accounts are recorded in the statement of financial position: assets, liabilities and owners' equity. These accounts provide information about the financial position of a company *as at the end of* a specified period; therefore, we can regard it is a "snapshot" of the financial information at the close of business on a specific day. The heading of the statement of financial position identifies that day, for example:

XYZ Limited

Statement of financial position *as at* 30 September 2018

The statement of financial position therefore tells us what the balances of the assets, liabilities and equity accounts of XYZ Limited were at the close of business on 30 September 2018. These balances represent an accumulation of amounts over time, of which the total as at 30 September 2018 is shown in the statement of financial position. It further means that on 1 October 2018 all the assets, liabilities and owners' equity accounts in the general ledger will start with the same balance that they had on 30 September 2018.

10.2.2 Financial performance

Performance is the result of activity. A company's performance happens through its business activities (by means of the day-to-day activities of management and employees of the company). The business activities can be measured and expressed in financial terms. Information about the financial performance of a company (i.e. whether the business activities resulted in a profit or a

loss) is provided in the statement of profit or loss. The balances on the income accounts and expense accounts are reported here. This information is presented *for* a specified period, usually a period of one year, being the financial year of the company. The heading of the statement of profit or loss identifies the period on which it is reporting, for example:

XYZ Limited
Statement of profit or loss *for the year* ended 30 September 2018

This means that the amounts shown for income and expenses in the statement of profit or loss were *for that year only*. On 1 October 2018, all the income and expense accounts in the general ledger will start with a zero balance.

The profit (or loss) *for the year* is added (or deducted) from owners' equity in the statement of financial position, because the profit of the company "belongs" to the owners.

Thus, the statement of profit or loss provides information about the financial *performance* of the company (whether it made a profit or a loss *for the year*), while the statement of financial position provides information about the financial *position* of the company by stating the value of the assets *on the last day of the year* and how the assets were funded.

10.2.3 Cash flows

The information about the cash flows of a company is provided in the statement of cash flows. This information also pertains to a specified period (e.g. the financial year). The heading of the statement of cash flows identifies the period on which it is reporting, for example:

XYZ Limited
Statement of cash flows *for the year* ended 30 September 2018

The statement of cash flows will tell us where cash and cash equivalents came from *during that year*, what cash and cash equivalents were spent on *during that year* and whether the difference between the cash generated and the cash spent during the year resulted in an increase or a decrease in cash from the beginning of the year to the end of the year.

10.2.4 Users

The users of the information contained in the financial statements can be internal or external parties (refer to sections 1.2 and 14.2). Apart from management, who are internal users of financial information, there are several categories of external users with an interest in the financial statements of a company, including the following:

SARS	to assess the tax liability of the company
Investors	to assess the risk and return on an investment in the company
Lenders	to assess the ability of the company to pay interest on loans and to repay loans
Suppliers	to assess the ability of the company to pay for purchases
Public	to assess the contribution of the company to society

Whereas management will have unlimited access to inside information available to them when assessing the performance of the business, the external users only have the information provided in the financial statements at their disposal.

10.2.5 Management stewardship

Management is responsible for the custody and safeguarding of the company's resources and assets and for their efficient and profitable use. Therefore, management must develop and adopt policies and procedures to guide all business decisions and business activities. We can determine the effectiveness and efficiency of these policies by analysing the financial statements.

The financial manager must have a solid knowledge and understanding of financial reporting standards and financial statements. The financial statements are used as the basis for analysing the financial health of the company. We discuss the analysis and interpretation of financial statements in learning unit 11.

Example 10.1

The following is the *trial balance* of Thandi Retail Limited on 31 March 2017:

Account name	**Debit**	**Credit**
	R	**R**
Furniture and equipment	80 000	
Inventory of merchandise	15 000	
Trade debtors	10 000	
Bank	18 000	
Trade creditors		8 000
Share capital		105 000
Sales		285 000
Cost of sales	200 000	
Administrative costs	45 000	
Advertising and selling costs	30 000	
	398 000	398 000

Because of the double entry system, the total of the debits is the same as the total of the credits. We say that the trial balance *balances*. The income and expense accounts are included in the *statement of profit or loss*.

Statement of profit or loss

(Note that the following is not in the prescribed format since we present the information for explanatory purposes only.)

	R	**R**
Sales		285 000
Cost of sales	200 000	
Administrative costs	45 000	
Advertising and selling costs	30 000	
	275 000	285 000

The statement of profit or loss does not balance, because it merely contains extracts from the trial balance. You will notice that income (credits) exceeds expenses by R10 000, indicating that the company made a profit of R10 000. This profit is shown as owners' equity in the statement of financial position.

The *statement of financial position* contains the balances of the assets, liabilities and owners' equity as well as the profit for the year as reported in the statement of profit or loss. The statement of financial position will therefore balance.

Statement of financial position

(Note that the following is not in the prescribed format since we present the information for explanatory purposes only.)

Assets		
Furniture and equipment	80 000	
Inventory of merchandise	15 000	
Trade debtors	10 000	
Bank	18 000	
Liabilities (trade creditors)		8 000
Owners' equity		
Share capital		105 000
Net profit for the year		10 000
	123 000	123 000

*Reflects investment decision

†Reflects financing decision

*Refer to section 9.2.

†Refer to section 9.3.

The accounting equation is based on the statement of financial position and is normally stated as follows: assets = liabilities plus owners' equity: R123 000 = 8 000 + 115 000. As indicated, the investment in assets is financed by the owners (equity) as well as outside parties (liabilities).

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10.3 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 Income and expense accounts can be considered as owners' accounts.

1.2 The balances of the assets, liabilities and owners' equity accounts are reported in the statement of profit or loss.

1.3 The information in the statement of cash flows is presented as at a certain day.

1.4 The opening trial balance for the financial year will contain the balances of the accounts that were reported on in the statement of financial position at the end of the previous year.

1.5 The investment decision is reflected in the asset accounts, while the financing decision is reflected in the liability and owners' accounts.

1.6 The accounting equation A = E + L indicates that assets are financed by both equity and liabilities.

QUESTION 2

Match the party to the interest below to indicate clearly each party's interest in the financial statements of the company.

Parties

1 lenders
2 investors
3 SARS
4 suppliers
5 general public

Interest

A to assess the tax liability of the company
B to assess the risk and return on an investment in the company
C to assess the ability of the company to pay interest on loans and to repay loans
D to assess the ability of the company to pay for purchases
E to assess the contribution of the company to society

QUESTION 3

What does management stewardship mean?

---oOo---

10.4 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 T
1.2 F
1.3 F
1.4 T
1.5 T
1.6 T

QUESTION 2

Match the party to the interest below to indicate clearly each party's interest in the financial statements of the company.

Parties		**Interest**	
1	Lenders	C	to assess the ability of the company to pay interest on loans and to repay loans
2	Investors	B	to assess the risk and return on an investment in the company
3	SARS	A	to assess the tax liability of the company
4	Suppliers	D	to assess the ability of the company to pay for purchases
5	General public	E	to assess the contribution of the company to society

QUESTION 3

Management stewardship refers to management's responsibility to ensure that the company's resources and assets are safeguarded and applied efficiently and effectively for wealth creation. To this end, management must develop and adopt appropriate policies and procedures to guide all major decisions and business activities.

---oOo---

LEARNING UNIT 11: ANALYSIS AND INTERPRETATION OF FINANCIAL STATEMENTS

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- identify the important ratios used for analysing financial statements

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- classify the ratios used for analysing financial statements
- calculate the ratios used for analysing financial statements
- interpret the results of the calculated ratios

OVERVIEW

This learning unit is divided into the following sections:

11.1 INTRODUCTION

The overall objective of financial statement analysis is to make an informed decision. The kind of decision will vary depending on the needs of the analyst. A lender or supplier, for example, may seek answers to the following questions:

Why does the company want to borrow money, or why does it want to make purchases on account?

How much outstanding debt does the company currently have?

How well does the company manage its working capital?

Does the company generate sufficient cash from its operations to repay its debt?

Therefore, the first step in the analysis of financial statements would be to clearly state the purpose of the analysis. The results of the analysis must be interpreted in order to be meaningful. In order to draw a meaningful conclusion, analysts may wish to consider the past performance and current position of a company as well as its future potential performance and the risk associated with it.

Activity 11.1

Why is it sometimes necessary to analyse the financial statements of a company?

Feedback on activity 11.1

The user of financial statements may want to interpret the information presented in the financial statements in a meaningful way and would then use analytical tools to help him/her to do so in order to make an informed and considered decision.

11.2 TOOLS AND TECHNIQUES FOR THE ANALYSIS OF FINANCIAL STATEMENTS

One common tool for financial statement analysis is ratio analysis, which we will discuss in this learning unit. Other popular tools include *common size financial statements* and *structural analysis*. In common size financial statements, all items are expressed as percentages of a common base figure, for example, each account in the statement of financial position is expressed as a percentage of total assets, and each account in the statement of profit or loss is expressed as a percentage of revenue. Structural analysis determines the importance of each of the different components of a company for the realisation of the company's goals.

Ratios are based on information contained in the statement of financial position and in the statement of profit or loss, and are considered against information contained in the statement of cash flows. It is important to weigh the results of a ratio analysis against information contained in the notes to the financial statements (especially the note on accounting policy) as well as the directors' and the auditor's report. A potential investor may view a ratio analysis of a company very favourably without noticing that the auditors have qualified their opinion on the financial statements. In this learning unit, we will look at the calculation of ratios based on the information in the statement of financial position and the statement of profit or loss only.

The interpretation of the ratios is as important as their calculation. If we know that a company's gross profit margin is 30%, how do we know whether this is too high or too low, or whether it is good or bad? To make the ratio values meaningful, we also need to compare them with something else. We can compare ratios by means of the following two analyses:

- time-series analysis
- cross-sectional analysis

A *time-series (or trends) analysis* evaluates the performance of the company over time. For example, we can compare the after tax profit of a company over a period of a few years to establish whether the company's performance was as planned. Time-series analysis therefore involves the financial ratio analysis of a company in order to evaluate its current financial performance *against its own* past financial performance.

In contrast, a *cross-sectional analysis* compares the performance of the company with industry standards. These industry standards may be obtained through commercial services (e.g. Bloomberg), trade associations or online sites. Analysts may even develop their own industry standards. Cross-sectional analyses therefore compare a company's financial ratios against the financial ratios *of other companies* in the same industry or against industry averages. Companies often compare their own results with those of successful competitor companies. This type of cross-sectional analysis is called benchmarking. In cross-sectional analysis, benchmarking is used primarily to identify areas for improvement.

Activity 11.2

Distinguish between time-series analysis and cross-sectional analysis.

Feedback on activity 11.2

A time-series analysis compares the company's latest performance with its own performance of past periods to form an opinion of its current financial performance. Cross-sectional analysis compares the company's performance with the performance of other companies in the same industry or with industry averages.

11.3 RATIO ANALYSES

A ratio expresses the relation between two numbers; it shows how many times the value of one number is contained in the other number. We therefore calculate a financial ratio by dividing one reported amount in rand in the financial statements by another reported amount in rand. If a company buys merchandise for R100 and sells the merchandise for R200, we express the ratio between sales and cost of sales as 2:1. When we say this out loud, we say "two to one", which means that for every R2 of sales, the cost of sales is R1 (R200 ÷ R100).

Note that when we divide one amount in rand amount by another amount in rand, the answer is *never* in rand. Consider R200 ÷ R100:

$$\frac{R200}{R100} = \frac{\cancel{R}200}{\cancel{R}100} = \frac{2\cancel{00}}{1\cancel{00}} = \frac{2}{1} = 2:1$$

Ratio analysis is a commonly used tool for financial statement analysis. Financial ratios can be divided into four basic categories:

Liquidity ratios
Net working capital
Current ratio
Quick ratio

Efficiency ratios
Debtors collection period
Inventory turnover ratio and days' sales held in inventory
Creditors settlement period
Cash conversion cycle

Profitability ratios
Profit margins
Return on assets (ROA)
Return on equity (ROE)

Capital structure ratios
Debt ratio
Debt-equity ratio
Times interest earned ratio

Liquidity, efficiency and profitability ratios are important for evaluating the operations (i.e. the short-term viability) of the company. We use the capital structure ratio when considering the long-term prospects of the company.

Liquidity, efficiency and capital structure ratios measure *risk*, while profitability ratios measure *return* (see section 9.3.1). All these ratios are based on amounts reported in the statement of financial position and the statement of profit or loss.

Earlier we indicated that a mere calculation of ratios is not very useful. We need to interpret the results of the calculations before drawing a conclusion. In this section, we explain the different ratios by first presenting the *analysis* (i.e. the calculation of the ratios) and then presenting an *interpretation* by commenting on the results of the calculations and indicating, amongst others, possible additional sources of information to consider. When working with ratios, the analyst must always bear in mind the industry in which the company operates and any relevant legislation (e.g. the Banks Act is applicable to the banking industry) as well as the economic and political climate.

Activity 11.3

1 Which ratios are used to determine the short-term and the long-term stability of a company?

2 Which ratios are used to measure the risk and the return of a company?

Feedback on activity 11.3

1 We calculate and interpret the liquidity, efficiency and profitability ratios to determine the short-term stability of a company. We calculate and interpret the capital structure ratios to determine the long-term stability of a company.

2 We calculate the liquidity, efficiency and capital structure ratios to measure risk and the profitability ratios to measure return.

11.3.1 Liquidity ratios

Liquidity means having enough money available to pay for day-to-day operating expenses, to pay debts when they are due and to take care of unexpected needs for cash. Liquidity ratios are designed to measure the ability of a company to pay its *short-term* liabilities as they become payable. We can measure liquidity by means of net working capital, the current ratio and the quick ratio.

Net working capital

Net working capital is the excess of a company's current assets over its current liabilities. Although net working capital is not actually a ratio, we often use it to measure companies' overall liquidity.

Example 11.1

The following is an extract from the statement of financial position of Pi Company as at 31 December 2018:

	Pi Company			Industry
	2018	**2017**	**2016**	**2018**
	R	**R**	**R**	**R**
Current assets				
Inventories	47 041	36 769	37 528	20 004
Trade receivables	14 232	16 354	15 894	30 116
Prepayments	512	759	584	408
Cash and cash equivalents	4 061	2 382	5 555	1 463
	65 846	56 264	59 561	51 991
Current liabilities				
Trade payables	19 963	12 904	14 294	7 149
Short-term (interest-bearing) borrowings	5 614	6 012	5 313	6 882
Current portion of non-current liabilities	1 884	1 516	1 446	4 943
	27 461	20 432	21 053	18 974
Net current assets	38 385	35 832	38 508	33 017

Analysis

We calculate the net working capital of the company as *current assets – current liabilities.* Therefore, at the end of 2018, the net working capital is R65 846 – R27 461 = R38 385 (i.e. the net current assets).

Interpretation

Time-series and cross-sectional analyses:

	Pi Company			Industry
	2018	**2017**	**2016**	**2018**
	R	**R**	**R**	**R**
Net working capital	38 385	35 832	38 508	33 017

At first glance, it would appear as if the position of Pi Company has improved in line its 2016 level in 2018 after a slump in 2017. It would also appear as if the performance of Pi Company is superior to that of the industry average. However, the figure for net working capital viewed in isolation is not very useful when comparing the performance of different companies. For example, net working capital of R250 million may be sufficient for a small residential building contractor, but it may well be inadequate for a large industrial contractor, even though both companies are operating in the same industry (i.e. the construction industry). To make this figure more meaningful, we would need additional information, such as the sales figure, inventory write-offs, allowance for doubtful debts, etc. Further ratio analyses, such as the inventory turnover and debtors collection period, may also contribute to a more meaningful interpretation of the net working capital figures. Net working capital expressed as a percentage of sales will also result in a more meaningful cross-sectional as well as time-series analysis.

Current ratio

The current ratio is based on the working capital of the company. The current ratio expresses the ratio of current assets to current liabilities and is calculated as *current assets ÷ current liabilities.* This ratio is also called the working capital ratio.

In essence, the company must be able to pay its current liabilities out of the proceeds of its current assets. As a rule of thumb, current liabilities are those liabilities that must be paid within one year, while current assets are those assets that are expected to be realised in cash (or consumed) within one year.

Example 11.2

The following is an extract from the statement of financial position of Pi Company as at 31 December 2018:

	2018	**2017**
	R	**R**
ASSETS		
Non-current assets	29 079	18 977
Property, plant and equipment	29 079	18 977
Current assets	65 846	56 264
Inventories	47 041	36 769

	2018 R	2017 R
Trade receivables	14 232	16 354
Prepayments	512	759
Cash and cash equivalents	4 061	2 382
Total assets	94 925	75 241
EQUITY AND LIABILITIES		37 199
Capital and reserves	45 562	
Issued capital	5 500	5 500
Reserves (accumulated profits)	40 062	31 699
Non-current liabilities	21 902	17 610
Interest-bearing borrowings	21 902	17 610
Current liabilities	27 461	20 432
Trade payables	19 963	12 904
Short-term (interest-bearing) borrowings	5 614	6 012
Current portion of non-current liabilities	1 884	1 516
Total equity and liabilities	94 925	75 241

Analysis

The current ratio of Pi Company is current assets ÷ current liabilities:

2018	2017
65 846 / 27 461	56 264 / 20 432
= 2.4:1	= 2.8:1

Interpretation

In 2018 and 2017, the company had R2,40 and R2,80 respectively in current assets for every R1 of current liabilities. One common rule-of-thumb maintains that this ratio must be at least 2:1 (i.e. R2 in current assets for every R1 of current liabilities). However, in order to determine whether a ratio of more than 2:1 is good or a ratio of lower than 2:1 is bad, one would have to compare it with the company's past current ratio (time-series analysis) and with successful companies in the same industry (cross-sectional analysis).

A high current ratio may indicate that the company is in a position to meet its short-term financial obligations. However, it could also be indicative of slow debtors collection, high inventory holdings, etc. The ratio would have to be considered in conjunction with the efficiency ratios discussed below.

The more predictable a company's cash flows, the lower the acceptable current ratio. A ratio of 1:1 may be quite acceptable for a firm of auditors, but unacceptable for a large manufacturing concern.

A current ratio of 1:1 indicates that net working capital is nil. For example, if current assets are R100 000 and current liabilities are also R100 000, the current ratio is 1:1 (R100 000 ÷ R100 000), and the working capital is R nil (R100 000 – R100 000). A ratio of below 1:1 would indicate negative net working capital (i.e. that current liabilities exceed current assets).

Quick ratio

The quick ratio is a more rigorous test of short-term solvency than the current ratio, because it aims to measure the relationship between assets that can be converted into cash and cash equivalents quickly on the one hand and current liabilities on the other hand. There are alternative ways of determining the quick ratio, but most commonly it is calculated as *(current assets – inventory) ÷ current liabilities.*

Example 11.3

Use the same information in example 11.2 and calculate the quick ratio of Pi Company.

Analysis

Quick ratio of Pi Company is (current assets – inventory) ÷ current liabilities:

2018	2017
(65 846 – 47 041) / 27 461	(56 264 – 36 769) / 20 432
= 0,7:1	= 1:1

Interpretation

The higher the ratio, the more liquid the company is considered to be. The rule-of-thumb in this instance is a ratio of 1:1, but again we should also consider past trends and industry norms.

We cannot apply the mentioned rules-of-thumb uniformly across all companies, because the nature of the different industries is not the same. For example, consider the working capital requirements of a grocery and a furniture store. The grocery store will carry large inventories, because the inventory turnover (i.e. the rate at which it sells) is a lot higher than that of the furniture store. Furthermore, the grocery store sells for cash only, while the furniture store sells mostly on account. The profit margin of grocery stores is also a lot lower than that of furniture stores.

In this example, Pi Company's quick ratio has deteriorated from 1 to 0,7, while its current ratio has deteriorated from 2,8 to 2,4. The latter is due largely to the 54,7% [(19 963 – 12 904) / 12 904 x 100] increase in creditors and the decrease in debtors. The quick ratio is more adversely affected, since inventory, which is deducted for the purposes of this ratio, constituted 71,4% (47 041 / 65 846 x 100) of current assets in 2018 (2017: 65,35%). Based on this information alone, it would seem as if the sales of the company has decreased (lower debtors and higher inventory), or that inventory holding has increased (higher inventory and creditors figures for 2018), or a combination of these. One would need to interpret these analyses in conjunction with the efficiency and profitability ratios.

11.3.2 Efficiency ratios

Commonly used efficiency ratios are the debtors collection period, the inventory turnover ratio, days' sales held in inventory, the creditors settlement period and the cash conversion cycle. Efficiency ratios measure how efficiently the working capital is used to generate cash flow. Current assets are usually presented in the statement of financial position in order of the asset's liquidity, which is how quickly the asset can be converted into cash. The least liquid asset

appears first, while the most liquid asset appears last. The most liquid asset is obviously cash and cash equivalents, as it is already cash. The chronology for converting current assets into cash is as follows:

1. inventory is sold (i.e. converted into debtors)
2. debtors is collected (i.e. converted into cash)

Therefore, debtors are considered more liquid than inventory, because debtors are only one step away from cash, while inventory is two steps away.

Two efficiency ratios, the *debtors collection period* and *the inventory turnover period*, measure the speed with which accounts receivable and inventories are converted into cash and debtors respectively, i.e. a more liquid form of current asset. Another efficiency ratio, the *creditors settlement period*, measures the time it takes to settle debts with current creditors. Efficiency ratios are also called activity ratios.

Debtors collection period

The debtors collection period measures the speed at which receivables are converted into cash and is calculated as *accounts receivable ÷ average daily credit sales*, where average daily credit sales = sales for the year ÷ 365 (days per year).

The statement of profit or loss reports only a single figure for sales. Since it is not always possible to establish how many of the sales were on credit, we use the total sales figure to determine the debtors collection period. We can still assess the figure if we consider the industry in which the company operates; a furniture retailer like Lewis Stores would have a relatively small percentage of cash sales, while a clothing chain like Edgars would have a comparatively larger percentage of cash sales. Both these stores would have mainly credit sales though.

Example 11.4

The following is an extract from the financial statements of Pi Company for the year ended 31 December 2018:

	2018	2017
	R	R
Inventories	47 041	36 769
Trade receivables	14 232	16 354
Trade payables	19 963	12 904
Revenue from sales	342 600	300 000
Cost of sales	205 560	180 150

Analysis

We calculate the debtors collection period of Pi Company for the two years as accounts receivable ÷ average daily credit sales. Average daily sales for 2018 = 342 600 ÷ 365 = R939. Average daily sales for 2017 = 300 000 ÷ 365 = R822.

2018	2017
R14 232 / 939	R16 354 / 822
= 15 days	= 20 days

Interpretation

In 2018, it took the company 15 days on average to collect the cash for sales after the date of sales. This is an improvement over the 20 days of the previous year. Despite an increase in sales, outstanding debtors have decreased over the previous year. Depending on the credit policy of the company and the industry in which it operates, debtors collections seem to be under control. For example, if the credit policy of Pi Company states that debtors must pay within 30 days after sales, then Pi Company's collection process seems to be very efficient. However, we should also consider debtor write-offs and provision for doubtful debts as possible reasons for the lower outstanding debtors balance.

Inventory turnover ratio and days' sales held in inventory

Inventory turnover means the number of times that the company sells its average investment in inventory. Therefore, the inventory turnover ratio measures the speed at which inventories are turned into debtors. The ratio is calculated as *cost of sales ÷ closing inventory.* For the purposes of determining the inventory turnover ratio, we assume the value of closing inventory to be representative of the value of closing inventory at the end of every month during the year.

Days' sales refer to the inventory sold in a single day, while *days' sales in inventory* refer to the number of days for which the inventory will be able to cover sales. We can determine how many days' sales are held in inventory from the inventory turnover ratio: *days' sales in inventory = 365 days ÷ inventory turnover.* We can also calculate the days' sales in inventory as *closing inventory ÷ (cost of sales ÷ 365).* If cost of sales for the year is R205 560, it means that on average, inventory with a cost of R563 (R205 560 ÷ 365) is sold every day.

Example 11.5

The same information applies as in example 11.4.

Analysis

The inventory turnover ratio of Pi Company = cost of sales ÷ closing inventory:

2018	2017
R205 560 / R47 041	R180 150 / R36 769
= 4,37 times	= 4,9 times

Days' sales inventory held = 365 days ÷ inventory turnover:

2018	2017
365 / 4,37	365 / 4,9
= 83,52 days	= 74,49 days

Or

Days' sales inventory held = closing inventory ÷ (cost of sales ÷ 365)

2018	2017
47 041 / (205 560 / 365)	36 769 / (180 150 / 365)
= 83,53 days	= 74,50 days

Interpretation

The inventory turnover ratio measures how many times inventory is turned over (i.e. the number of times inventory moves to and from the company during the year). This means that Pi Company sold inventory to the value of R47 041 for 4,37 times during 2018. Generally, higher values are preferred for this ratio, which means that Pi Company's performance has deteriorated from 2017. It would be advisable to measure this performance against the industry average. A high inventory turnover could also indicate insufficient inventory levels on hand, which could result in lost sales.

The ratio for days' sales in inventory indicates that there was sufficient inventory on hand for 83,53 days' sales during 2018. This means that new inventory is required every 83,53 days. Again, this ratio is meaningless on its own. Consider, for instance, what you would expect the days' sales in inventory to be at Fournos Bakery and Prima Toys respectively.

Creditors settlement period

The creditors settlement period measures the time it takes to pay current creditors. The creditors settlement period is calculated as *accounts payable ÷ average daily purchases*. We can determine purchases based on the following equation that you are already familiar with:

cost of sales = opening inventory + purchases – closing inventory.

You can swop the two sides of the equation and write it as follows (see information box in section 7.5.1):

opening inventory + purchases – closing inventory = cost of sales

Now we deduct *opening inventory* and add *closing inventory* on both sides of the equals sign. We then determine purchases for the year as follows:

purchases = cost of sales – opening inventory + closing inventory

Example 11.6

The same information applies as in example 11.4. Calculate how long it takes Pi Company to pay its suppliers for purchases.

Analysis

We determine the creditors settlement period of Pi Company as accounts payable ÷ average daily purchases:

2018

Purchases for the year	=	205 560 + 47 041 – 36 769	=	R215 832
Average daily purchases	=	215 832 / 365	=	R591
Creditors payment period	=	19 963 / 591	=	33,8 days

Since the opening inventory for 2017 is not available, we cannot calculate the creditors payment period for that year.

Interpretation

The fact that *daily purchases at cost* = R591 (see above) and *daily sales at cost* = R563 (cost of sales ÷ 365 = R205 560 ÷ 365 = R563) could lead to inventory build-up, and the company would have to increase its inventory turnover or lower inventory levels. See example 11.3, where inventory constituted 71,4% of current assets.

Cash conversion cycle

We can now also determine the cash conversion cycle of Pi Company. The cash conversion cycle is the number of days that it takes to convert cash into inventory, and then to convert the inventory into debtors, and then to convert the debtors back into cash again. We determine the cash conversion cycle as days' sales in inventory + debtors collection period (in days) – creditors payment period (in days) = cash conversion cycle (in days): 84 + 15 – 34 = 65 days. We elaborate on this concept in the analysis below:

	Activity	**Ratio**
Day 1	Inventory purchased	
Day 34	Creditors (inventory) paid	Creditors payment period
Day 84	Last inventory sold	Days' sales in inventory
Day 99 (84 + 15)	Receive payment from debtors	Debtors collection period

Therefore, the cash conversion cycle starts on day 34 (when cash flows out to pay for the inventory purchases) and ends on day 99 (when cash flows in as debtors pay for the inventory sold). The length of the cycle is therefore 99 – 34 = 65 days. The cash conversion cycle should ideally be as short as possible. We can shorten the cycle by accelerating inventory turnover, accelerating debtors collection (i.e. reducing the debtors collection period) and extending the creditors payment period, but only if it is possible to do so without incurring additional cost or negatively affecting sales.

11.3.3 Profitability ratios

Profitability ratios measure the earnings potential and profitability record of the company. Three commonly used measures of profitability are profit margins, return on assets (ROA) and return on equity (ROE).

Profit margins

We use the gross profit margin, the operating profit margin and the net profit margin to evaluate the profitability of a company. These margins can be improved by either increasing selling prices or decreasing costs. We calculate them as follows:

Gross profit margin	=	*gross profit ÷ revenue*
Operating profit margin	=	*profit from operations ÷ revenue*
Net profit margin	=	*net profit for the period ÷ revenue*

Example 11.7

The following information pertains to Pi Company:

Statement of profit or loss for the year ended 31 December 2018

	2018	2017
	R	R
Revenue from sales	215 600	153 000
Cost of sales	129 364	91 879
Gross profit	86 236	61 121
Other operating income	422	838
	86 658	61 959
Distribution costs	32 664	26 382
Administrative expenses	31 314	20 887
Other operating expenses	3 015	2 046
Profit from operations	19 665	12 644
Finance cost	2 585	2 277
Profit before tax	17 080	10 367
Income tax expense	7 686	4 457
Net profit for the period	9 394	5 910

Analysis

The gross profit margin is as follows:

2018	2017
86 236 / 215 600	61 121 / 153 000
= 0,4 or 40%	= 0,3995 or 39,95% (40% rounded)

Gross profit is the difference between the value of the sales and the cost of the goods sold.

The operating profit margin is as follows:

2018	2017
19 665 / 215 600	12 644 / 153 000
= 0,0912 or 9,12%	= 0,0826 or 8,26%

Operating profit is the rand value remaining after all expenses in respect of the business operations have been deducted from the gross profit. We calculate operating profit before financing cost (interest) and income tax expenses, as these are not considered normal operating expenses. From your financial accounting studies, you will recall that in the statement of cash flows, we deduct interest and income tax payments from the cash generated from operations (i.e. we consider interest and tax payments as part of operations).

The net profit margin is:

2018	2017
9 394/ 215 600	5 910 / 153 000
= 0,0436 or 4,36%	= 0,0386 or 3,86%

Net profit is the rand value remaining after all costs and expenses as well as interest and income tax have been deducted from income. This is the profit that may be returned to the owners in the form of dividends.

Interpretation

The gross profit margin remained the same for the two years under review. Therefore, there has been no change in the mark-up from cost price to selling price.

Both the other profit margins have improved slightly, which could indicate a higher sales volume or a reduction in other expenses.

Again, it would be more meaningful to compare these profit margins to the industry in which Pi Company operates. On their own, they are not very useful. Consider, for example, the net profit margins of a supermarket like Checkers compared with the profit margins of a jewellery store. A net profit margin of 1% on sales may be acceptable and even good for Checkers, considering its large sales turnover, but for the jeweller such a low margin would be unacceptable.

Return on assets (ROA)

ROA measures the efficiency with which the company uses its assets to generate profit. The ROA is calculated as *net profit for the period ÷ total assets at cost.* ROA is often used to compare the efficiency of companies in the same industry, because different industries require different investments in assets. Compare, for example, the assets required by a construction company with the assets required by a graphic design company.

Example 11.8

Use the information in example 11.7 and the additional information below:

Extract from the statement of financial position of Pi Company at 31 December 2018

	2018 R	2017 R
ASSETS		
Non-current assets	29 079	18 977
Property, plant and equipment	29 079	18 977

	2018 R	2017 R
Current assets	65 846	56 264
Inventories	47 041	36 769
Trade receivables	14 232	16 354
Prepayments	512	759
Cash and cash equivalents	4 061	2 382
Total assets	94 925	75 241

Analysis

The ROA of Pi Company is the net profit for the period ÷ total assets:

2018	2017
9 394 / 94 925	5 910 / 75 241
= 0,099 or 9,9%	= 0,0785 or 7,85%

Interpretation

It would seem as if the company has put their assets to better use in 2018, given the improved ROA. In order to assess the ROA, we need appropriate cross-sectional analysis and time-series data.

Profits come from sales, and sales come from the productive use of assets. Therefore, the key to profitability is to recognise that profits arise not only from the profit margin (i.e. the mark-up on cost), but also from the effective use of capital employed. Consider example 11.9:

Example 11.9

P and R manufacture the same product and both use exactly the same type of equipment, machine Q, in the manufacturing process. Each paid R1 000 000 for machine Q. Machine Q has the capacity to manufacture 200 units per hour. The production cost per unit is R1 875 for both P and Q, and both apply a profit mark-up of 40% on cost. The profit per unit is thus R750 (R1 875 x 0,4) per unit for both companies. P operates its factory for seven hours a day, five days a week. R operates its factory for eight hours per day on weekdays, plus five hours per day on Saturdays. If the entire production is sold each week, the respective ROAs of P and R would be as follows:

P	R
Production:	Production:
7 hrs x 5 days = 35 hrs x 200 units = 7 000 units	8 hrs x 5 days + 5 hrs x 1 day = 45 hrs x 200 units = 9 000 units
ROA:	ROA:
(R750 profit per unit x 7 000 units) ÷ R1 000 000	(R750 profit per unit x 9 000 units) ÷ R1 000 000
= 5,25%	= 6,75%

Although the gross profit margin of both P and R is 40%, the ROA of R is better than that of P, not because its mark-up is higher, but because its asset is working harder.

Return on equity (ROE)

ROE measures the return earned on the owners' investment in the company. Generally, the higher this return, the better off the owners (shareholders). The ROE is essentially the ROA after taking into account debt. ROE is calculated as *net profit for the period ÷ total equity (equity capital plus reserves).*

Example 11.10

Use the information in example 11.7 as well as the following information about Pi Company:

Extract from the statement of financial position at 31 December 2018

EQUITY AND LIABILITIES	**R**	**R**
Capital and reserves	45 562	37 199
Issued capital	5 500	5 500
Reserves (accumulated profits)	40 062	31 699

Analysis

The ROE of Pi Company is net profit for the period ÷ total equity:

2018	**2017**
9 394 / 45 562	5 910 / 37 199
= 0,2062 or 20,62%	= 0,1589 or 15,89%

Interpretation

The company shows a higher ROE in 2018 than in the previous year. In order to assess the ROE, we need appropriate cross-sectional analysis and time-series data.

The return to the shareholders may be greater or less than the ROA, depending on the company's use of debt. Consider the following accounting equation: assets = equity + liabilities (A = E + L). The equation indicates that assets are financed by both owners' funds (equity) and debt (liabilities). If there was no debt, the equation would have been A = E, and the ROA and the ROE would be the same. If debt is added, the ROE (net profit ÷ total equity) will be higher than the ROA (net profit ÷ total assets) because the denominator for the ROA will be greater. Consider the following two scenarios:

Scenario 1: no debt

A company has total assets of R800 000, which is financed by equity of R800 000. The net profit of the company is R52 000. Both ROA and ROE will be R52 000 ÷ R800 000 = 6,5%.

Scenario 2: add debt

A company has total assets of R1 000 000, which is financed by equity of R800 000 and debt of R200 000, and the net profit is R52 000. The ROA is R52 000 ÷ R1 000 000 = 5,2%, and the ROE is R52 000 ÷ R800 000 = 6,5%. The ROE is now higher, because the denominator used to calculate ROA has increased from R800 000 to R1 million.

Let's now assume that the addition of debt in scenario 2 lead to a higher profit of R59 000. The ROA is R59 000 ÷ R1 000 000 = 5,9%, and the ROE is R59 000 ÷ R800 000 = 7,4%. Notice that the ROE has increased from 6,5% to 7,4%; this is an indication that the profit earned on assets acquired with debt is higher than the interest paid on the debt (refer to the discussion of the debt ratio in example 11.11).

Relationship of ROA and ROE

Earlier, we said that the ROE is essentially the ROA after taking debt into account. In section 9.3.4, you will see that we determine the equity multiplier (EM), which is one financial leverage ratio, as total assets ÷ total equity.

In example 11.8, we calculated ROA as net profit ÷ total assets = 9 394 ÷ 94 925 = 9,9%. In example 11.11, we calculated ROE as net profit ÷ equity = 9 394 ÷ 45 562 = 20,62%. We calculate the EM as total assets ÷ total equity = 94 925 ÷ 45 462 = 2,09.

Instead of calculating ROE as net profit ÷ equity, we can calculate it as ROE = ROA x EM = 9,9 x 2,09 = 20,69. We know that ROA = net profit ÷ total assets, and that EM = total assets ÷ total equity. We can therefore extend the equation ROE = ROA x EM as follows:

$$\text{ROE} = \frac{\text{net profit}}{\text{total assets}} \times \frac{\text{total assets}}{\text{total equity}}$$

And then reduced as follows: $\text{ROE} = \frac{\text{net profit}}{\cancel{\text{total assets}}} \times \frac{\cancel{\text{total assets}}}{\text{total equity}}$

Therefore, we are left with the following: $\text{ROE} = \frac{\text{net profit}}{\text{total equity}}$ or ROE = net profit ÷ total equity.

11.3.4 Capital structure ratios

Capital structure ratios are also referred to as debt ratios, leverage ratios and gearing ratios. They are designed to measure the extent and the effect to which the company is using debt to finance its assets. Commonly used capital structure ratios are the debt ratio, the debt-equity ratio and the times interest earned ratio.

Both equity (share capital) and debt (liabilities) are employed to finance the assets of a company, hence the accounting equation A = E + L. The more debt a company has, the more highly leveraged or geared it is. The optimal capital structure (i.e. the optimal mix of own and borrowed funds) will ultimately depend on the risk profile of that company.

It is important to understand what is considered as debt and equity respectively. Equity typically consists of ordinary share capital only. Debt includes fixed dividend preference shares, debentures, mortgage bonds, long-term loans, bank overdrafts and other interest-bearing debt. The cost of debt is the interest paid on debentures and loans as well as the fixed dividends paid to preference shareholders. The cost of equity is the dividends paid to ordinary shareholders. The company will only pay dividends to ordinary shareholders if there is sufficient profit and cash available for distribution.

Three commonly used measures in this category are the *debt ratio*, the *debt-to-equity ratio* and the *times interest earned ratio*. The first two ratios measure the extent to which the company is

financed through debt. The times interest earned ratio measures the ability of the company to pay interest on debt out of profits. These ratios are very important because of the trade-off between risk and return.

Debt ratio

The debt ratio measures the relationship between total debt and total assets in the equation A = E + L and is calculated as *total liabilities ÷ total assets*. All liabilities are included in the calculation (e.g. also creditors, which normally do not attract any interest cost).

Example 11.11

Extract from the statement of financial position of Tara Limited (remember: A = E + L)

	R
Non-current liabilities	30 000
Current liabilities	20 000
Equity	90 000
Total assets	140 000

Therefore, the debt ratio of Tara Limited is (R30 000 + R20 000) / R140 000 = 0,36 or 36%.

Although debt implies risk, it also provides an opportunity for increased benefits to the owners (equity shareholders) of the company. When debt is used successfully (i.e. if the profits from the borrowed funds exceed the cost of the debt), the return to owners is increased. The cost of debt (e.g. interest) is fixed, regardless of the level of operating profit. As operating profits rise or fall, financial leverage produces positive or negative effects on shareholder returns. This is illustrated in example 11.12:

Example 11.12

Use the same information as in example 11.11 and assume that all the debt bears interest of 10% per annum and that the company pays tax at a rate of 28%. If the company made an operating profit of R20 000, the return to shareholders would be 12%:

	R
Operating profit	20 000
Interest (R50 000 x 10%)	(5 000)
Profit before tax	15 000
Income tax expense (R15 000 x 28%)	(4 200)
Net profit for the period	10 800

Return on equity: R10 800 / R90 000 = 12%

If Tara is able to double its operating profit from R20 000 to R40 000, the return to shareholders will more than double, increasing from 12% to 28%:

	R
Operating profit	40 000
Interest (R50 000 x 10%)	(5 000)
Profit before tax	35 000
Income tax expense (R35 000 x 28%)	(9 800)
Net profit for the period	25 200

Return on equity: R25 200 / R90 000 = 28%

If operating profit drops from R20 000 to R10 000, the return to shareholders drops by two-thirds from 12% to 4%:

	R
Operating profit	10 000
Interest (R50 000 x 10%)	(5 000)
Profit before tax	5 000
Income tax expense (R5 000 x 28%)	(1 400)
Net profit for the period	3 600

Return on equity: R3 600 / R90 000 = 4%

Debt-equity ratio

The debt-equity ratio shows the extent to which the company's assets are funded by debt in relation to equity (i.e. it measures the extent to which the company is *leveraged* or *geared*). The larger the debt-equity ratio, the more fixed obligations (e.g. to make interest, creditors and loan repayments) the company has and the bigger the financial risk. The debt-equity ratio is calculated as *total debt ÷ owners' equity.*

Example 11.13

Extract from the statement of financial position of Tara Limited

	R
Non-current liabilities	30 000
Current liabilities	20 000
Equity	90 000
Total assets	140 000

The debt-to-equity ratio is total debt ÷ owners' equity (i.e. R50 000 / R90 000 = 0,56 or 56%).

We mentioned that the EM is another financial leverage ratio. We calculate it as *total assets ÷ total equity*: 140 000 ÷ 90 000 = 1,56, meaning that for every R1 of equity, there is R1,56 worth of assets. This indicates that every R1 of assets is financed by 56c in debt and 44c in equity. One rand equals 100 cents; therefore, debt financing is 56 / 100 = 56% (see above).

Times interest earned ratio

This ratio measures the company's ability to pay interest from current earnings. It is calculated as *operating profit for the period (i.e. profit before finance cost and income tax) ÷ finance cost.*

Example 11.14

The following information pertains to Tara Limited:

	R
Operating profit	20 000
Interest (R50 000 x 10%)	5 000
Profit before tax	15 000
Income tax expense (R15 000 x 28%)	4 200
Net profit for the period	10 800

Times interest earned is R20 000 / 5 000 = 4 times.

11.4 LIMITATIONS OF RATIO ANALYSES

Although the analytical techniques discussed in this learning unit are useful to provide insights into the financial position (according to the statement of financial position) and results of operations (according to the statement of profit or loss) of a company, the analyst should be cautious in the interpretation of trends and ratios. For example, he/she should bear in mind the following:

Financial statements are prepared according to historical data. The financial statements may be published months after the end of the financial year to which they refer.

The financial statements are often based on historical cost. The ratio for the ROA includes net profit, which is based on the most current year, while the amount for assets may refer to the cost of assets some years ago.

The statement of financial position contains information as at the end of the year. This information may not be typical of the financial position during the year.

Companies – even in the same industry – may not be comparable. They may use different accounting policies; the financial statements may also contain best estimates of management.

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11.5 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 The overall objective of financial statement analysis is to make an informed decision.
1.2 A time-series analysis is the same as a trend analysis.
1.3 Cross-sectional analysis means comparing the performance of the company with itself.
1.4 Ratios are based on information contained in the financial statements.
1.5 Liquidity means generating sufficient income to make a profit.
1.6 Profitability ratios are designed to measure earnings potential.
1.7 Capital structure ratios are also referred to as gearing ratios.
1.8 Operating profit is also referred to as net profit.
1.9 The more debt a company uses, the higher its business risk will be.
1.10 The cash conversion cycle refers to the length of time it takes for cash invested in inventory to be converted back into cash.

QUESTION 2

This question consists of eight multiple-choice questions based on the abridged financial statements of Asmara Limited for the financial year ended 31 March 2019.

Statement of financial position

	2019	**2018**
	R	**R**
Ordinary share capital	250 000	125 000
Accumulated profits	120 000	70 000
Ordinary shareholders' equity	370 000	195 000
Long-term loans	150 000	195 000
Total equity and liabilities	**520 000**	**390 000**
Property, plant and equipment	365 000	280 000
Current assets	305 000	255 000
Inventory	180 000	155 000
Trade receivables	120 000	90 000
Cash and cash equivalents	5 000	10 000
Current liabilities	150 000	145 000
Short-term portion of long-term debts	45 000	45 000
Trade payables	105 000	100 000
Total assets	**520 000**	**390 000**

Statement of profit or loss

	2019	2018
	R	R
Sales	3 250 000	2 500 000
Cost of sales	2 080 000	1 970 000
Gross profit	1 170 000	530 000
Operating expenses	1 044 000	420 000
Operating profit	126 000	110 000
Interest paid	16 000	19 000
Income tax	60 000	39 000
Net profit for the year	**50 000**	**52 000**

Carefully consider each option and select only the most correct option as your answer.

2.1 The debt-equity ratio for 2019 and 2018 was … and … respectively.

(a) 0,98; 1,89
(b) 1,10; 1,34
(c) 0,81; 1,74
(d) 0,76; 0,99

2.2 The net profit margin for 2019 and 2018 was … and … respectively.

(a) 2,54%; 2,00%
(b) 1,54%; 2,08%
(c) 1,81%; 2,00%
(d) 1,05%; 1,80%

2.3 The return on equity for 2019 and 2018 was … and … respectively.

(a) 13,5%; 26,7%
(b) 18,2%; 36,0%
(c) 23,0%; 40,0%
(d) 9,6%; 20,1%

2.4 The quick ratio for 2019 and 2018 was … and … respectively.

(a) 1,0; 1,0
(b) 2,0; 1,0
(c) 0,8; 1,0
(d) 0,83; 0,69

2.5 The debtors collection period for 2019 and 2018 was … and … respectively.

(a) 16,2 days; 16,4 days
(b) 15,3 days; 15,3 days
(c) 14,4 days; 15,2 days
(d) 13,5 days; 13,1 days

2.6 The times interest earned for 2019 and 2018 was … and … respectively.

(a) 9,7; 8,5
(b) 6,2; 5,8
(c) 7,9; 5,8
(d) 7,1; 7,5

2.7 The days' sales in inventory for 2019 and 2018 was … and … respectively.

(a) 31,6 days; 28,7 days
(b) 33,6 days; 30,7 days
(c) 29,6 days; 30,7 days
(d) 28,6 days; 28,7 days

2.8 If Asmara had 100 000 ordinary shares in issue on 31 March 2019, a market value of … per share on that date would indicate a growth on shareholders' wealth.

(a) R5,20
(b) more than R5,20
(c) less than R5,20
(d) The market value of shares is not an indication of shareholders' wealth.

QUESTION 3

The following is an extract from the financial statements of Massawa Limited for the year ended 31 December 2018:

Statement of financial position as at 31 December 2018

	2018 R000	**2017 R000**
ASSETS		
Non-current assets	35 637	23 771
Property, plant and equipment	35 637	23 770
Current assets	79 675	68 079
Inventories	56 920	44 490
Trade receivables	10 842	10 104
Prepayments	620	918
Cash and cash equivalents	11 293	12 567
Total assets	115 312	91 850
EQUITY AND LIABILITIES		
Capital and reserves	55 583	45 819
Issued capital	7 481	6 660
Accumulated profits/(losses)	48 102	39 159
Non-current liabilities	26 501	21 308
Interest-bearing borrowings	26 501	21 308
Current liabilities	33 228	24 723
Trade payables	24 155	15 614
Short-term (interest-bearing) borrowings	6 793	7 275
Current portion of non-current liabilities	2 280	1 834
Total equity and liabilities	115 311	91 850

Statement of profit or loss for the year ended 31 December 2018

	2018 R000	2017 R000
Sales	260 876	185 130
Cost of sales	156 530	111 174
Gross profit	104 346	73 956
Distribution costs	17 252	13 058
Administrative expenses	39 523	31 922
Other operating expenses	24 286	14 691
Profit from operations	23 285	14 285
Finance cost	3 128	2 755
Profit before tax	20 157	11 530
Income tax expense	11 214	7 646
Net profit for the year	8 943	3 884

Assume that inventory on 1 January 2017 was R50 000.

3.1 Using the information above, calculate the following ratios:

Capital structure ratios:	debt ratio
	debt-equity ratio
	times interest earned ratio
Profitability ratios:	gross profit margin
	operating profit margin
	net profit margin
	ROA
	ROE
Liquidity ratios:	current ratio
	quick ratio
Efficiency ratios	average debtors collection period
	inventory turnover ratio
	creditors payment period
	cash conversion cycle

3.2 Comment on the results of the ratio calculations and indicate, where appropriate, what other factors could be considered in order to make an informed decision on the performance of Massawa Limited.

QUESTION 4

Briefly discuss the limitations of ratio analyses.

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11.6 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 T
1.2 T
1.3 F
1.4 T
1.5 F
1.6 T
1.7 T
1.8 F
1.9 F
1.10 T

QUESTION 2

2.1 (c)
2.2 (b)
2.3 (a)
2.4 (d)
2.5 (d)
2.6 (c)
2.7 (a)

QUESTION 3

3.1 Ratio analysis for Massawa Limited

Ratio	**2018**	**2017**
Capital structure ratios		
Debt ratio		
(Total liabilities ÷ total assets)	(26 501 + 33 228) / 115 312 = 52%	(21 308 + 24 723) / 91 850 = 50%
Debt-equity ratio		
(Total liabilities ÷ owners' equity)	(26 501 + 33 228) / 55 583 = 1,07	(21 308 + 24 723) / 45 819 = 1
Times interest earned ratio		
[(net profit for the period + finance cost + income tax expense) ÷ finance cost]	(8 943 + 3 128 + 11 214) / 3 128 = 7,76 times	(3 884 + 2 755 + 7 646) / 2 755 = 5,33 times
Profitability ratios		
Gross profit margin		
Gross profit ÷ revenue	104 346 / 260 876 = 40%	73 956 / 185 130 = 40%
Operating profit margin		
Operating profit ÷ revenue	23 285 / 260 876 = 8,93%	14 285 / 185 130 = 7,72%
Net profit margin		
Net profit for the period ÷ revenue	8 943 / 260 876 = 3,43%	3 884 / 185 130 = 2,10%
ROA		

Ratio	2018	2017
Net profit for the period ÷ total assets	8 943 / 115 312 = 7,76%	3 884 / 91 850 = 4,23%
ROE		
Net profit for the period ÷ total equity	8 943 / 55 583 = 16,09%	3 884 / 45 819 = 8,48%
Liquidity ratios		
Current ratio		
Current assets ÷ current liabilities	79 675 / 33 228 = 2,40	68 079 / 24 723 = 2,75
Quick ratio		
(current assets – inventory) ÷ current liabilities	(79 675 – 56 920) / 33 228 = 0,68	(68 079 – 44 490) / 24 723 = 0,95
Efficiency ratios		
Average debtors collection period		
Accounts receivable ÷ average daily sales	10 842 / (260 876 / 365) = 15,17 days	10 104 / (185 130 / 365) = 19,9 days
Inventory turnover ratio		
Cost of sales ÷ closing inventory	156 530 / 56 920 = 2,75	111 174 / 44 490 = 2,50
Creditors payment period		
Accounts payable ÷ average daily purchases	24 155 / 462,90 = 52,2 days	15 614 / 289,49 = 53,9 days
Average daily purchases:	(156 530 + 56 920 – 44 490) / 365 = 462,9	(111 174 + 44 490 – 50 000) / 365 = 289,5
Days' sales in inventory		
365 days ÷ inventory turnover [1]	365 / 2,75 = 132,7 days	365 / 2,50 = 146 days
OR		
Closing inventory ÷ (cost of sales ÷ 365) [1]	56 920 / (156 530 / 365) = 132,7days	44 490 / (111 174 / 365) = 146 days
Cash conversion cycle	*133 + 15 – 52 = 96*	*146 + 20 – 54 = 112*

[1] alternative methods

3.2 Comments on ratios

Capital structure

The increase in the debt ratio could indicate that activities other than purchasing of assets had been financed by debt.

The debt-equity ratio indicates a slight increase in gearing, but the company is still financed roughly 50% by equity and 50% by debt.

Both the above two ratios have increased over the previous year, indicating a slightly riskier capital structure.

Despite the increase in debt, the times interest earned ratio has improved, indicating the company's improved ability to cover interest payments from operating profits.

Profitability

The gross profit margin has remained stable, which would indicate a stable mark-up on cost of inventory. Both the operating profit margin and net profit margin have improved. It would seem that Massawa was able to control operating expenses while sharply increasing revenue by 41% [(260 876 – 185 130) / 185 130].

Both ROA and ROE has improved. The increase in ROE indicates that the profit earned with increased debt is greater than the interest paid on the debt.

Liquidity

The current ratio of Massawa indicates that current assets covered current liabilities 2,4 times at year-end, which is down from the 2,75 times of the previous year. The quick ratio also shows a decline. The collection of debtors has improved markedly from 20 days to 15 days. Inventory turnover has also improved, which could be ascribed to the higher sales activity. Although the value of inventory was higher at the end of 2018 than at the end of 2017, it is available for fewer days' sales.

Efficiency

The debtors collection period has improved significantly from 20 days to 15 days, while inventory turnover has also improved slightly from 2,5 times to 2,75 times per year. The number of days' sales in inventory has decreased from 146 days to 133 days. The aforementioned have contributed to the significant improvement of the cash conversion cycle, which has decreased from 112 days to 96 days. However, the creditors payment period decreased from 54 to 52 days; if the creditors payment period could increase to around 60 days without incurring additional cost, the cash conversion cycle would improve even further.

Other factors

(i) The purpose for which the financial statements are being analysed – for example, the financial manager of Massawa may want to assess the current financial health of the company, or external parties may be considering investing in the share capital of Massawa or granting credit to Massawa.

(ii) Consider a trend analysis of the performance of Massawa over a number of years.

(iii) Consider Massawa's performance compared with other companies in the same industry or with industry averages.

QUESTION 4

Financial statements are prepared based on historical data. The financial statements may be published months after the end of the financial year to which they refer.

The financial statements are based on historical cost. The ratio for the return on assets includes net profit, which is based on the most current year, while the amount for assets may refer to the cost of assets some years ago.

The statement of financial position contains information as at the end of the year. This information may not be typical of the financial position during the year.

Even in the same industry, companies may not be comparable. They may use different accounting policies, and the financial statements may contain best estimates of management.

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LEARNING UNIT 12: WORKING CAPITAL MANAGEMENT

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- describe the different facets of working capital management
- compute the ratios that assist with working capital management

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- explain working capital and working capital management
- explain the reasons for keeping inventory
- explain the role of credit and debt collection policies by calculating appropriate liquidity ratios
- determine an entity's ability to meet its short-term financial obligations

OVERVIEW

This learning unit is divided into the following sections:

12.1 INTRODUCTION

In this learning unit, we will look at managing working capital. Gross working capital is the total of the current assets, while net working capital is the current assets minus the current liabilities. Working capital management involves managing the following:

- the inventory and accounts receivable of the company as well as the financing of these current assets
- the cash and cash equivalents of the company
- the accounts payable of the company

Working capital management therefore boils down to two questions: what must the balance be in the inventory, debtors, cash and creditors accounts; and, how should the company finance its current assets (working capital)?

For many manufacturers and retailers, inventory and accounts receivable constitute a very large portion of both the *current* assets and the *total* assets of the company. Therefore, managing the working capital of the company is an extremely important function of the financial manager. In fulfilling this function, the financial manager will frequently use ratio analysis. In this learning unit, we will therefore often refer to learning unit 11, where we discussed the analysis and interpretation of financial statements. The liquidity and efficiency ratios are especially important for managing working capital.

Working capital is the capital that a company has available for its day-to-day business activities. Managing the working capital will require the development and implementation of appropriate policies and processes to ensure that the company will have sufficient cash flow to pay for its day-to-day business activities, to meet its short-term debt obligations and to make the most productive use of its current resources.

The efficiency of working capital management will depend on whether the planning and controlling of current assets and liabilities are effective in avoiding excessive investment in current assets, yet ensuring that currents assets are sufficient to meet business objectives. For example, too little cash may mean that the company's cash flow is insufficient, while too much cash may mean that the company cannot make the most productive use of its current resources because it has invested too much in low-earning or even non-earning assets.

12.2 MANAGING INVENTORY

The inventory of a merchandiser consists of merchandise, while the inventory of a manufacturer consists of materials and consumables, work-in-progress and finished goods. You will remember that some consumables are not used in the manufacturing process only (e.g. stationery). Therefore, a merchandiser will also have an inventory of consumables, but its value is likely to be minimal.

We explained the importance of inventory management and control in section 4.4. We advise you to refer back to it now. Specifically take note of the need for carrying inventory and the balance between the benefits of having inventory on the one hand and the costs of holding and ordering inventory on the other hand.

The employees accountable for inventory management must therefore

- make sure that inventory is available when required for manufacturing or sales (i.e. planning *what* inventories will be required, *where* those inventories will be required, *how much* of each type of inventory will be required and *when* they will be required)
- minimise the costs associated with inventory (e.g. ordering costs, holding costs and losses as a result of damage, theft, spoilage, obsolescence, etc)

Although the financial manager is not directly responsible for the management and control of inventory, he or she will still have to monitor the company's investment in and the movement of inventory to be able to provide advice on the cost-effective management of inventory. We can measure the effectiveness of inventory management by the inventory-related ratios that were explained in learning unit 11, namely the inventory turnover ratio, the days' sales held in inventory and the cash conversion cycle. The *inventory turnover ratio* measures the speed at which inventories are turned into debtors; the *days' sales held in inventory* indicates for how many days' sales the inventory on hand will be sufficient; and the *cash conversion cycle* indicates the time it takes to convert cash into inventory and back into cash. Comparing the *current ratio* to the *quick ratio* will give us an idea of the effect that the inventory level has on the liquidity of the company. Inventories are assets; therefore, they will affect other ratios such as the *return on assets ratio* as well.

The company invest a portion of its cash resources in the inventory on hand, and those cash resources are not available for other investment until the inventory is converted back into cash. For this reason, keeping inventory in storage will have an opportunity cost attached to it: if R240 000 is invested in inventory, that R240 000 cannot, for example, be deposited in the money market at 5% interest, leading to an opportunity cost of R1 000 per month if the inventory is not sold (R240 000 x 5% ÷ 12 months). This implies that, generally speaking, a higher turnover of inventory is preferred to a lower turnover. Other arguments in favour of a higher turnover rate are the following:

- The *storage and handling costs* of inventory held in storage may be considerable.
- There is always the *risk of theft or damage* to inventory held in storage, regardless of the nature of the inventory.
- The *nature of the inventory* can add to this risk:
    - *Risk of spoilage*. Some types of inventory (like food products) have a "best before" date and can therefore spoil. Spoiled inventory will have to be thrown away.
    - *Risk of obsolescence*. Some types of inventory may become outdated or obsolete very quickly. Consider, for example, mobile phones and the fashion industry. The consumer demand for high-fashion clothes lasts for a single season only.

On the other hand, if inventory turnover is too high, it may result in shortages that could hamper the company's sales and production. When determining optimal inventory levels that will affect the inventory turnover, the manager will have to consider the risks of higher inventory levels and fewer inventory turnovers (e.g. higher handling and storage costs) against the risks of lower inventory levels and more inventory turnovers (e.g. higher ordering costs and the effect on operations should the company run out of inventory). The manager should also monitor the inventory turnover rate closely to identify any changes in efficiency.

Managing inventory will require the careful forecasting of inventory needs as well as the timely ordering of inventory to avoid business disruption. In our discussion of the ordering of inventory, only inventories of merchandise and materials are relevant, because work-in-progress and finished goods are manufactured inventories (not purchased). To ensure optimal levels of inventory, we need to consider the following:

- The daily use of inventory (i.e. how many units of merchandise are sold on average per day, or how many units of materials are placed into production every day)
- Ordering lead-time (i.e. how long the supplier takes to deliver the ordered inventory)
- Demand lead-time (i.e. how much inventory will be used while delivery of a new order is being awaited)
- Safety levels (i.e. how many extra units should be ordered in case the inventory used while waiting for delivery was higher than anticipated)

Two common inventory-management strategies used to control the ordering, receiving, storing and issuing of inventory are just-in-time (JIT) systems, where companies order inventory for delivery as they are needed rather than keeping the inventory in storage, and materials requirement planning (MRP) systems, where inventory is ordered and delivered based on sales or production forecasts. One model used in inventory planning is the economic order quantity (EOQ). The EOQ is the quantity (units) of inventory that should be ordered every time an order is placed so that the total inventory cost is minimised. Apart from the cost of the inventory (i.e. the amount that is debited to the inventory account), inventory costs include period costs such as ordering costs, holding costs and inventory shortage costs.

The basic EOQ model

The basic EOQ model assumes that

- the number of units of inventory that will be required for sales (merchandise) or production (materials) is known and constant
- there is no lead time (i.e. delivery follows immediately after the order is placed and there will be sufficient inventory available until delivery is made)
- the only inventory costs that are pertinent are ordering and holding costs

We use the basic EOQ model to determine the number of units of inventory that we should order at a time to ensure that holding and ordering costs are minimised. These inventory costs are calculated as follows:

- total ordering costs = number of orders placed x fixed cost per order
- total holding cost = average number of units in inventory* x holding cost per unit

*We assume that the average number of units in inventory is the number of units ordered with each order placed divided by two.

In section 4.4, we discussed the inverse relationship of ordering and holding costs: the higher the ordering cost, the lower the holding cost; and the higher the holding cost, the lower the ordering cost. If the aim of the EOQ model is to minimise these costs, it follows that the EOQ must determine an ordering level where ordering cost equals holding cost. When we use the EOQ model, we require the following information:

The number of units of inventory required for sales (or production) for the year (S)

The fixed cost of placing each order (F)

The variable holding cost per unit of inventory for one year (C)

The economic order quantity is the square root of 2 x S x F ÷ C. This equation is written as follows:

$$EOQ = \sqrt{(2 \times S \times F) \div C}$$

Example 12.1

Dolly Limited sells porcelain dolls. The fixed cost of placing one order to purchase dolls is R300, regardless of the number of dolls ordered. The average cost for holding one doll in inventory is R20 per year. The sales for the year is estimated at 50 000 dolls.

Required

Using the EOQ, calculate the following:

1. the number of dolls that should be ordered with each order placed
2. the number of orders that will be placed during the year
3. the total ordering and holding costs for the year

Answer

S = 50 000 dolls per year

F = R300 per order placed

C = R20 per doll per year

1. Number of dolls to be ordered at a time:

$$EOQ = \sqrt{(2 \times S \times F) \div C}$$

$$EOQ = \sqrt{(2 \times 50\,000 \times 300) \div 20}$$

$$EOQ = \sqrt{1\,500\,000}$$

$$= 1\,224{,}745 \text{ (i.e. } \textit{1 225 dolls per order}\text{)}$$

On your financial calculator, enter "1500000", press "√", and "1224.745" will appear on the screen.

2. Number of orders to be placed during the year

Total number of dolls required = 50 000
Number of dolls per order (see 1) = 1 225
Number of orders to be placed = 40,81633 (i.e. *41 orders*)

3. Total ordering and holding costs for the year

Total number of orders placed during the year = 41 orders (see 2)

Therefore, total ordering cost = 41 orders x R300 per order = R12 300

The average number of units in inventory is considered as EOQ ÷ 2 (i.e. the average number of units ordered with each order. Thus, total holding cost = average inventory x annual holding cost per unit= (1 225 / 2) x 20 = R12 250.

The difference between the ordering cost of R12 300 and holding cost of R12 250 is the result of rounding. Without rounding, the result would be as follows:

- ordering cost: 40,81633 orders x R300 = R12 245
- holding cost: 1 224,745 ÷ 2 x R20 = R12 247

Consider the total inventory cost at different order quantities in the table below:

Table 12.1

Annual demand (AD) =		50 000	dolls					
Fixed ordering cost (FC) =		R300	per order placed					
Variable holding cost (VC) =		R20	per doll in inventory					
Order quantity (OQ) →		1 150	1 175	1 200	**1 225**	1 250	1 275	1 300
Number of orders (NO)	AD ÷ OQ	43	43	42	**41**	40	39	38
Average inventory (AI)	OQ ÷ 2	575	587,5	600	**612,5**	625	637,5	650
Inventory costs		**R**	**R**	**R**	**R**	**R**	**R**	**R**
Ordering costs (OC)	NO x FC	13 043	12 766	12 500	**12 245**	12 000	11 765	11 538
Holding costs (HC)	AI x VC	11 500	11 750	12 000	**12 250**	12 500	12 750	13 000
Total costs	OC + HC	24 543	24 516	24 500	**24 495**	24 500	24 515	24 538

Total cost is minimised where ordering cost ≈ holding cost (i.e. where 1 225 dolls are ordered with each order placed). This is the same result as that obtained by applying the EOQ model. Notice the inverse relationship between the ordering cost and the holding cost in the above table.

Activity 12.1

1 Briefly discuss the importance of inventory management.

2 Which ratios would an analyst use to help assess the efficiency and effectiveness of inventory management?

3 What risks are associated with carrying inventory?

4 What assumptions underlie the EOQ model?

Feedback on activity 12.1

1 Inventory management is important, as it will ensure that adequate inventory is available for uninterrupted business activities and will minimise investment in inventory to enhance shareholders' return on their investments.

2 An analyst may use the following ratios to help him/her assess the efficiency and effectiveness of inventory management:

- The *inventory turnover ratio* measures the speed at which inventories are turned into debtors.
- The *days' sales held in inventory* indicates for how many days' sales inventory is on hand.
- The *cash conversion cycle* indicates the time it takes to convert cash into inventory and back into cash.
- A comparison of the *current ratio* and the *quick ratio* indicates the effect that the inventory level has on the liquidity of the company.

3 The risks associated with carrying inventory are the following:

- the risk of inadequate inventory on hand to meet the demand for sales or production
- the risk of too much inventory resulting in poor cash flow or financial loss due to damage to or the, theft, spoilage and obsolescence of inventory

4 The assumptions underlying the EOQ model are the following:

- the number of units of inventory that will be required for sales (merchandise) or production (materials) is known and constant
- there is no lead time (i.e. delivery follows immediately after the order is placed) and there will be sufficient inventory available until delivery is made
- the only inventory costs that are pertinent are ordering and holding costs

12.3 MANAGING ACCOUNTS RECEIVABLE

For the purposes of this discussion, accounts receivable refers to debtors (i.e. the amounts that others owe for credit sales and that the company has not received yet). Any business would like to sell for cash only but, depending on the nature of the business, a cash-only policy may lead to a loss of sales. Consider, for example, how the sales of Edgars would be affected if it sold for cash only.

If the balance of debtors outstanding constitutes a rather large percentage of sales, it could indicate that the company grants credit to its customers too easily. The effective management of credit sales and, by extension, accounts receivable requires balancing the desire for increased sales and profit with the cost of the following:

- maintaining debtors accounts, for example the salaries of the employees who must issue invoices, post invoices to debtors accounts and reconcile the debtors subsidiary ledger with the debtors control account in the general ledger
- granting interest-free loans to customers, because the money that debtors owe cannot be invested elsewhere until they pay their accounts
- possible bad debts due to accounts not being paid

We can measure the effectiveness of managing accounts receivable using the debtors collection period and the cash conversion cycle as explained in section 11.3.2.

In learning unit 10, we indicated that management must develop and adopt policies and procedures to guide all the major decisions and business activities, and that the financial manager must develop strategies and policies that will ensure the financial sustainability of the company. The credit policy manage credit sales and accounts receivable in a company.

12.3.1 Credit policy

A company's credit policy will guide its investment in accounts receivable. The credit policy will have a significant impact on the sales turnover of the company, as will be apparent from the discussion below. As a rule, higher sales will result in higher profits. Of course, most businesses will prefer to sell for cash only, since cash sales mean that inventory is converted into cash immediately upon the sale thereof. Cash sales also does not have the added administrative cost of maintaining a debtors ledger, collecting outstanding amounts from debtors etc. However, the very nature of many businesses will significantly restrict their market share should they adopt a policy of cash sales only; therefore, their credit policies will allow for credit sales as well. Apart from the administrative cost and the delay in converting inventory into cash that will result from credit sales, there is also the risk that debtors may not pay their accounts. A good credit policy therefore requires a careful trade-off between the cost and risk of credit sales on the one hand,

and the higher volume of sales resulting from granting credit on the other hand. The credit policy will generally cover the following four areas:

Creditworthiness

Creditworthiness refers to the ability of customers to pay their accounts. Steps suitable for verifying a customer's creditworthiness include the following:

- verifying the customer's identity by inspecting his/her identity document
- verifying the customer's residential address by requesting, for example, an original electricity account that will indicate the residential address
- checking with a credit bureau if the customer has been blacklisted for non-payment of debts previously

If you have opened an account at a clothing store or for buying a cell phone before, you will be familiar with the procedure. In South Africa, the National Credit Act places stringent requirements on credit providers to ensure that vulnerable people are not plunged into debt they cannot afford.

People must be very careful not to be caught in a debt spiral from which they cannot recover. According to financial reports, millions of South Africans are drowning in debt, and most are in debt because they are living above their means. It is very important that, before you buy anything (especially when you are going to incur debt for the purchase) you honestly answer the question: do I need this, or do I want this?

A need is something that is essential to have, while a want is something that would be nice to have. You need the protein, vitamins and minerals in foods like fruit, vegetables and nuts to survive; you do not need chocolates to survive, though you may very well want chocolates. You need water to survive; you do not need alcohol to survive, however much you may want it. Some items are not crucial for survival, but you may need them for a meaningful life (e.g. a radio that provides access to information).

Other wants or desires are unnecessary for either survival or a meaningful existence, for example the desire to wear branded clothing. It is advisable not to incur any debt for such purchases. (It is questionable whether these purchases should be made at all.)

Credit period

The credit period refers to the length of time that customers will be allowed to pay their accounts. Clothing stores will typically allow you six months to pay your account before they start charging interest. The credit period and the debtors collection period are not the same. It is one thing to tell customers when to pay their account (credit period), but quite another thing for them to actually pay when the account is due (collection period).

Discounts

Discounts refer to amounts that customers can deduct from their accounts if they pay earlier than the credit period dictates. The larger the discount, the more inclined the customer will be to pay early.

Collection policy

The collection policy refers to the methods that the company uses to collect accounts that are past due. The more aggressive the policy, the quicker payment will be received, although a policy that is too aggressive may harm the relationship between the customer and the company. Typically, the company will first send reminders to the customer that payment is due. If no payment is forthcoming, the company may report the customer to a credit bureau, which could

affect the customer's future ability to obtain credit. A final step may be to attach the customer's assets through legal action and to sell these to pay the outstanding account.

Collectively, the credit period and discounts form the credit terms of the company. Often, special terminology is used to describe the credit terms, for example. credit terms of *2/10 net 60* means that the customer receives 2% discount if his/her account is paid within 10 days of purchase, and should the account not be paid within 10 days, it must be paid within 60 days (without a discount).

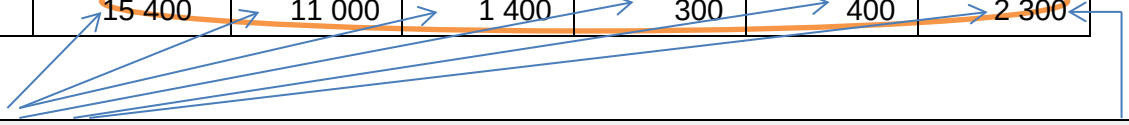
12.3.2 Age analysis

A debtors age analysis (also called an ageing schedule) is a list that shows the number of days that debts are outstanding for each debtor and in total. It is a useful tool for managing the outstanding debts of debtors.

Example 12.1

The credit terms of Sunflower Limited are 3/30 net 60. The age analysis of the company at the end of July 2018 is as follows:

		(a)	(b)	(c)	(d)	(e)
Customer	Total balance outstanding	0–30 days	31–60 days	61–90 days	90–120 days	More than 120 days
	R	**R**	**R**	**R**	**R**	**R**
A	6 900	6 000	900	0	0	0
B	1 200	1 000	0	200	0	0
C	4 300	4 000	0	0	0	300
D	2 400	0	0	0	400	2 000
E	600	0	500	100	0	0
Total	15 400	11 000	1 400	300	400	2 300



A note on casting and cross-casting

In a schedule such as the age analysis above, we refer to the vertical areas (marked (a), (b) etc) as *columns* and the horizontal areas (A, B, C etc) as *lines*. There is a line for each debtor, and the total outstanding for each debtor is analysed according to the age of the debt in columns (a) to (e).

The sum of the amounts that appear in each column is then determined by adding the figures in that column together. For example, the total debt outstanding for 0–30 days is the sum of the amounts that appear under column (a) (i.e. R6 000 + R1 000 + R4 000 = R11 000). In accounting, we refer to this adding together as *casting*. In casting the total column, we determine that total debtors outstanding amount to R15 400. We then add the totals of columns (a) to (e) across to make sure that they agree with the total of R15 400. In accounting, we refer to this adding across the columns as *cross-casting*.

According to the credit terms, customers receive 3% settlement discount if they pay their accounts within 30 days, but all accounts must be paid within 60 days. Therefore, all outstanding balances in columns (c) to (e) should be investigated. Let's now consider each of the above debts:

Customer A: There are no problems with this account, as all outstanding amounts fall within the credit limits of the company.

Customer B: Follow up on the amount of R200 outstanding for more than 60 days.

Customer C: Investigate the amount of R300 outstanding for more than 120 days. It may be that C disputes this amount, as generally the account is well maintained.

Customer D: Investigate this account. There have been no sales for three months, which could indicate that customer D was refused further credit until his/her account is paid. It could also indicate that customer D simply decided to not pay his/her account or that he/she is deceased, in which case a claim will have to be submitted to the executor of customer D's estate.

Customer E: Follow up on the amount of R100 outstanding for more than 60 days.

Activity 12.2

The totals of the age analyses of Company P and Company R at the end of their financial year on 30 June are as follows:

	% of total	Company P	% of total	Company R
		R		R
0–10 days	25,36	36 000	33,20	69 000
11–30 days	64,07	90 960	37,22	77 370
31–60 days	0	0	25,06	52 100
60 days +	10,57	15 000	4,52	9 400
	100,00	141 960	100,00	207 870

Both companies do business in the same industry. Company P's credit terms are 3/10 net 30, while Company R's credit terms are 2/10 net 30. Both companies' credit sales for the year amounted to R1 850 550.

1 Determine the debtors collection period of both companies.

2 Comment on the two companies' management of debtors.

Feedback on activity 12.2

1 Debtors collection period is determined as accounts receivable ÷ average daily credit sales

	Company P	Company R
	R	R
Sales (given)	1 850 550	1 850 550
Accounts receivable per age analysis	141 960	207 870
Daily sales (annual sales ÷ 365)	5 070	5 070
Debtors collection period in days	28	41

2 The two companies' management of debtors

Company P seems to be managing its debtors better with a collection period of 28 days as opposed to the 41 days of Company R. Only approximately 10% of the balance of debtors of Company P is overdue, while the overdue accounts of Company R constitute almost 30% of total debtors. The settlement discount of 2% offered by Company R seems to be insufficient to motivate customers to pay early. With average sales of R5 070, the sales for June would be approximately R152 100 (R5 070 x 30 days). Debts outstanding for 1–30 days (i.e. the June sales) amounted to R146 370 (R69 000 + R77 370) for Company R as opposed to R126 960 (R36 000 + R90 960) for Company P.

12.4 MANAGING ACCOUNTS PAYABLE

For the purposes of this discussion, accounts payable refers to creditors, which are the amounts owed to suppliers for purchases of merchandise or materials and consumables that the company has not paid yet. Creditors are part of the current liabilities of the company. Therefore, companies use creditors as a source of financing to finance their assets (consider A = E + L) and mostly suppliers to fund their inventory. The advantage of this kind of debt is that it is relatively easy to obtain and largely without cost to the company. However, falling behind with payments to creditors become very costly when interest and recovery fees must be paid. Suppliers may also refuse to extend further credit, thereby disrupting normal business activities. If the company is unable to pay suppliers, it may affect the company's credit rating and have negative consequences for future business transactions.

Like with debtors, a creditors age analysis is a useful tool for managing the amount owing to creditors. We can measure the effectiveness of managing accounts payable using the creditors payment period and the cash conversion cycle, which we explained in section 11.3.2.

Suppliers also have credit policies that prescribe their credit terms. (In the example below, we consider transactions from Sunflower Limited's point of view, but bear in mind that while Cosmos is Sunflower's creditor, Sunflower is Cosmos's debtor.) For example, if a supplier offers credit terms of 2/10 net 60, the company buying on credit must carefully consider if it is in its best interest to have a *smaller* but *earlier* cash outflow or a *larger* but *later* cash outflow when paying the supplier.

Example 12.2

Sunflower Limited purchased inventory from Cosmos Limited on 1 March for R100 000. The credit terms of Cosmos are 1/10 net 60. Therefore, the discount offered for early settlement within 10 days is R100 000 x 1% = R1 000. If Sunflower pays within 10 days of 1 March, it will need to pay only R99 000 (R100 000 – R1 000). If Sunflower chooses to pay only after 10 days but within 60 days, it will have to pay R100 000. The cost of this debt of R100 000 is therefore R1 000 for 50 days. Of course, this is not an actual cost that is incurred; we refer to it as an *opportunity cost*. An opportunity cost is not something that you pay; it is what you lose by choosing one alternative over another. If Sunflower chooses to pay the supplier after 10 days but within 60 days it loses the opportunity to take the discount of R1 000. If Sunflower does not take the discount, the company will actually only enjoy free credit for a period of 10 days. The period of 50 days (from day 11 to day 60), when the full R100 000 must be paid, comes at an opportunity cost of R1 000.

The decision of whether to take early settlement discounts offered is an example of a short-term financing decision. Let's consider what the 1% discount offered in example 12.2 equates to if we express it as an annual percentage. If Sunflower pays within 10 days, it will pay only R99 000.

Therefore, the opportunity cost of not paying within 10 days and using the R99 000 for a further 50 days is R1 000. This equates to a nominal rate of (R1 000 ÷ R99 000) x 365 days ÷ 50 days = 7,37% per annum.

Assume that Sunflower has excess cash on deposit in the money market at an interest rate of 6% per annum. Had they paid the R99 000 to Cosmos within 10 days, they would have forfeited interest of 6% x R99 000 x 50 / 365 = R813,70. By not paying early, they will forfeit discount of R1 000, which is equal to 7,37% per annum. In this instance, it would make financial sense to pay early and take the discount.

The following journal entry demonstrates how the early settlement will be treated in the accounting records of Sunflower:

Debit creditor (Cosmos)	R99 000	
Credit bank		R99 000
Recording payment made		
Debit creditor (Cosmos)	R1 000	
Credit cash discount received		R1 000
Recording cash discount taken		

Sunflower will disclose the cash discount received as income in the statement of profit or loss. It is important to note that an early settlement discount does *not* reduce the cost of inventory, since IAS 2 states that only trade discounts reduce the cost of inventory.

Now assume that Sunflower does not have excess cash and is operating on a temporary bank overdraft on which it pays 11% interest per annum. Had they paid the R99 000 to Cosmos within 10 days, they would have paid additional interest on the overdraft of 11% x R99 000 x 50 / 365 = R1 491,78. By not paying early, they will forfeit discount of R1 000. In this instance, it would make financial sense not to pay early and defer the payment until day 60.

A period of 50 days is relatively short; therefore, we use the *nominal* interest and discount rates and not the *effective* rates, which would consider compound interest.

Most companies would strive to pay their creditors as late as possible while collecting their debtors as early as possible so that cash flows are optimal. Please refer to the debtors collection period in learning unit 11 again. As indicated above, a company should carefully consider if early settlement discounts offered by suppliers are in their best cash-flow interest. For cash flow considerations, it may sometimes even be better to make purchases from a supplier with slightly higher prices but more favourable payment terms.

Activity 12.3

The annual credit purchases of Sunflower Limited from Cosmos Limited is R1 000 000. The credit terms of Cosmos are 2/10 net 45. These terms are enforced strictly; any accounts older than 45 days attract interest at a nominal interest rate of 18% per annum. The cost of other available short-term financing options (like a bank overdraft) is at a nominal rate of 13% per annum.

1 What would the total cash outflows in respect of purchases for the year be if Sunflower always paid within 10 days of purchase?
2 What would the nominal opportunity cost of purchases be if Sunflower always paid on the last day allowed?

Feedback on activity 12.3

1 Cash outflows when payment is always made within 10 days of purchase

		R	
Total gross purchases	=	1 000 000	
Cash discount allowed	=	(20 000)	2% x 1 000 000
Total cash outflow	=	980 000	

OR

R1 000 000 x 0,98	=	980 000	
100% – 2% = 98% or 0,98			

2 The nominal cost of purchases if Sunflower always paid on the last day allowed

If Sunflower pays within 10 days, it will pay only R980 000. The opportunity cost of not paying within 10 days is R20 000 for using the R980 000 for a further 35 days. This equates to a nominal rate of (R20 000 ÷ R980 000) x 365 days ÷ 35 days = 0,2128 or 21,28% per annum.

12.5 MANAGING CASH AND CASH EQUIVALENTS

Cash refers to the currency (rands and cents) that a company may hold as petty cash or in a bank account. Cash is available for use immediately. Cash equivalents refer to highly liquid investments that can be turned into cash in a very short period of time and with a minimal, if any, change in value.

Cash management refers to the planning and allocation of cash resources (i.e. the collection, management and short-term investment of cash). Sound cash management is essential for a company's financial stability and solvency.

12.5.1 Reasons for holding cash

The amount of cash and cash equivalents that a company should have readily available should be sufficient to do the following:

Pay for the day-to-day transactions of the company

The normal business activities of the company require the availability of cash to pay for various costs (e.g. salaries, telephone accounts, municipal charges, etc). Cash is also required to pay interest and instalments on loans. If the company does not have enough money to pay for these expenses as they fall due, it may be at risk.

Comply with any conditions of the bank for keeping the bank account

The company have to comply with the conditions of banks and other financial institutions. The bank may open a bank account for the company on condition that the company maintains a minimum balance in the account. Furthermore, the bank or another financial institution may grant a loan to the company on condition that a minimum balance is maintained in the bank account. These conditions are referred to as *covenants*.

Pay for unexpected transactions

Cash inflows and outflows are not predictable with certainty. For example, the company cannot know for sure how much it will collect from debtors every day. Some expenses may also be higher than anticipated. There should be cash in reserve to pay for expenses in these unforeseen circumstances. An alternative to holding extra cash would be for the company to arrange an overdraft facility with the bank. This means that the bank will allow the company to spend more money than it has in its bank account, subject to certain restrictions.

Invest in unexpected opportunities

The company may be presented with unexpected investment opportunities. For example, a supplier may offer merchandise at largely reduced prices, provided that the purchase is made in cash. Of course, the company would also be able to utilise a bank overdraft facility to fund such unexpected investments.

12.5.2 Cash budgets

The cash budget is an important tool at the disposal of the financial manager for planning for the cash requirements of the company. A cash budget will show the company's projected cash inflows and outflows over a period. The period may be any length of time, for example, a month, a week or even a day. It is unlikely to be longer than a month, because that will make monitoring the cash flows very difficult.

Any company will wish to keep its cash conversion cycle as short as possible (refer to section 11.3.2). Therefore, the company will wish to delay paying its creditors for as long as possible, while collecting its debtors as quickly as possible. Carefully prepared cash budgets will provide an early warning of potential cash shortfalls to allow for proper planning. Anticipated cash inflows from debtors are based on the history of debtors payments. However, one cannot merely assume that debtors will continue to pay their accounts as in the past; other factors, such as the general economic and political environment, must also be considered. For example, a company selling directly to consumers in Secunda should be cautious in forecasting debtors collections when Sasol (a major employer in Secunda) is retrenching large numbers of employees. When anticipating cash inflows from debtors, we should also consider seasonal sales fluctuations. When preparing a cash budget, we also need to consider carefully the expenses and creditors that must be paid. Again, we cannot merely assume that paying creditors can be postponed. We must also provide for interest and loan repayments. The capital budget will provide information about planned investment in property, plant and equipment or other investments (e.g. in the shares of other companies) and the probable sources of finance for these investments.

The cash budget starts with the cash on hand at the beginning of the budget period. We then add cash inflows and deduct cash outflows to show the anticipated cash surplus or shortfall at the end of the period. We deal with the preparation of cash budgets in learning unit 13.

We cannot emphasise the importance of financial planning enough. It is important for the business to become aware of potential cash shortages as soon as possible so that it can make timely plans. For example, if a company wishes to make use of a bank overdraft for a few months until cash inflows improve, it would be far better to approach the bank well in advance.

Banks will be rather cautious of a company that needs money urgently and immediately because it failed to plan properly.

12.5.3 Sources of short-term financing

We mentioned earlier that current asset management includes the management of inventory and accounts receivable of the company as well as the financing of these current assets. When considering alternative sources of financing, management must consider the risk and return of the alternatives carefully. There are several sources of short-term financing available to a company. We can divide these sources into free short-term finance and short-term finance that has a cost. For the purposes of this module, we will consider only trade creditors and bank overdrafts.

Trade creditors

Most companies, if not all, purchase from their suppliers on credit. Trade creditors provide a spontaneous line of credit that arises from the ordinary business activities of the company. Provided that creditors accounts are paid when due, this source of financing has no cost. In example 11.6, we saw that the average daily purchases of inventory of Pi Company are R591. If the suppliers' payment terms are net 30 days, it means that Pi Company owes its suppliers R17 730 (R591 x 30 days) on average – interest free. This line of credit is automatically increased or decreased as purchases increase of decrease. If increased sales demand higher purchases of, say R800 per day, credit will automatically increase from R17 730 to R24 000 (R800 x 30 days). If the company could negotiate extended payment terms, say from 30 days to 45 days without incurring interest, then the current line of credit of Pi Company would increase from R17 730 to R26 595 (R591 x 45 days). Trade creditors may have an opportunity cost attached if a settlement discount is foregone in favour of extending the payment period (see example 12.2).

Bank overdrafts

A bank overdraft is a loan with the bank for which the company do not have to open a separate loan account. A company will have a current account with the bank into which it will deposit money (e.g. money received from debtors) and from which it will withdraw money (e.g. to pay creditors and salaries). An overdraft means that the bank allows the company to pay more money out of the current account than it has available in the account (i.e. the account will go into a negative balance). From your Financial Accounting module, you will know that we usually disclose "bank" as a current asset in the statement of financial position. When the bank account is overdrawn, we will disclose bank as a current liability in the statement of financial position. When considering an application for overdraft facilities, the bank will take into account the risk profile of the company. The riskier the bank considers the company to be, the higher the interest rate that the bank will charge on the overdrawn account. The lowest interest rate that the bank will charge is the prime rate.

The prime rate is charged to large and financially strong companies. The interest rate on an overdraft is expressed as prime plus a number. For example, if the prime rate is 9,25% and the bank grants Pi Company an overdraft at an interest rate of 11,25%, we say that the overdraft of Pi Company is serviced at prime plus 2. Interest rates can be expressed in a number of ways, for example as simple interest, flat rate interest, etc. This distinction falls beyond the scope of the study guide. However, it is important to know that in taking a decision, management must look at the effective rate of interest that will be paid and not the quoted rate.

12.5.4 Advantages and disadvantages of short-term financing

The advantages of short-term financing include the following:

- Short-term financing can be obtained much faster than long-term financing.
- The borrower is not locked into a long-term commitment with possible early settlement penalties.
- It offers the flexibility of matching financial needs for short-term periods as a result of seasonal trading trends.
- It may not be necessary to provide collateral (surety) for the loan.

The disadvantages of short-term financing include the following:

- Interest rates are subject to fluctuation (e.g. as the prime rate changes).
- The banks may not be willing to extend the period of the short-term financing. For example, if an overdraft facility was granted for three months, the bank may be unwilling to extend the facility beyond three months.

Activity 12.4

Cashflash Limited has R8 000 000 in its current bank account on 1 January. On 31 March, an investment of R12 000 000 will mature and pay out, together with interest accrued on it of R4 500 000. Other expected cash inflows and outflows for normal operating activities over the next three months are as follows:

	January	**February**	**March**
	R	**R**	**R**
Expected cash inflows	52 000 000	50 000 000	58 000 000
Expected cash outflows	56 000 000	54 000 000	70 000 000

If all cash flows occur on the last day of the month, determine the cash position of Cashflash on 31 March.

Feedback on activity 12.4

Cash position of Cashflash on 31 March

	January	**February**	**March**
	R	**R**	**R**
Cash balance at the beginning of the month	8 000 000	4 000 000	0
Expected cash inflows	52 000 000	50 000 000	58 000 000
Expected cash outflows	(56 000 000)	(54 000 000)	(70 000 000)
Investment pay out (R12 m + R4,5 m)			16 500 000
Cash balance at the end of the month	4 000 000	0	4 500 000

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12.6 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 There is a positive correlation between return and risk; greater risk demands greater return.

1.2 ABC takes a loan of R1 000 for six months. The loan requires an interest payment of R60. We can conclude that the nominal interest rate is 6% per annum.

1.3 Trade terms of 1/10, net 30 means that 1% of the amount owing must be paid within 10 days.

1.4 Gross working capital refers to current assets of a company.

1.5 Current liabilities are ideal for raising funds to meet the seasonal needs of the company.

1.6 A company makes a long-term loan of R1 million and purchases inventory with the proceeds of the loan. Net working capital will increase by R1 million.

1.7 The time interval between paying for direct materials and collecting cash on sales of finished goods is known as the cash conversion cycle.

1.8 The opening balance of accounts receivable was R50 000, the closing balance was R40 000 and R200 000 was collected during the month. Sales for the month was R150 000.

QUESTION 2

This question consists of ten multiple-choice questions. Carefully read the information provided and select only the most correct option as your answer.

2.1 Net working capital refers to … .

(a) total assets minus property, plant and equipment
(b) current assets minus current liabilities
(c) current assets minus inventory
(d) current assets

2.2 Reducing the level of inventory may … .

(a) lower the quality of production
(b) lead to an increases in prices by suppliers
(c) result in the business being unable to meet the demand for its products
(d) increase production capacity

2.3 Which ratio is most relevant in assessing the working capital of a company?

(a) return on equity
(b) current ratio
(c) operating profit margin
(d) debt ratio

2.4 … will result in an increase in working capital.

(a) A decrease in the level of inventory held by adopting the EOQ model
(b) Using cash to reduce a bank overdraft
(c) An extension of payment terms by creditors
(d) An extension of the payment terms for debtors

2.5 Which one of the following businesses is likely to hold the highest levels of inventory?

(a) Flight Centre
(b) Checkers
(c) Grant Thornton Chartered Accountants
(d) Roman's Pizza

2.6 If inventory is R10 million, cost of sales = R15 million, credit sales = R3 million, debtors = R1 million, creditors = R1,5 million and purchases = R10 million, then the cash collection cycle is … days.

(a) 310,25
(b) 419,75
(c) 118,58
(d) 365

2.7 The cash receipts and the cash expenses for a period are the … of the company.

(a) cash and cash equivalents
(b) current assets
(c) accounts receivable
(d) cash flows

2.8 Debtors are allowed to pay their accounts 45 days from date of sale, but if they pay within 15 days of sale, they recieve a 3% settlement discount. This is expressed as … .

(a) 3/15, net 45
(b) 15/45, net 3
(c) 15/3, net 45
(d) 3/45, net 15

2.9 Working capital management is mainly concerned with … .

(a) the capital structure of the company
(b) financing and managing the company's current assets
(c) managing the inventory of the company
(d) managing the company's capital assets

2.10 The advantage of using trade payables to finance current assets is that it … .

(a) reduces illiquidity risk
(b) reduces exposure to interest rate fluctuations
(c) reduces interest cost
(d) All of the above are advantages of using trade payables to finance current assets.

QUESTION 3

The following is an extract from the trial balance of Hadida Limited:

	R
Accrued expenses	91 000
Cash	120 000
Inventory	550 000
Investments	1 600 000
Long-term loans	3 500 000
Property, plant and equipment	980 000
Trade payables	656 000
Trade receivables	265 000

Required

3.1 Calculate the gross working capital.
3.2 Calculate the net working capital.

QUESTION 4

Explain how working capital affects the liquidity and profitability of a company.

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12.7 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 T
1.2 F R60 / R1000 = 6% interest paid for six months. Therefore, the annual rate is 12%: R1 000 x 12% = R120 per annum, which is R60 for six months.
1.3 F It means that 1% discount will be received if paid within 10 days, with 30 days maximum to pay.
1.4 T
1.5 T
1.6 T
1.7 T
1.8 F The sales for the month was R40 000 + 200 000 – R50 000 = R190 000.

QUESTION 2

2.1 (b)
2.2 (c)
2.3 (b)
2.4 (d)
2.5 (b)
2.6 (a) see below
2.7 (d)
2.8 (a)
2.9 (b)
2.10 (d)

cash conversion cycle
= days' sales in inventory + debtors collection period – creditors payment period
= 243,33 + 121,67 – 54,75 = 310,25 days

days' sales in inventory = *closing inventory ÷ (cost of sales ÷ 365)*
= R10 m / (R15 m / 365) = 243,33 days

debtors collection period = *accounts receivable ÷ average daily credit sales*
= R1 m / (R3 m / 365) = 121,67 days

creditors payment period = *accounts payable ÷ average daily purchases*
= R1,5 m / (R10 m / 365) = 54,75 days

QUESTION 3

3.1 Gross working capital

	R
Inventory	550 000
Trade receivables	265 000
Cash	120 000
Gross working capital	935 000

3.2 Net working capital

	R
Gross working capital	935 000
Less: Current liabilities	747 000
Accrued expenses	91 000
Trade payables	656 000
Net working capital	188 000

QUESTION 4

Working capital management is concerned with decisions about the level of cash, inventory and debtors and how these assets should be financed. The working capital should be neither more nor less than required. If working capital is more than required, it will increase liquidity but decrease profitability at the same time; if working capital is less than required, the company will struggle to meet the requirements of its day-to-day operating activities. The amounts of current assets and current liabilities should be determined so that the company remains profitable without falling into illiquidity.

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LEARNING UNIT 13: BUDGETING

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- draft components of the operating budget of a manufacturing entity
- draft the purchases of merchandise budget of a retail entity
- draft a cash budget

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- analyse data
- prepare the components of operational budgets of a manufacturing entity
- prepare the operational budget of a retail entity
- prepare a cash budget

OVERVIEW

This learning unit is divided into the following sections:

13.1 Introduction
13.2 Purpose and function of budgets
13.3 Operational budgets
13.4 Budgeting for retailers
13.5 Cash budgets

13.1 INTRODUCTION

An important function of management is to ensure that the company achieve its goals timely. Management does this by, amongst others, setting policies and standard operating procedures for the outputs that must be achieved, allocating financial resources, measuring actual performance against the stated standards and taking corrective action where required.

A budget is prepared for allocating financial resources to ensure that the operational plan will be achieved for the forthcoming one-year period, for example. A budget expresses the company's plans for achieving its stated goals and objectives in financial terms. A company does not possess unlimited cash resources, and the budgeting process will assist management in deciding which assets and operations should take precedence for funds allocation. A well-prepared budget will indicate if surplus cash will be generated in the budget period or whether external funding will be required to fund the operational plan.

A budget can be prepared for any period; a long-term budget is often prepared to assess the feasibility of the company's strategic plan. Detailed budgets are prepared for shorter periods. These short-term budgets can be used as a control to measure actual performance against budgeted targets. Any differences between actual performance and budgeted targets must be investigated and corrective action must be taken (see static and flexible budgets below).

The budgeting process typically begins with a strategic planning session by senior management, culminating in an operational plan for a future period, for example the forthcoming financial year. Using the operational plan as a starting point, a number of budgets are prepared. These budgets include the following:

Operational budgets

Operational budgets budget for the elements of the statement of profit or loss (i.e. elements of revenues and expenses). A series of operational budgets are developed that will ensure that the company meets the objectives set out in the operational plan. In a manufacturing environment, these operational budgets would typically include the budgets for sales, production, direct materials, direct labour, production overheads, cost of goods manufactured and sold (which is derived from the budgets for direct materials, direct labour and production overheads) and selling, distribution and administration expenditure.

In learning unit 10, we said that the statement of profit or loss provides information about the financial *performance* of the company (i.e. whether the company made a profit or loss *for the year*). The operational budgets, which culminate in the budgeted statement of profit or loss, express the financial plans for the performance of the company in the forthcoming year. The company uses the operational budgets in its daily operations and they form the basis for the financial budgets.

Financial budgets

The financial budgets involve the elements that affect the statement of financial position (i.e. assets, liabilities and owners' equity). In learning unit 10, we said that the statement of financial position provides information about the financial *position* of the company (i.e. the value of the assets *on the last day of the year* and how they are funded). Financial budgets include a capital expenditure budget (indicating the purchases and funding of non-current assets), a cash budget and a budgeted statement of financial position.

Master budget

The master budget consists of the different components of the operational and financial budgets, for example:

1 Sales budget
2 Production budget
3 Direct materials budget
4 Direct labour budget
5 Production overheads budget
6 Cost of goods manufactured and sold budget
7 Selling, distribution and administration expenses budget
8 Cash receipts budget
9 Cash payments budget
10 Cash budget
11 Budgeted statement of profit or loss and other comprehensive income
12 Budgeted statement of financial position

The master budget is a static budget, as it is based on a single volume of activity (e.g. the number of units to be sold) that is predicted for the future. The components of the master budget are prepared in advance, usually for a period of one year.

Static budgets vs flexible budgets

We prepare a static budget for a single level of activity that is expected to occur in the future (e.g. sales volume or production volume). A static budget does not change, even if the underlying cost-driver activities (e.g. sales or production levels) turn out to differ from the planned level of activity. In contrast, we prepare a flexible budget "in hindsight" (i.e. after actual results are known). The static budget serves as a planning tool, while the flexible budget is a tool used for performance evaluation (control). A flexible budget adjusts the static budget for actual levels of output, and the action may be referred to as "flexing the budget".

Activity 13.1

PQR Company plans to produce and sell 1 000 units at a selling price of R1 500 per unit in the first quarter (January to March) of next year. Assume there are no opening and closing inventories. The estimated production cost of one unit is as follows:

		R
Direct materials cost	3 components at R8 each	24
Direct labour cost	2 hours at R100 per hour	200
Variable overheads	R180 per unit manufactured	180
Budgeted variable cost per unit		404

Fixed overheads are estimated at R556 000 for the quarter.

Salespersons receive 5% commission on all sales. Other period costs are estimated at R65 000.

Required

1 Prepare the static (planning) budgeted statement of profit or loss for the first quarter of next year.

2 Prepare the flexible budget that will be used for performance evaluation, assuming all planned targets were met, except that only 950 units were manufactured and sold.

Feedback on activity 13.1

1 Static planning budgeted statement of profit or loss for the first quarter of next year

		R	R
Sales	(1 000 units x R1 500)		1 500 000
Cost of sales*			(960 000)
Variable production cost	(1 000 units x R404)	404	404 000
Direct materials cost	(3 components x R8)	24	
Direct labour cost	(2 hours x R100)	200	
Variable overheads		180	
Fixed production overheads			556 000
Gross profit			540 000
Commission	(5% x R1 500 000)		(75 000)
Other period costs			(65 000)
Operating profit			400 000

*There are no inventories; hence, production costs and cost of sales will be the same, because all units produced will be sold.

2 Flexible budget that adjusts the static budget for actual output level of 950 units manufactured and sold. The flexible budget will be used for performance evaluation.

		R	R
Sales	950 units x R1500		1 425 000
Cost of sales			939 800
Variable production cost	950 x 404	404	383 800
Direct materials cost	3 components x R8	24	
Direct labour cost	2 hours x R100	200	
Variable overheads		180	
Fixed production overheads			556 000
Gross profit			485 200
Commission	5% x R1 425 000		(71 250)
Other period costs			(65 000)
Operating profit			348 950

Note that in the flexible budget, we change the sales figure as well as the total variable production costs (driven by production output volume) and commission expenses (driven by sales volume). The performance of the production department, for example, will be measured on two targets: output and cost. The department did not meet the *output target*: only 950 units were manufactured instead of the 1 000 units budgeted. The department met the *cost target* as measured against the flexible budget: the manufactured units were manufactured at a variable cost of R404 per unit, and the fixed overheads was R556 000 as budgeted.

If only 950 units are actually produced and sold, management will expect the total production cost and cost of sales to be only R939 800 and not R960 000, as initially planned in the static budget. Similarly, management would expect commission expenses to be only R71 250 and not R75 000, as initially budgeted. You will agree that it would be silly to say that production was efficient, because only R939 800 was spent and not R960 000 as budgeted; the reason for the "saving" is not efficiency, but ineffective production (too few units produced) (see section 13.2.2 and example 13.1 for the difference between efficiency and effectiveness).

The fundamental difference between a static and a flexible budget is that a static budget does not change with the volume of activity, whereas a flexible budget does. A flexible budget adjusts, or "flexes" income and expenses for changes in the volume of activity and is therefore more effective as a cost control tool. Stated differently, the flexible budget answers the question: what was the budget supposed to look like for the production and sales of 950 units only?

A budget steering committee, chaired by the chief executive officer or another high-ranking official, will develop budget policies and a time frame for the preparation of the budget. The budget steering committee will monitor all budgeting activities and oversee the consolidation of individual budgets into a master budget. The steering committee then recommends the budget to management and the board of directors for approval. For control purposes, we often divide operational budgets into shorter periods, for example monthly or quarterly budgets.

Activity 13.2

1 What are the components of the operational budget of a manufacturing entity?
2 Differentiate between a static and a flexible budget.

Feedback on activity 13.2

1 The components of the operational budget of a manufacturing entity are as follows:

- Sales budget
- Production budget
- Direct materials budget
- Direct labour budget
- Production overheads budget
- Cost of goods manufactured and sold budget
- Selling, distribution and administration expenses budget
- We can also add the budgeted statement of profit or loss.

2 Differentiate between a static and a flexible budget.

- A static budget does not change if the actual volume of output achieved is different from the budgeted volumes. A flexible budget changes with the actual level of activity.
- A static budget assumes that all conditions will remain unaltered. A flexible budget is prepared for different activity levels.
- A static budget is a planning tool that predicts the volumes of activity in the future. A flexible budget adjusts (or flexes) the static budget after actual volumes of activity that are known; it is used as a performance evaluation (control) tool.

13.2 PURPOSE AND FUNCTION OF BUDGETS

A budget is an important management tool that can assist management in their planning, monitoring and control responsibilities.

Planning and coordination

A budget provides a glimpse of what the future may hold and is therefore an important planning tool. It can identify any potential cash shortfalls and as such assists management in the effective allocation of financial resources to ensure that goals and objectives are achieved.

Typically, the sales budget is prepared first: we have to know how many units the company plans to sell of each product before we can prepare a production budget that will ensure that sufficient units of the products are available for sale. Once we know what the company will manufacture, we can prepare the budgets for direct materials, direct labour and production overheads.

The master (static) budget is used for planning purposes.

Monitoring and control

Budgets assist operational managers and senior management to evaluate actual performance achieved against budgeted targets on an ongoing basis. Such continuous performance monitoring may also reveal gaps in the budget that may lead to timely corrective action to ensure that goals and objectives will be achieved.

A flexed budget is used for monitoring and control purposes.

13.2.1 Underlying budgeting principles

One of the primary goals of a company is to increase shareholders' wealth by maximising profit. That means that the company will strive to increase its income while keeping its costs low. Careful planning and continuous control are essential for achieving these goals. The following are some of the principles underlying a good budget:

Clearly defined management objectives

The people charged with the task of developing the budgets must have a clear understanding of what management wishes to attain. (Typically, the budget steering committee will oversee the budgeting process.)

Realistic, understandable and attainable goals and objectives

Management use the budget to control the company's activities. It is important that staff members understand the objectives set for them and that these objectives are fair and realistic so that it is possible to attain them. Unrealistic goals and budgets can have a demoralising effect on staff.

Ability to predict

The budgeting process involves "looking into the future". Due consideration must be given to internal factors, such as the company's human resources and production capacity, possible seasonality of the company's products, the remaining useful life of plant and equipment and any possible financing needs. *Microeconomic* factors, such as the latest technological trends, who the competitors are and stability of the industry in which the company operates must be considered, as must be *macroeconomic* factors, like government policy and international developments.

Economics is a social science that studies the interaction of government, people and the business with each other. It entails an analysis of the production, distribution and consumption (use) of goods and services. Economics also looks at how *scarce resources* could be used to ensure that everyone will derive some benefit from them. There are two branches of economics: *macroeconomics* that looks at a country's operations, and *microeconomics* that looks at the behaviour of organisations and individuals.

Scarce resources

Scarcity in economics refers to the unlimited wants of the people and the limited resources available that can satisfy those wants.

Macroeconomics

Macroeconomics aims to understand fluctuations in business cycles and to identify the elements that contribute to long-term economic growth; both of these are important for both government and businesses for setting sound economic policies. Macroeconomics looks at factors such as gross domestic product, gross national product, the consumer price index, unemployment, inflation, foreign trade, international finance etc and the interaction between them.

Microeconomics

Microeconomics looks at the behaviour of individual consumers and businesses in an attempt to understand how they make certain decisions; it looks at how buyers and sellers interact and at the factors that influence the choices of buyers and sellers. Microeconomics essentially looks at how the supply of goods and services and the demand for those goods and services affect the determination of the prices of the goods and services in a particular market (e.g. information technology).

Clearly defined and communicated responsibility

The budget steering committee must allocate responsibilities for the drafting of the budget to those individuals who have the best knowledge of what expenditure is likely to be (e.g. human resources manager and production manager) and what income is likely to be (e.g. sales manager). These individuals must then take accountability for actual results.

13.2.2 Advantages of good budgeting

A well-prepared budget will focus the attention and direct the activities of all staff members to work together to achieve the goals and objectives of the entity in an *effective and efficient* manner. It creates an awareness of the importance of cost control and highlights any problem areas in a timely manner so that management can take corrective action.

Effectiveness and efficiency are not the same. Effectiveness is often referred to as "doing the right *thing*"; it refers to achieving what was intended to be achieved. Efficiency is often referred to as "doing the thing *right*"; it refers to, for example, the time it takes and the resources required to achieve an objective.

Example 13.1

A company manufactures coffins. Some coffins are made of pine wood, and others are made of cherry wood. At the beginning of the month, there were 50 pine coffins and 50 cherry wood coffins in finished goods inventory. According to the standards set by the company, each coffin requires six metres of wood and takes five hours to complete. Management decided to manufacture only 200 pine coffins during the month. It would therefore require 1 200 metres (6 m x 200 coffins) of pine and 1 000 direct labour hours (5 hrs x 200 coffins) to manufacture the planned 200 pine coffins.

Assume that 1 300 metres of wood were used and that workers had to work 1 050 hours to make the 200 pine coffins. Sales for the month consisted of 230 pine coffins and 40 cherry wood coffins. We can conclude that:

- production for the month was *not efficient*, because more time and resources were used than planned: the workers did not "do the thing right"
- production for the month was *effective*, because sufficient inventory was available to meet the sales demand: management "did the right thing" by instructing that only pine coffins should be manufactured

Now assume that 1 200 metres of wood were used and that workers worked only 900 hours to make the 200 coffins of the required quality. Sales for the month were only 80 pine coffins, but orders were received for 80 cherry wood coffins. We can conclude that

- production for the month was *efficient*, because the resources were used as planned and the time used was better than planned – the workers "did the thing right"
- production for the month was *not effective*, because potential sales of 30 (80 – 50) cherry wood coffins are lost because of a lack of inventory – management "did the wrong thing" by instructing that only pine coffins should be manufactured

Budgeting assists management to manage the financial resources of the company efficiently and effectively through sound financial planning (where financial resources will come from and how they will be spent) and financial control.

Activity 13.3

1 What are the principles of budgeting?

2 Explain the difference between *effectiveness* and *efficiency* as these terms relate to goal achievement.

Feedback on activity 13.3

1 The principles of budgeting are the following:

- clearly defined management objectives
- realistic, understandable and attainable goals and objectives
- ability to predict
- clearly defined and communicated responsibility

2 Effectiveness refers to whether or not goals were achieved.

Efficiency refers to whether the time and resources were used as planned.

If the goal is to manufacture 100 units at a total production cost of R1 000 (i.e. R100 per unit) and 100 units are actually manufactured but at a cost of R1 200, then performance was effective (100 units were produced as planned) but not efficient (more resources were used than planned). If 90 units are produced at a total cost of R880, then performance was not effective (units produced were 10 less than planned) but efficient (fewer resources were used for the actual output than planned).

13.3 OPERATIONAL BUDGETS

Usually, operational budgets are presented in either a monthly or a quarterly format. The sequence for the preparation of the operational budget for a manufacturing company is as follows:

(1) Prepare the sales budget; (2) prepare the production budget; (3) prepare the budgets for direct materials, direct labour and production overheads; (4) prepare the budget for cost of goods manufactured and sold; (5) prepare the budget for other operating expenses (e.g. selling and distribution expenses).

13.3.1 Sales budgets

This budget reflects income from sales and must not be confused with the budget for expenses relating to sales. Expenses relating to sales are included in the selling, distribution and administration expenses budget.

The sales budget is usually prepared first, because it informs the other operational budgets. It specifies the expected number of sales units for a period as well as the expected rand value per unit and in total. If a company has multiple products, we usually compile the budget per product category or per geographic region. For the purposes of this module, we will assume a single product only.

The information that is used to prepare the sales budget comes from a variety of sources. Staff members who deal with products on a daily basis provide most of the information about existing products. For example, the marketing staff will provide information about special promotions that may influence the timing and quantity of sales, while the research and development staff will provide information about the launch of new products and the withdrawal of old products. The preparation of the sales budget also requires an analysis of market conditions, government policy as well as the macroeconomic and microeconomic environment in which the company operates (see information box under section 13.2.1).

It is extremely important that sales projections are as accurate as possible, because we use the sales budget as the basis for the preparation of almost every other budget. If the sales budget is significantly inaccurate, it follows that all the other budgets will also be significantly inaccurate.

13.3.2 Production budgets

The production budget is not really a budget in the stricter sense of the word, but rather a schedule of the units that must be manufactured during a specific period. Sufficient units must be manufactured to meet the expected sales demand during that period plus the planned finished goods inventory at the end of that period. This budget (schedule) does not contain any financial values; the budgets for direct materials, direct labour and production overheads will contain details of the financial resources needed for meeting the production requirements set out in the production schedule.

The projected unit sales information in the sales budget feeds directly into the production budget. We calculate the number of units that must be produced as follows: *projected sales units + required units in closing inventory – units in opening inventory*

We must consider the planned levels of finished goods inventory very carefully; too many units in inventory may lead to obsolete or damaged inventory that must be disposed of at a loss, while

too few units in inventory may result in lost sales. Issues such as inventory holding costs must be considered as well (refer to learning unit 4).

13.3.3 Direct materials requirements and purchases budgets

Once we have determined the level of production volume, we can prepare a budget for the direct materials requirements and purchases. The direct materials budget shows the quantities of materials needed to meet the expected production demand during the period, the planned closing inventory of direct materials at the end of that period and the quantities that must be purchased. We multiply the calculated required purchase quantities by the expected purchase prices to determine the amounts needed. We calculate the quantity of materials to be purchased as follows: *quantity required for production + quantity required in closing inventory – quantity in opening inventory*.

Depending on the type of goods manufactured, the direct materials budget may demand a considerable portion of the company's financial resources; therefore, we should compile it with great care. A significantly inaccurate budget may erroneously indicate excessively high or excessively low cash requirements to fund direct materials purchases.

The company may literally use hundreds of different types and components of direct materials in the production of finished goods. It would be impossible to calculate the direct materials budget for every component and type of direct material in inventory. Most companies would use materials requirements planning (MRP) software to determine direct materials purchases requirements (see section 4.4.2 in learning unit 4); by entering the production budget into the MRP system, the software can generate the direct materials budget.

13.3.4 Direct labour budgets

Like the direct materials budget, the direct labour budget uses the production budget as a starting point. The direct labour budget shows the total number of direct labour hours required for production and the cost thereof. This budget can assist management to anticipate the number of employees required during the budgeted period and to plan for possible new appointments or overtime (see the last paragraph of example 6.4 in learning unit 6). We calculate the amount needed for the direct labour budget as follows: *number of units to be manufactured x number of direct labour hours per unit x direct labour recovery rate per hour*

13.3.5 Production overheads budgets

The production overheads budget lists all the anticipated production costs, other than the cost of direct materials and direct labour, needed to give effect to the production schedule. This budget will typically consist of two sections: one section for variable overheads and the other for fixed overheads. The budget also contains non-cash flow items, such as depreciation. It is advisable for this budget to also indicate the expected cash flows, as it will assist in the preparation of the cash budget.

13.3.6 Cost of goods manufactured and sold budgets

The cost of goods manufactured and sold budget summarises the expected production costs that will be incurred to meet the budgeted production volumes as well as the accumulated costs of goods that will be sold. The cost of goods manufactured and sold budget is based on the budgets for direct materials purchases, direct labour, production overheads and sales. This budget is prepared for the year (not monthly or quarterly) as it feeds into the budgeted statement of profit or loss for the year. You are already familiar with the format of the cost of goods manufactured and sold statement; the format for the cost of goods manufactured and sold budget is the same.

13.3.6 Selling, distribution and administration expenses budgets

The selling, distribution and administration budget comprises all the period costs, in other words the budgets of the non-manufacturing departments such as sales, marketing, accounting, etc. This budget does not depend on the information in the other budgets, but is prepared based on the general level of activity and past trends.

13.3.7 Budgeted statement of profit or loss

The format of the budgeted statement of profit or loss is the same as that of a regular statement of profit or loss. We also prepare this statement for the year, and not per month or per quarter. The budgeted statement of profit or loss is a projection of what the statement of profit or loss may look like at the end of the budget period. We compile it from the information contained in the operational budgets. Management can compare the budgeted statement of profit or loss with the results for the previous period to identify any anomalies that may require adjustment.

Activity 13.4

Explain how the operating budgets of a manufacturing entity feed into each other.

Feedback on activity 13.4

We prepare the sales budget first and feed the anticipated quantity of units required for sales into the production schedule. The production schedule determines the number of units to be manufactured to ensure that there are sufficient goods available for sale and in closing inventory according to management policy. The number of units to be manufactured, as determined in the production schedule, feeds into the direct materials budget, the direct labour budget and the production overheads budget.

The direct materials budget determines the quantity of direct materials to be purchased to ensure that sufficient materials are available for production demand and in closing inventory according to management policy. The direct labour budget determines the total labour hours required to meet production demand. The total variable overheads portion of the production overheads budget is based on the production activity level. We use the information contained in the direct materials budget, the direct labour budget and the production overheads budget to prepare the cost of goods manufactured and sold budget.

In turn, we use the cost of goods sold as determined in the cost of goods manufactured and sold budget to complete the budgeted statement of profit or loss.

Example 13.2

Example 13.2 is a comprehensive example that will illustrate the preparation of the operational budgets of a manufacturing entity. We present the budgets in quarterly format where appropriate.

XYZ Ceramics buys dry powdered clay that is mixed with water in underground tanks to create a slip (liquid clay solution). The slip is then poured into casting moulds to manufacture the finished goods that are sold. The cost of the labour to mix the powdered clay with water is considered a fixed overheads.

Each final product requires the equivalent of 500 grams of powdered clay. The cost of the clay is expected to be R12 per kilogramme on 1 January 2017, but a price increase of R1 per kilogramme is expected with effect from 1 July 2017.

It takes one worker an average of 15 minutes to prepare one casting mould and to pour the slip into it. Once set, it takes one worker a further 15 minutes to release the product from the mould. Once released from the moulds, the products are left to dry naturally. Once dry, the products are put through a finishing process to smooth away the mould line. It takes one worker 10 minutes to finish one unit. The products are then fired in a kiln to convert the clay into stoneware. Once the products have cooled down, artists apply the glazing and finishing touches to each unit. It takes an artist 45 minutes per unit to complete this task. The units are then placed into the kiln for a second firing. After the units have cooled down from the second firing, they are labelled, wrapped and packed into individual boxes; this process takes one worker 20 minutes per unit to complete. The labour recovery rate for artists is R150 per hour; for all other workers it is R80 per hour.

Anticipated sales are 4 000 units x R320; 5 000 units x R350; 5 500 x R350 and 8 000 units x R380 for each of the four quarters of 2017.

Variable production overheads are budgeted for on the basis of direct labour hours (DLH) as follows:

	R per DLH
Indirect materials	1,20
Consumables	0,90
Indirect labour	3,00
Variable portion of mixed costs	3,10

The management of XYZ Ceramics has adopted the following policies:

- The FIFO method is used.
- Closing inventory of finished goods is to be maintained at 10% of the next quarter's projected sales (projected sales for the first quarter of 2018 is 7 000 units).

There was no work-in-progress at the beginning of the year. Other opening inventories on 1 January 2017 were as follows:

- 90 kg of dry powdered clay at R11,50 per kilogramme
- 1 000 units of finished goods at R237,30 per unit

Required

Prepare the operational budgets of XYZ Ceramics for the financial year ending on 31 December 2017.

Sales budget of XYZ Ceramics for the year ending 31 December 2017

	Quarter 1	**Quarter 2**	**Quarter 3**	**Quarter 4**
Projected sales in units	4 000	5 000	5 500	8 000
Price per unit	R320	R350	R350	R380
Gross sales	R1 280 000	R1 750 000	R1 925 000	R3 040 000

The sales budget of XYZ Ceramics shows a peak in sales in the last quarter, which may be ascribed to the festive season. The lower selling price per unit in quarter 1 (Q1) may be a strategy to move excess unsold inventory from the previous festive season.

Production budget of XYZ Ceramics for the year ending 31 December 2017

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Projected sales in units	4 000	5 000	5 500	8 000
Plus: Planned closing inventory	500	550	800	700
Equals: Total units required	4 500	5 550	6 300	8 700
Less: Opening inventory	(1 000)	(500)	(550)	(800)
Equals: Units to be manufactured	3 500	5 050	5 750	7 900

- The 1 000 units in opening inventory at the beginning of the year may indicate that sales in the last quarter of 2016 was lower than planned.
- Closing inventory at the end of Q1 = 5 000 x 10% (10% of projected sales for Q2)
  Closing inventory at the end of Q2 = 5 500 x 10% (10% of projected sales for Q3)
  Closing inventory at the end of Q3 = 8 000 x 10% (10% of projected sales for Q4)
  Closing inventory at the end of Q4 = 7 000 x 10% (10% of Q1 of 2018 sales)

Direct materials budget of XYZ Ceramics for the year ending 31 December 2017

	Q 1	Q 2	Q 3	Q 4
Production required (units)	3 500	5 050	5 750	7 900
Times: Clay per unit (kg)	0,5	0,5	0,5	0,5
Equals: Total clay required (kg)	1 750	2 525	2 875	3 950
Plus: Planned closing inventory (kg)	250	275	400	350
Equals: Total clay needed (kg)	2 000	2 800	3 275	4 300
Less: Opening inventory (kg)	(90)	(250)	(275)	(400)
Purchases required (kg)	1 910	2 550	3 000	3 900
Cost per kilogram	R12	R12	R13	R13
Total purchase cost	R22 920	R30 600	R39 000	R50 700

The planned closing inventory levels are in line with the planned closing inventory of finished goods (e.g. at the end of Q1, closing inventory of finished goods is planned at 500 units; if 500 g of clay (or 0,5 kg, because there are 1 000 g in one kilogramme) are required for each unit, then 500 x 0,5 = 250 kg of clay will be required in closing inventory of direct materials at the end of Q1.

Direct labour budget of XYZ Ceramics for the year ending 31 December 2017

	Q 1	Q 2	Q 3	Q 4
Production required (units)	3 500	5 050	5 750	7 900
Artists (45 min: 45 / 60 = 0,75 hrs)				
Total artist hours (units x 0,75 hrs)	2 625	3 787,5	4 312,5	5 925
Other workers (60 min = 1 h*)				
Total worker hours (units x 1 h)	3 500	5 050	5 750	7 900
Artist cost (total artist hours x R150)	R393 750	R568 125	R646 875	R888 750
Worker cost (total worker hours x R80)	R280 000	R404 000	R460 000	R632 000
Total direct labour cost	R673 750	R972 125	R1 106 875	R1 520 750

*Activity	Minutes
Pour into mould	15
Release from mould	15
Finishing	10
Packing	20
Total minutes	60

The labour recovery rate of all workers other than artists is R80 per direct labour hour; therefore, we can group them together for budgeting purposes.

Production overheads budget of XYZ Ceramics for the year ending 31 December 2017

	Per DLH	Q1	Q2	Q3	Q4
Total units of production		3 500	5 050	5 750	7 900
*Total DLH		6 125	8 837,5	10 062,5	13 825
Variable production overheads		R	R	R	R
Indirect materials	1,20	7 350	10 605	12 075	16 590
Consumables	0,90	5 512	7 954	9 056	12 443
Indirect labour	3,00	18 375	26 512	30 188	41 475
Variable portion of mixed costs	3,10	18 988	27 396	31 193	42 858
Total variable costs	8,20	50 225	72 467	82 512	113 366
Fixed production overheads					
Rent		20 000	20 000	20 000	20 000
Insurance		2 000	2 000	2 000	2 000
Fixed labour cost		190 000	190 000	190 000	190 000
Depreciation		6 000	6 000	6 000	6 000
Fixed portion of mixed costs		28 000	28 000	28 000	28 000
Total fixed costs		246 000	246 000	246 000	246 000
Total production overheads		*296 225*	*318 468*	*328 513*	*359 365*
Less: Non-cash items		(6 000)	(6 000)	(6 000)	(6 000)
Equals: Expected cash outflows		290 225	312 468	322 513	353 365

*Total DLH	Q1	Q2	Q3	Q4
Total artist hours	2 625	3 787,5	4 312,5	5 925
Total worker hours	3 500	5 050,0	5 750,0	7 900
Total direct labour hours	6 125	8 837,5	10 062,5	13 825

- The variable overheads budget is based on a predetermined rate per DLH (e.g. indirect materials budget for Q1 = 6 125 hours x R1,20 per hour = R7 350.
- Depreciation (and other non-cash items, should there be any) is deducted from the total overheads to obtain the figure that will be used in the cash budget.

After completing the production budgets, we can determine the absorbed cost per unit. We need the cost per unit to calculate the value of closing inventory of finished goods.

Calculation of absorption cost per unit		R
Direct materials cost	(0,5 kg x R13* per kg)	6,50
Direct labour: artists	(0,75 hours x R150 per hour)	112,50
Direct labour: other	(1 hour x R80 per hour)	80,00
Variable production overheads[#]	(R8,20 per DLH x 1,75 DLH)	14,35
Total variable cost		213,35
Fixed production overheads	(R984 000 ÷ 22 200)	44,32
Total absorption cost per unit		257,67

* The FIFO method is used; therefore, closing inventories will be held at the most recent costs in. (First costs in would have flown out of inventory first.)

[#] Variable overheads per direct labour hour is R8,20 and each unit takes 1,75 hours to complete. Therefore, the variable overheads per unit = R8,20 x 1,75 DLH.

Cost of goods manufactured and sold budget of XYZ Ceramics for the year ending 31 December 2017

	R	
Opening inventory direct materials	1 035	Note 1
Plus: Direct materials purchases	143 220	
Less: Closing inventory direct materials	(4 550)	Note 2
Equals: Cost of direct materials	139 705	
Plus: Direct labour cost	4 273 500	
Plus: Production overheads	1 302 570	
Equal: Total manufacturing cost	5 715 775	
Plus: Opening inventory work-in-progress	0	Note 3
Less: Closing inventory work-in-progress	0	Note 3
Equals: Budgeted cost of goods manufactured	5 715 775	
Plus: Opening inventory of finished goods	237 300	Note 4
Equals: Goods available for sale	5 953 075	
Less: Closing inventory of finished goods	(180 369)	Note 5
Equals: Cost of goods sold	5 772 706	

1 Opening inventory of direct materials = 90 kg x R11,50 = R1 035 (given in question).

2 Closing inventory of direct materials = 350 kg x R13 = R910. The FIFO method means that inventory will be held at the last cost in (because first costs into inventory flow out of inventory first, so that inventory is held at the most recent costs in).

3 In this example, there is no work-in-progress.

4 Opening inventory of finished goods = 1 000 units x R237,30 = R237 300 (given in question).

5 Closing inventory of finished goods = 700 units x R257,67 = R180 369 (see calculation under production overheads budget).

Sales, distribution and administration budget of XYZ Ceramics for the year ending 31 December 2017

	Q1	Q2	Q3	Q4
	R	R	R	R
Advertising	50 000	40 000	40 000	50 000
Delivery charges	4 700	3 800	3 900	4 800
Insurance (non-manufacturing)	8 000	8 000	8 000	8 000
Rent (non-manufacturing)	12 000	12 000	12 000	12 000
Salaries and benefits	200 000	200 000	200 000	240 000
Consumables (e.g. stationery)	15 000	15 000	15 000	15 000
Travelling expenses	12 000	12 000	13 000	15 000
Other	12 000	12 000	12 000	12 000
Total expenses	313 700	302 800	303 900	356 800

Budgeted statement of profit or loss for the year ending 31 December 2017

	R	
Sales	7 995 000	(sales budget)
Cost of sales	5 772 706	(cost of goods manufactured and sold budget)
Gross profit	2 222 294	
Expenses	1 277 200	(selling, distribution and administration expenses budget)
Operating profit	945 094	
Finance costs	0	
Net profit for the year	945 094	

Activity 13.5

ABC Manufacturing manufactures a single product. The following information was gathered, from which the operational budget for the year ending 30 June 2018 must be prepared:

Production requirements per unit of production:

Direct materials: 2 kg (the expected cost is R50 per kg)

Direct labour: 3 hours (the labour recovery rate is R90 per hour)

Variable overheads: R20 per direct labour hour

Fixed overheads for the year is estimated at R93 100

Inventory on 1 July 2017:

Direct materials: 200 kg at R45 each

Finished goods: 100 units at R390 each

Closing inventory of finished goods must be equal to 10% of the budgeted sales.

Closing inventory of direct materials must match the closing inventory of finished goods.

There will be no opening or closing inventory of work-in-progress.

The FIFO method is applied.

The company expects to sell 1 300 units at a selling price of R1 200 each.
Period costs are expected to be a total of R322 000.

Required

Prepare the following budgets for ABC Manufacturing for the year ending 30 June 2018:

1 Sales budget
2 Production budget (schedule)
3 Direct materials budget
4 Direct labour budget
5 Production overheads budget
6 Cost of goods manufactured and sold budget
7 Budgeted statement of profit or loss

Feedback on activity 13.5

1 Sales budget

Projected sales in units	1 300	given
Times: Price per unit	R1 200	given
Equals: Gross sales	R1 560 000	

2 Production budget (schedule)

Projected sales in units	1 300	sales budget
Plus: Planned closing inventory	130	10% x 1 300
Equals: Total units required	1 430	
Less: Opening inventory	(100)	given
Equals: Production required in units	1 330	

3 Direct materials budget

Production required	1 330	production budget
Times: Kilogram per unit	2	given
Equals: Total kilogram required	2 660	
Plus: Planned closing inventory	260	130 units x 2 kg each
Equals: Total kilogram needed	2 920	
Less: Opening inventory	(200)	given
Equals: Purchases required	2 720	
Times: Cost per kilogram	R50	given
Equals: Total purchase cost	R136 000	

4 Direct labour budget

Production required	1 330	production budget
Hours required per unit	3	given
Total direct labour hours required	3 990	
Times: Labour recovery rate per hour	R90	given
Total direct labour cost	R359 100	

5 Production overheads

Production required	1 330	production budget
Total direct labour hours required	3 990	direct labour budget
Variable overheads per DLH	R20	given
Total variable costs	R79 800	3 990 hrs x R20
Total fixed costs	R93 100	given
Total production overheads	R172 900	

Absorption cost per unit manufactured	**R**	
Direct materials	100	2 kg x R50
Direct labour	270	3 hrs x R90
Variable overheads	60	3 hrs x R20
Total variable cost	430	
Fixed overheads	70	R93 100 / 1330
Total absorption cost per unit	500	

6 Cost of goods manufactured and sold budget

	R	
Opening inventory direct materials	9 000	200 kg x R45
Plus: Direct materials purchases	136 000	direct materials budget
Equals: Available for production	145 000	
Less: Closing inventory direct materials	(13 000)	260 kg x R50
Equals: Direct materials consumed in production	132 000	
Plus: Direct labour cost	359 100	direct labour budget
Plus: Production overheads	172 900	production overheads budget
Equals: Total budgeted manufacturing cost	664 000	
Plus: Opening inventory work-in-progress	0	given
Less: Closing inventory work-in-progress	0	given
Equals: Budgeted cost of goods manufactured	664 000	
Plus: Opening inventory of finished goods	39 000	100 x 390
Equals: Goods available for sale	703 000	
Less: Closing inventory of finished goods	(65 000)	130 x R500 (absorption cost calculation)
Equals: Budgeted cost of goods sold	638 000	

7 Budgeted statement of profit or loss

	R	
Sales	1 560 000	sales budget
Cost of sales	(638 000)	cost of goods manufactured and sold budget
Gross profit	922 000	
Expenses	(322 000)	given
Operating profit for the year	600 000	

13.4 BUDGETING FOR RETAILERS

Retail companies are merchandisers that purchase merchandise to sell for a profit. The same budgeting principles apply to both retailers and manufacturers, but the master budget of a retailer will consist of the following sections only:

1 Sales budget
2 Merchandise requirements and purchases budget
3 Cost of goods sold budget
4 Selling, distribution and administration expenses budget
5 Cash receipts budget
6 Cash payments budget
7 Cash budget
8 Budgeted statement of profit or loss and other comprehensive income
9 Budgeted statement of financial position

Retailers do not have production-related budgets, because they do not manufacture the goods they sell. Instead of a production budget, a retailer will have a merchandise purchases budget.

Operational budget of a retailer

In setting the sales budget, the retailer will consider past sales patterns and external factors, such as the economic climate. Retailers should bear in mind that consumers are far less likely to spend their money on luxuries in times of recession.

Activity 13.6

Colourburst buys and sells colouring-in books and pencils for children and adults. The books are of a standard size and quality and cost the same. During the forthcoming financial year ending on 30 September 2018, anticipated sales and quantities are as follows:

	Books	Pencils
Quarter 1 (1 October 2017 to 31 December 2017)	2 000	1 800
Quarter 2 (1 January 2018 to 31 March 2018)	1 000	900
Quarter 3 (1 April 2018 to 30 June 2018)	1 800	1 620
Quarter 4 (1 July 2018 to 30 September 2018)	1 700	1 530

Closing inventories at the end of September 2016 included 500 books at R50 each and 300 pencil sets at R80 each. Management wants future closing inventory at the end of each quarter to be 400 books and 200 pencil sets.

Colourburst has entered into an agreement with its suppliers, according to which the cost of books and pencils will be fixed at R50 and R80 respectively throughout the budget period, provided that purchases for the year will be at least R300 000 for books and at least R400 000 for sets of pencils. The selling prices of Colourburst are determined as 80% mark-up on cost.

The expenses for the year are estimated as follows:

	R
Rent	30 000
Insurance	6 000
Salaries	300 000
Other	55 500

These expenses are incurred evenly throughout the year.
Commission is paid at 3% of sales.

Required

Prepare the operational budget of Colourburst for the year ending 30 September 2018.

Feedback on activity **13.6**

Workings

	Books	**Pencils**
	R	**R**
Unit cost price	50	80
80% mark-up on cost at	40	64
Selling price per unit	90	144

Sales budget for the year ending 30 September 2018

	Q1	**Q2**	**Q3**	**Q4**
Books in units	2 000	1 000	1 800	1 700
Units x R90 (A)	R180 000	R90 000	R162 000	R153 000
Pencils in units	1 800	900	1 620	1 530
Units x R144 (B)	R259 200	R129 600	R233 280	R220 320
Total sales (A) + (B)	R439 200	R219 600	R395 280	R373 320

Merchandise purchases budget for the year ending 30 September 2018

	Q1	Q2	Q3	Q4
Books				
Units required for sales	2 000	1 000	1 800	1 700
Plus: Required in closing inventory	400	400	400	400
	2 400	1 400	2 200	2 100
Less: Opening inventory	500	400	400	400
Purchases required	1 900	1 000	1 800	1 700
Total purchases at R50 (A)	R95 000	R50 000	R90 000	R85 000
Pencils				
Units required for sales	1 800	900	1 620	1 530
Plus: Required in closing inventory	200	200	200	200
	2 000	1 100	1 820	1 730
Less: Opening inventory	300	200	200	200
Purchases required	1 700	900	1 620	1 530
Total purchases at R80 (B)	R136 000	R72 000	R129 600	R122 400
Total purchases budget (A) + (B)	R231 000	R122 000	R219 600	R207 400

Therefore, purchases for the year will be sufficient for the unit costs of R50 and R80 (for books and pencils respectively) as per the agreement with the supplier.

Cost of goods sold budget for the year ending 30 September 2018

	R	R	
Opening inventory merchandise		49 000	
Books (500 x R50)	25 000		
Pencils (300 x R80)	24 000		
Purchases		780 000	purchases budget
Available for sales		829 000	
Closing inventory		(36 000)	
Books (400 x R50)	20 000		
Pencils (200 x R80)	16 000		
Cost of goods sold		793 000	

Expenses budget for the year ending 30 September 2018

	Q1	Q2	Q3	Q4
	R	R	R	R
Commission on sales at 3%*	13 176	6 588	11 858	11 200
Rent#	7 500	7 500	7 500	7 500
Insurance#	1 500	1 500	1 500	1 500
Salaries#	75 000	75 000	75 000	75 000
Other#	13 875	13 875	13 875	13 875
	111 051	104 463	109 733	109 075

*Total sales per sales budget	439 200	219 600	395 280	373 320	1 427 400
3% of sales	R13 176	R6 588	R11 858	R11 200	R42 822

[#] Costs are incurred evenly throughout the year; therefore, the yearly cost is distributed evenly across the four quarters (e.g. rent: R30 000 ÷ 4 = R7 500 per quarter).

Budgeted statement of profit or loss for the year ending 30 September 2018

	R	
Sales	1 427 400	sales budget
Cost of sales	(793 000)	cost of goods sold budget
Gross profit	634 400	
Expenses	(434 322)	expenses budget
Net profit for the year	200 078	

13.5 CASH BUDGETS

We indicated earlier that a company prepares an operational budget and a financial budget. The cash budget is a component of the financial budget of the company, and its purpose is to monitor the flow of cash in the company. The budgeted financial statements of the company are also financial budgets.

The financial statements of companies are prepared in compliance with IFRS. In terms of the Conceptual Framework for Financial Reporting, transactions are recorded in the accounting records according to the accrual basis (i.e. in the period in which the transactions occur), even if the cash receipts or cash payments relating to those transactions occur in a different period. The most obvious examples of accrual accounting are sales and purchases transactions on account. When goods are sold to a customer on credit, for example, the sales transaction is recorded as indicated below, even though the customer has not yet paid for the goods:

Debit trade receivables	Rxxx	
Credit sales		Rxxx
Sold goods on account		

It is therefore possible for a company to make a profit, yet be in financial trouble because of a shortage of cash.

Example 13.3

Below is the opening trial balance of a company on 1 April (the beginning of its financial year):

	Debit (R)	Credit (R)
Bank	70 000	
Trade debtors	330 000	
Inventory of merchandise	100 000	
Trade creditors		200 000
Accumulated profit		180 000
Share capital		120 000
	500 000	500 000

On Friday, 2 April, the company must pay the weekly wages of R80 000. You can see that the company is in trouble: it only has R70 000 cash, but wages amount to R80 000.

It is essential for a company to prepare a cash budget to determine if it will generate sufficient cash from its operations to meet the budgeted cash requirements. If a temporary cash shortfall is anticipated, management must find additional funding in good time.

The cash budget consists of two sections: the sources of cash (i.e. where cash will come from) and the uses of cash (i.e. where the cash will go). We say that cash sources are cash inflows (cash flowing into the business), and cash uses are cash outflows (cash flowing out of the business). We determine the cash at the end of the budget period (the amount to be included in the budgeted statement of financial position as cash and cash equivalents) as follows: *opening balance of cash and cash equivalents + cash inflows – cash outflows = cash and cash equivalents at the end of the period*

The cash budget is prepared for shorter periods – at least monthly – so that management can identify when any potential shortfalls of cash may occur. This will enable management either to arrange for alternative sources of financing in good time, or to adjust the budget to avoid cash shortfalls. The cash budget can also help identify periods when there may be a significant build-up in cash reserves. In these instances, management will decide how to invest excess funds appropriately. In this learning unit, we will prepare quarterly budgets for illustration purposes.

We use several of the operational budgets and the capital expenditure budget to prepare the cash budget. The capital expenditure budget shows the purchases of long-term assets (property, plant and equipment). The preparation of the capital expenditure budget falls beyond the scope of this learning unit.

Typically, inflows of cash are derived from cash sales, collections from debtors, sale of items of property, plant and equipment as well as investment income (e.g. dividend income and interest income). Cash outflows typically occur for direct materials (or merchandise) purchases, direct labour payments, production overheads payments, the payment of period costs and the repayment of loans. Other sources of cash that fall beyond the scope of this learning unit include financing received in the form of loans or additional investment by the owners. Other payments that fall beyond the scope of this learning unit include capital purchases and dividends paid to shareholders.

Example 13.4

Refer to the information in example 13.2. On 31 December 2016, XYZ Ceramics had the following balances in its statement of financial position:

Bank	R1 576 000
Debtors	R750 000
Creditors	R48 000

The following assumptions will apply in the preparation of the cash budget of XYZ Ceramics for the year ending 31 December 2017:

- All purchases of direct materials are made on credit, and creditors are paid in the quarter following the quarter in which purchases were made (i.e. purchases made in Q1 are paid for in Q2).
- Debtors are collected in the quarter following the quarter in which sales occur. There are no cash sales.
- All other costs are paid as incurred.

Required

Prepare the cash budget of XYZ Ceramics for the year ending 31 December 2017.

For easy reference, we supply the following summary of the budgets in example 13.2:

	Q1	Q2	Q3	Q4
	R	R	R	R
Sales budget	1 280 000	1 750 000	1 925 000	3 040 000
Direct materials budget	22 920	30 600	39 000	50 700
Direct labour budget	673 750	972 125	1 106 875	1 520 750
Production overheads budget*	290 225	312 468	322 513	353 365
Period costs budget	313 700	302 800	303 900	356 800

*Excluding non-cash items

Cash budget of XYZ Ceramics for the year ending 31 December 2017

	Q1	Q2	Q3	Q4
	R	R	R	R
Opening balance of cash	1 576 000	1 000 325	670 012	656 124
Cash inflows:				
Collections from debtors [1]	750 000	1 280 000	1 750 000	1 925 000
Total cash available	2 326 000	2 280 325	2 420 012	2 581 124
Cash outflows	1 325 675	1 610 313	1 763 888	2 269 915
Direct materials purchases [2]	48 000	22 920	30 600	39 000
Direct labour payment [3]	673 750	972 125	1 106 875	1 520 750
Production overheads payment [3]	290 225	312 468	322 513	353 365
Payment of period costs [3]	313 700	302 800	303 900	356 800
Net cash position	1 000 325	670 012	656 124	311 209

[1] Debtors from Q4 of 2016 are collected in Q1 of 2017: R750 000.
Debtors from Q1 of 2017 are collected in Q2 of 2017: R1 280 000 etc.

[2] Creditors from Q4 of 2016 are paid in Q1 of 2017: R48 000
Creditors from Q1 of 2017 are paid in Q2 of 2017: R22 920 etc.

[3] Payment is made in the same month that the costs are incurred.

The management of XYZ Ceramics must investigate the company's cash position thoroughly. In spite of a budgeted profit of R945 094, the cash budget indicates that cash reserves will dwindle from R1 576 000 at the beginning of the year to only R311 209 at the end of the year. The

R311 209 is unlikely to sustain operations in the first quarter of 2018. Management should look into raising the selling price per unit and improving debtors collection.

Activity 13.7

Refer to activity 13.6 and prepare the cash budget of Colourburst for the year ending 30 September 2017, based on the following assumptions:

All sales are cash sales, and all purchases are paid for in the quarter following the quarter in which the purchases are made. All other expenses are paid in the same quarter as they are incurred. The opening balance of cash in the bank on 1 July 2017 was R100 000, while creditors outstanding on that date was R175 680.

Feedback on activity 13.7

Cash budget of Colourburst for the year ending 30 September 2017

	Q1 R	Q2 R	Q3 R	Q4 R
Opening balance of cash	100 000	252 469	472 069	867 349
Cash inflows				
Sales	439 200	219 600	395 280	373 320
Total cash available	539 200	472 069	867 349	1 240 669
Cash outflows	286 731	335 463	231 733	328 675
Purchases of merchandise	175 680	231 000	122 000	219 600
Payment of other expenses	111 051	104 463	109 733	109 075
Net cash position	252 469	136 606	300 153	344 798

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13.6 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 The sales budget must be stated in units as well as rand value.
1.2 The planned purchase of a delivery truck will be included in the capital budget.
1.3 The production budget indicates the cost of direct materials that must be purchased in the budget period.
1.4 The cash budget is a financial budget.
1.5 The production budget, the direct materials budget, the direct labour budget and the production overheads budget are ultimately all dependent on the information contained in the sales budget.
1.6 The operating budgets provide all the information that is required to prepare the budgeted statement of profit or loss.
1.7 The closing cash balance in the cash budget must be the same as the net profit in the budgeted statement of profit or loss.
1.8 Budgets are prepared for a one-year period only.
1.9 The cost of goods manufactured budget summarises the expected production costs that will be incurred to meet the budgeted production volumes.
1.10 It makes no sense to prepare a cash budget for a period of shorter that one year.

QUESTION 2

This question consists of eight multiple-choice questions. Carefully read the information provided and select only the most correct option as your answer.

2.1 Would you consider a budget as a(n) …?

(a) goal
(b) plan
(c) assumption
(d) spreadsheet

2.2 Which of the following budgets is considered an element of the financial budget?

(a) sales budget
(b) production budget
(c) capital budget
(d) pro forma statement of profit or loss

2.3 A manufacturing entity would first prepare the … budget.

(a) production budget
(b) capital budget
(c) sales budget
(d) cash budget

The following information pertains to questions 2.4 and 2.5:

Ilanga Limited is in the process of preparing its cash budget for the forthcoming financial year. The budgeted statement of financial position reflects the following balances for trade receivables (debtors) and trade payables (creditors):

	Trade receivables	Trade payables
	R	R
Opening balance	3 000 000	2 600 000
Closing balance	3 800 000	2 400 000

The sales and purchases budgets reflect budgeted credit sales of R14 000 000 and credit purchases of R10 000 000 respectively.

2.4 What is the expected cash received from debtors?

(a) R9 800 000
(b) R13 200 000
(c) R14 800 000
(d) R10 200 000

2.5 What is the expected cash paid to creditors?

(a) R9 800 000
(b) R13 200 000
(c) R14 800 000
(d) R10 200 000

2.6 In larger companies a/the … is usually responsible for the budgeting process.

(a) budget accountant
(b) budget officer
(c) budget committee
(d) budget managers

2.7 When the cash budget is prepared, the *budgeted cash payments* will not consider … .

(a) the credit terms offered by creditors
(b) the payment patterns of debtors
(c) planned capital purchases
(d) budgeted manufacturing costs

2.8 The budget of Inyanga Limited indicates budgeted sales of 10 000 units and closing inventory of finished goods of 2 000 units. Actual opening inventory of finished goods is 1 000 units. The production budget is for … units.

(a) 9 000
(b) 10 000
(c) 1 000
(d) 11 000

QUESTION 3

A car salesperson is entitled to 10% commission on every car that he sells; 5% commission is paid on delivery of the car to the customer, and the other 5% once the customer's account has been paid in full. The salesperson sells a car on credit for R220 000 on 1 March 2017, and the car is delivered on the same day. In terms of the matching rule of accounting, show the correct journal entry to account for the commission on this transaction.

QUESTION 4

Thapama Limited manufactures deck chairs. The selling price of each chair is R1 800.
Budgeted sales for the first quarter of the forthcoming financial year are as follows:

April	8 000 chairs
May	7 000 chairs
June	5 000 chairs

The cost of opening inventory of finished goods was R700 per chair, and the cost of opening inventory of direct materials was R100 per metre for material A and R150 per metre for material B. The cost of direct materials is not expected to rise in the new quarter. The FIFO method applies.

Direct materials used for manufacturing one chair are as follows:

Material A: 2 metres

Material B: 1 metre

It takes three hours to manufacture one chair. The labour recovery rate is R100 per hour.

Variable production overheads are budgeted for at R50 per unit manufactured.

Fixed production overheads are absorbed at R20 per direct labour hour.

According to the inventory policy, which is strictly observed, inventory of

- finished goods at the end of the month must be 50% of the next month's budgeted sales
- direct materials at the end of the month must be 100% of the next month's production requirements

Budgeted sales are 4 500 and 5 500 chairs for July and August respectively.

All purchases and sales are on account. Debtors pay their accounts in the month following sales, and creditors are paid in the second month after purchases. The outstanding balance of debtors was R15 300 000 on 1 April. Purchases for February and March amounted to R1 125 000 and R1 687 500 respectively. All other costs are paid as incurred. On 1 April, the company had a favourable balance in the bank of R3 000 000.

Required

4.1 Use the available information to prepare the monthly operational budgets of Thapama Limited for the first quarter of the next financial year.

4.2 Prepare the cash budget of Thapama for the first quarter of the next financial year.

4.3 Comment on the expected cash balance at the end of May as well as on the difference between the expected cash balance at the end of May and the budgeted gross profit.

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13.7 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 T
1.2 T
1.3 F
1.4 T
1.5 T
1.6 T
1.7 F
1.8 F
1.9 T
1.10 F

QUESTION 2

2.1 (b)
2.2 (c)
2.3 (c)
2.4 (b)
2.5 (d)
2.6 (c)
2.7 (b)
2.8 (d)

QUESTION 3

If this transaction were a cash transaction, the salesperson would have received the full 10% commission in March 2017. In the case of a credit sale, the first 5% will be paid in March 2017; however, the other 5% will only be paid when the car is paid off. The company will recognise the full R220 000 as income and, to comply with the matching rule, will recognise the full commission of R22 000 (R220 000 x 10%) in the same accounting period. The relevant journal entry to record the commission on the sale will be as follows:

Dr commission expenses (R220 000 x 10%)	R22 000	
Cr bank (5% paid on delivery)		R11 000
Cr accrued expenses (5% accrued as liability)		R11 000

Accounting for commission on sales

QUESTION 4

4.1 Monthly operational budgets of Thapama Limited

Sales budget of Thapama Limited for the first quarter

	April	**May**	**June**
Projected sales in units	8 000	7 000	5 000
Price per unit	R1 800	R1 800	R1 800
Gross sales	R14 400 000	R12 600 000	R9 000 000

The budget must comply with the company's inventory policy. In order to determine the required closing inventory of finished goods at the end of June, we need the projected sales for July. Furthermore, in order to determine the required closing inventory of direct materials at the end of June, we need the projected production for July, which in turn requires the projected sales for August.

Production budget of Thapama Limited for the first quarter

				For workings only; not part of the budget	
	April	May	June	*July*	*August*
Projected sales in units	8 000	7 000	5 000	*4 500*	*5 500*
Plus: Planned closing inventory[1]	3 500	2 500	2 250	*2 750*	
Equals: Total units required	11 500	9 500	7 250	*7 250*	
Less: Opening inventory[2]	(4 000)	(3 500)	(2 500)	*2 250*	
Equals: Units to be manufactured	7 500	6 000	4 750	*5 000*	

[1] The inventory policy requires the closing inventory of finished goods at the end of the month to be 50% of the projected sales for the next month. Therefore, closing inventory for April = 50% x 7 000 = 3 500; closing inventory for May = 50% x 5 000; and closing inventory for June = 50% x 4 500, being the projected sales for July.

[2] The projected sales for April = 8 000 units; therefore, the closing inventory at the end of March would be 4 000 units (50% x 8 000 units). The closing inventory for March is equal to the opening inventory for April; therefore, the opening inventory for April is 4 000 units.

Direct materials budget of Thapama Limited for the first quarter

	April	**May**	**June**	***July***
Projected units of production	7 500	6 000	4 750	*5 000*
Material A – production requirements at 2 m per unit	15 000	12 000	9 500	*10 000*
Plus: Planned closing inventory (metres) [1]	12 000	9 500	10 000	
Equals: Total materials needed (metres)	27 000	21 500	19 500	
Less: Opening inventory (metres) [2]	(15 000)	(12 000)	(9 500)	
Purchases required (metres)	12 000	9 500	10 000	
Cost per metre	R100	R100	R100	
Total purchase cost A	1 200 000	950 000	1 000 000	
Material B – production requirements at 1 m per unit	7 500	6 000	4 750	*5 000*

	April	May	June	*July*
Plus: Planned closing inventory (metres)[1]	6 000	4 750	5 000	
Equals: Total materials needed (metres)	13 500	10 750	9 750	
Less: Opening inventory (metres)[2]	(7 500)	(6 000)	(4 750)	
Purchases required (metres)	6 000	4 750	5 000	
Cost per metre	R150	R150	R150	
Total purchase cost B	900 000	712 500	750 000	
Total direct materials purchases (A + B)	2 100 000	1 662 500	1 750 000	

[1] The inventory policy requires the closing inventory of direct materials at the end of the month to be equal to the production requirements for the next month. Therefore, closing inventory for April = 12 000 metres, being the production requirements for May; closing inventory for May = 9 500 metres, being the production requirements for June; and closing inventory for June = 10 000 metres, being the production requirements for July.

[2] The production requirements for April = 15 000 metres; therefore, the closing inventory at the end of March would be 15 000 metres. The closing inventory for March is equal to the opening inventory for April; therefore, the opening inventory for April is 15 000 metres.

Direct labour budget of Thapama Limited for the quarter

	April	May	June
Projected units of production	7 500	6 000	4 750
Total direct labour hours (units x 3 hrs)	22 500	18 000	14 250
Total direct labour cost (total labour hours x R100)	R2 250 000	R1 800 000	R1 425 000

Production overheads budget of Thapama Limited for the quarter

	April	May	June
Projected units of production	7 500	6 000	4 750
Total direct labour hours	22 500	18 000	14 250
	R	R	R
Variable production overheads at R50 per unit	375 000	300 000	237 500
Fixed production overheads at R20 per DLH	450 000	360 000	285 000
Total production overheads	825 000	660 000	522 500

Production cost per unit

Calculation of absorption cost per unit		R
Direct material A	(2 m x R100 per metre)	200
Direct material B	(1 m x R150 per metre)	150
Direct labour	(3 hours x R100 per hour)	300
Variable production overheads	(R50 per unit	50
Total variable cost		700
Fixed production overheads	(R20 per DLH ∴ R20 x 3 hours)	60
Total absorption cost per unit		760

Cost of goods manufactured and sold budget of Thapama Limited for the quarter

	R	R	
Opening inventory direct materials		2 625 000	
Material A: 15 000 m x R100	1 500 000		
Material B: 7 500 m x R150	1 125 000		
Plus: Direct materials purchases		5 512 500	
Less: Closing inventory direct materials		(1 750 000)	
Material A: 10 000 m x R100	1 000 000		
Material B: 5 000 m x R150	750 000		
Equals: Cost of direct materials		6 387 500	
Plus: Direct labour cost		5 475 000	
Plus: Production overheads		2 007 500	
Equals: Budgeted cost of goods manufactured		13 870 000	
Plus: Opening inventory of finished goods		2 800 000	4 000 units x R700
Equals: Goods available for sale		16 670 000	
Less: Closing inventory of finished goods		(1 710 000)	2 250 units x R760
Equals: Cost of goods sold		14 960 000	

Budgeted statement of profit or loss of Thapama Limited for the quarter

	R
Sales	36 000 000
Cost of sales	(14 960 000)
Gross profit	21 040 000

4.2 Cash budget of Thapama for the first quarter of the next financial year

	April	May	June
	R	R	R
Opening balance of cash	13 000 000	24 100 000	34 352 500
Cash inflows:			
Collections from debtors[1]	15 300 000	14 400 000	12 600 000
Total cash available	28 300 000	38 500 000	46 952 500
Cash outflows	(4 200 000)	(4 147 500)	(4 047 500)
Direct materials purchases[2]	1 125 000	1 687 500	2 100 000
Direct labour payment[3]	2 250 000	1 800 000	1 425 000
Production overheads payment[3]	825 000	660 000	522 500
Net cash position	24 100 000	34 352 500	42 905 000

1 Debtors (i.e. sales) from March are collected in April: R15 300 000
Debtors from April are collected in May: R14 400 000
Debtors from May are collected in June: R12 600 000

2 Creditors (i.e. purchases) from February are paid in April: R48 000
Creditors from March are paid in May: R22 920; etc
Creditors from April are paid in June:

3 Payment is made in the same month that the costs are incurred.

4.3 Comments on the expected cash balance at the end of May and the budgeted gross profit

The budgeted cash balance is growing very rapidly; it will more than treble from the beginning of the quarter (R13 m) to the end of the quarter (± R43 m), largely due to the significantly short cash conversion cycle of 19 days (see ratio calculations below). Creditors are a valuable source of short-term financing (average payment period of 56 days) without a cost attached to it. The company should consider investing the surplus cash more profitably than retaining the cash on hand.

The budgeted cash balance at the end of the quarter is significantly higher than the gross profit for the quarter. This is because the budgeted statement of profit or loss is prepared on the accrual basis. This means that we recognise the cost of purchases made in May and June in the preparation of the statement of profit or loss, although the payment for these purchases is still outstanding at the end of June.

Calculation of ratios

Inventory turnover: cost of sales ÷ closing inventory
14 960 000 ÷ 1 710 000 = 8,75 times in the quarter

Days' sales inventory held: 91* days ÷ inventory turnover
91 ÷ 8,75 = 10 days

Debtors collection: accounts receivable ÷ average daily credit sales
R9 000 000 ÷ (36 000 000 ÷ 91*) = 23 days

Creditors settlement period: accounts payable ÷ average daily purchases
(1 662 500 + 1 750 000) ÷ (5 512 500 ÷ 91*) = 56 days

*The budgeted statement of profit or loss is prepared for the period 1 April to 30 June only, therefore there are only 91 days in this period: 30 (April) + 31 (May) + 30 (June).

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LEARNING UNIT 14: BASIC CONCEPTS – BUSINESS STRATEGY, STAKEHOLDERS AND BUSINESS RISKS

SPECIFIC LEARNING OUTCOMES FOR THIS LEARNING UNIT

After studying this learning unit, you should be able to do the following:

- discuss the concepts business strategy, stakeholders and business risks
- identify stakeholders and risks in basic scenarios

ASSESSMENT CRITERIA

After working through this learning unit, you should be able to do the following:

- define and explain the concepts vision, mission, strategic planning, stakeholders and business risk
- identify the organisation's internal and external stakeholders
- identify business risks from basic scenarios

OVERVIEW

This learning unit is divided into the following sections:

14.1 Business strategy
14.2 Stakeholders
14.3 Business risks

14.1 BUSINESS STRATEGY

14.1.1 Introduction

A strategy is a plan. For example, Mpule is 12 years old and in grade seven; she decides that she would like to become a chartered accountant one day. Her career guidance teacher at school has told her that it will require at least four years' university study, completion of a training contract and passing two professional examinations before she can qualify as a chartered accountant. Mpule then found out from several universities what their admission requirements are and how much it would cost to complete her university studies. She now knows that she will require good marks in mathematics and that the university studies will be costly. She was also told that students with good matriculation results may qualify for a bursary from the university. Mpule's parents are not rich, so she decided on the following plan of action:

1. For her last year at primary school, she will do her mathematics homework every day. She will also do additional exercises to ensure that she does not fall behind and that she achieves good marks.
2. When she goes to high school, she will – in addition to mathematics – select subjects that will prepare her for her intended accounting studies.
3. She will work very hard every day to achieve an A in all her subjects at the end of grade 12, so that she will meet the university's admission requirements and qualify for a full bursary.
4. At university, she will continue working hard so that she will be accepted for a training contract with the firm of her choice.

If Mpule passes all her examinations on the first attempt and successfully completes her training contract, she will qualify as a chartered accountant shortly before she turns 28 (i.e. in 16 years' time).

Therefore, Mphule's goal is to be a qualified chartered accountant by the time she turns 28. The four steps above sets out her long-term plan of action, or strategy, to achieve this goal. She will have to assess her progress against this plan frequently throughout the next 16 years and make adjustments as required. For example, if she qualifies for only a partial university bursary, she will have to apply for an additional bursary elsewhere or for a student loan.

Businesses also set goals and have strategies to achieve those goals. The strategic plan is the company's long-term plan of what it will do to achieve its goals.

14.1.2 Business planning

The management of the company is responsible for planning, monitoring and control in the company. Management is therefore responsible for creating the business strategy of the company. Some strategies (or plans) are common to all companies, for example the plan to grow and expand the company by developing new products, expanding operations to other countries, investing in new assets, etc. Another common strategy is to identify areas of the business that are not profitable and to set out a plan to terminate or phase out these sections of the business. Companies will also develop strategies for doing things that will set them apart from their competitors. These strategies typically focus on price and product. The price strategy will aim to achieve lower costs to enable the company to charge lower prices and to capture a larger market share and to gain a competitive edge over its competitors in the process. The product strategy will aim to improve the quality of the product so that customers are willing to pay more for it.

SWOT (strengths, weaknesses, opportunities and threats) analysis

In creating the business strategy, management will usually perform a SWOT analysis. It entails an honest evaluation of the company's strengths, weaknesses, opportunities and threats.

Strengths and weaknesses relate to the internal environment (i.e. conditions that exist inside the company, such as the company's processes, resources, systems, expertise of management, staff, etc). Examples of strengths (i.e. internal positives) are that a company has a well-established, large customer base and a limited level of financial risk. An example of a weakness (i.e. an internal negative) is if a company has a poor broad-based black economic empowerment (BBBEE) rating.

Opportunities and threats relate to the external environment (i.e. conditions that exist outside the company, such as the industry that the company operates in, the company's competitors, emerging technologies, economic and political factors, etc). An example of an opportunity (i.e. an external positive) is that the industry in which the company operates is in a growth phase. An example of a threat (i.e. an external negative) is a stringent regulatory environment that could create a risk of non-compliance to legislation.

You will recognise that both strengths and opportunities are "good", and that both weaknesses and threats are "bad". It is important to identify which positive (good) things are strengths and which are opportunities. Likewise, it is important to identify which negative (bad) things are weaknesses and which are threats. (In other words, which one of the positive and negative pair is internal to the company and which one exists in the external environment.)

When management has completed the SWOT analysis, they will develop business strategies to *improve* further on the identified *strengths*, to *resolve* the identified *weaknesses*, to *pursue* the identified *opportunities* and to *avoid or manage* the identified *threats*. These strategies will then form the basis of the company's strategic plan. In learning unit 1, we introduced you to strategic planning. Now, please read section 1.1 again.

In creating the strategic plan, which entails long-term planning for the future, management will have to make certain assumptions. Nobody knows without doubt what the future holds. Therefore, management will frequently have to review their business strategy and strategic plan in the light of prevailing conditions in both the internal and external environment. Such a review usually entails another SWOT analysis and the amendment of the strategic plan, if necessary.

During a SWOT analysis, it is important to list any identified issues only once. What is an opportunity for one company, may be a threat to another, but it cannot be both an opportunity and a threat for the same company. Consider for example a business operating in the fast food industry at a time of continued load shedding implemented by Eskom. Many households will be unable to cook dinner as a result of the load shedding and may want to buy takeaways instead. Therefore, load shedding could be regarded as an opportunity for a fast food outlet. However, load shedding will be a threat to fast food outlets that do not have back-up generators, because they will be unable to prepare food when there is no electricity supply. You will appreciate that load shedding cannot be both a threat and an opportunity for the same fast food outlet.

Strategic plan

In learning unit 1, we saw that the company's strategic plan will contain statements about its mission, vision, values, key strategies (that were developed from the results of the SWOT analysis) and long-term objectives.

The strategic plan is developed by the most senior management in the company and serves to explain the business of the company to its various stakeholders (see section 14.2). The strategic plan also serves as a framework within which operational managers develop detailed operational plans. A strategic plan is visionary and provides direction, while operational plans are detailed and measureable. In your personal life, your strategic holiday plan may have the goal of spending a holiday in Zanzibar; your operational holiday plans will include applying for the required visa and getting the required vaccinations against typhoid, tetanus, etc.

The company's strategic plan usually contains a mission, vision and value statement. The mission statement defines the core purpose of the company, the vision statement declares where the company sees itself in the future and the values statement sets forth the core beliefs that guide the business activities of the company. Below are the mission and vision statements of Tiger Brands (*http://www.tigerbrands.co.za*), as well as extracts from its values declaration.

Vision

To be the world's most admired branded consumer packaged goods company in emerging markets.

Mission

To be a high performing, fast-moving consumer goods company with leading brands, operating across the globe in several selected emerging territories.

Values

Our people – we value our people and treat them with dignity.

Our performance – we have a passion for excellence.

Our consumers – our consumers are our business.

Our world – we continue to reinvest in our society.

Our integrity – we act with integrity in everything we do.

The strategy of the company as set out in the strategic plan is implemented through the development of operational plans.

Operational plans

Operational plans are short-term plans based on the strategic plan created by the senior management of the company. Operational managers develop the operational plans for the company, for example, the sales manager will develop an operational plan for the sales department, the production manager will develop an operational plan for the production department, etc. The department's operational plan explain how the department will contribute towards achieving the goals set out in the strategic plan (i.e. *what* it is that their departments are going to do, by *when* they are going to do it, *how much money* they will need to do it and *how they will measure* if they have achieved what they set out to achieve). Operational plans serve as basis for the preparation of the individual performance plans of employees.

Activity 14.1

1 Identify which of the issues listed below are strengths, weaknesses, opportunities or threats:

- The company has low debt.
- The industry trade union is prone to strike action.
- The company has significant financial resources.
- There is a high level of waste of direct materials.
- The manufacturing equipment of the company is very old.
- There is an increased demand for the company's products.
- Many new competitors are entering the market.
- The company's workforce is highly skilled and committed.
- The company's suppliers are reliable.
- Staff turnover is high.
- Company tax rates are high.
- The prime interest rate is low.

2 What is the difference between the mission statement and the vision statement of a company?

3 How does the company's implement its strategic plan?

Feedback on activity 14.1

1 SWOT analysis

The company has low debt.	Strength
The industry trade union is prone to strike action,	Threat
The company has significant financial resources.	Strength
There is a high level of waste of direct materials.	Weakness
The manufacturing equipment of the company is very old.	Weakness
There is an increased demand for the company's products.	Opportunity
Many new competitors are entering the market.	Threat
The company's workforce is highly skilled and committed.	Strength
The company's suppliers are reliable.	Opportunity
Staff turnover is high.	Weakness
Company tax rates are high.	Threat
The prime interest rate is low.	Opportunity

2 The mission statement describes the purpose of the company, while the vision statement describes the desired future state of the company.

3 The company implements its strategic plan through the development of operational plans and the setting of performance plans for each employee.

14.2 STAKEHOLDERS

In South Africa, public companies must comply with the Companies Act as well as the King Report on Corporate Governance for South Africa 2009 (King report). There are several definitions of corporate governance, but in essence, corporate governance refers to the way in which companies are directed and controlled. The King Report has sections on, amongst others, ethical leadership and corporate citizenship, risk, information technology, compliance, internal audit, integrated reporting and stakeholder relationships. We will deal with the King Report in detail in later courses.

The principles of governing stakeholder relationships as set out in King Report are that the board (of directors) should

- *appreciate that stakeholders' perceptions affect a company's reputation*
- *delegate to management to proactively deal with stakeholder relationships*
- *strive to achieve the appropriate balance between its various stakeholder groupings, in the best interest of the company*
- *ensure disputes are resolved as effectively, efficiently and expeditiously as possible*

and furthermore that

- *companies should ensure the equitable treatment of shareholders*
- *transparent and effective communication with stakeholders is essential for building and maintaining their trust and confidence*

The stakeholders of a company are those parties that are affected by the business activities of the company, thereby having a legitimate interest in the affairs of the company. Stakeholders can be internal or external.

Internal stakeholders are those groups who work directly with the company (e.g. management and employees). The owners (shareholders) are internal stakeholders as well. Employees and management, for example, are interested in stable employment, while shareholders are interested in profit and wealth maximisation.

External stakeholders are parties outside the company that are affected by the activities of the company. Some external stakeholders are connected to the company through contracts (e.g. customers, suppliers, banks and other lenders). Customers will want quality products or services at affordable prices; suppliers will want the company to continue purchasing their goods; the bank will want the company to maintain a good account, while lenders will want the company to pay its debts on time. Other external stakeholders include the government and community. The government is interested in the company paying its fair share of taxes, while the general community want the company to create jobs.

Finally, the company also has a responsibility to protect the environment through the careful use of scarce resources and by preventing environmental pollution.

The company often deals with its responsibility towards its stakeholders in its value statement.

Activity 14.2

Identify the stakeholders of a company.

Feedback on activity 14.2

The stakeholders of a company can be classified as internal or external stakeholders. Internal stakeholders are management, employees and owners. External stakeholders are customers, suppliers, banks, lenders, the government, the community and the environment.

14.3 RISK MANAGEMENT

In section 9.3, we discussed the relationship between risk and return. We defined business risk as the risk of the company failing. A financial risk component comes into play when the company makes use of borrowed funds to fund its assets. When financial managers must decide where to invest (e.g. in an asset like manufacturing equipment or the shares of another company) they will consider the risks attached to the investment and the possible return on the investment. When financial managers consider an investment in the shares of another company, they will perform a ratio analysis, amongst others, on the financial statements of that company and consider the risks of an investment in that company.

The management of any company has the responsibility of considering the risk of their own company failing. The King Report sets out several principles on the governance of risk, amongst others, that the board of directors *should delegate to management the responsibility to design, implement and monitor a risk management plan* and that the *board should ensure that risk assessments are performed on a continual basis*.

In section 14.1, we saw that senior management will create a strategic plan setting out the goals and objectives of the company and that operational managers will create operation plans setting out the strategies (activities) that will be undertaken in order to meet the objectives. The strategies set out in the operational plan reflect what the operational managers hope to achieve in the future. They cannot say with absolute certainty that all the strategies will materialise or that something may occur to prevent them from materialising as planned. Let's assume that one of the strategies in the operational plan is to launch a new product in order to meet the objective of sales revenue of R2 billion. However, what will happen if the new product is a dismal failure? There are always risks that may prevent a company from meeting its objectives. Therefore, it is important to identify potential risks during the planning stage so that the risks can be managed.

14.3.1 Types of risk

Some of the most common risks faced by a company are the following:

Strategic risk

Strategic risks are essentially those risks that the company may fail to achieve its business objectives. Strategic risks encompass both business risk (i.e. those risks relating to the products and services of the company) and non-business risks (e.g. financial risk).

Financial risk

Financial risk is the risk that the company's cash flows will not be sufficient to cover its financial obligations (e.g. interest, creditors payments and loan repayments). The more debt a company has, the higher the level of its financial risk.

Compliance risk

Compliance risk refers to the risk that the company may fail to comply with legislation that applies to it. Non-compliance may be unintentional, for example, when an Act is amended and the company is unaware of the amendment.

Operational risk

Operational risk relates to the day-to-day operations of the company, for example, a disruption in the production process due to equipment breakdown or load shedding, the loss of key personnel, lost sales because of products or service of poor quality, debtors not paying their accounts, etc.

Reputational risk

Reputational risk refers to the risk that the reputation of the company may be harmed. Consider, for example, the harm to the reputation of a motorcar manufacturer when it has to recall some of its models due to malfunctioning airbags.

14.3.2 Evaluating risk

Once potential risks have been identified, it is important to evaluate the probability of the risky event occurring as well as the impact that the occurrence of the risk may have on the company so that the risks can be managed appropriately. Usually, we enter each risk on a matrix (also referred to as a heat map) so that management can decide which risks they are prepared to take and which risks they must manage:

Impact → Probability ↓	Insignificant	Minor	Moderate	Critical	Catastrophic
Improbable	**d**	**d**	**c**	**b**	**b**
Unlikely	**d**	**d**	**c**	**b**	**a**
Moderate	**d**	**c**	**b**	**a**	**a**
Probable	**c**	**b**	**b**	**a**	**a**
Almost certain	**b**	**b**	**a**	**a**	**a**

Squares marked "a" indicate an unacceptable risk. These squares will usually be coloured red.
Squares marked "b" indicate a high risk. These squares will usually be coloured yellow.
Squares marked "c" indicate a medium risk. These squares will usually be coloured green.
Squares marked "d" indicate a low risk. These squares will usually be coloured blue.

14.3.3 Managing risk

Once management have identified and evaluated the risks, they must decide how to manage the risks. Risk management involves the following four options:

1 The risk can be *avoided* by reducing the probability of it occurring. For example, the risk that the external auditors may qualify their report on the financial statements because of a lack of financial reporting expertise in the finance department. The risk can be avoided by appointing a consultant to evaluate the financial statements before they are submitted for audit.

2 The risk can be *mitigated* by taking action to minimise the impact of the risk should it occur. For example, the impact of the risk of Eskom's load shedding can be minimised (mitigated) by installing a back-up generator.

3 The risk can be *transferred* by moving the impact of the risk to an external party when it occurs. For example, the financial impact of the risk that the factory can burn down can be transferred to an insurance company by taking out an insurance policy.

4 The risk can be *accepted* when management is prepared to accept the impact of the occurrence of the risk. This will usually be the case where the cost of mitigating or transferring the risk is higher than the impact of the risk, should it occur. For example, the risk that usual production may not be sufficient to meet seasonal demands – instead of employing more staff, management may decide to accept the risk and, should it occur, pay existing staff overtime to meet production demands.

Activity 14.3

Identify five common risks that companies face.

Feedback on activity 14.3

Five common risks that companies face are strategic, financial, compliance, operational and reputational risks.

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14.4 SELF-ASSESSMENT QUESTIONS

QUESTION 1

Carefully consider the following statements and indicate whether they are *true (t)* or *false (f)*:

1.1 A SWOT analysis means an analysis of the strengths, weaknesses, opportunities and talents of the company.

1.2 The mission statement defines the core purpose of the company.

1.3 The stakeholders of a company do not have a legitimate interest in the affairs of the company.

1.4 According to the King Report, the board of directors should appreciate that stakeholders' perceptions affect a company's reputation.

1.5 Compliance risk refers to the risk that the company may fail to comply with applicable laws.

1.6 The first step in creating a strategic plan is to do a SWOT analysis.

1.7 Opportunities and threats emanate from the industry, macro-economic and political environment.

1.8 Some conditions can be opportunities as well as strengths.

1.9 A risk is accepted when management is prepared to accept the impact of the occurrence of the risk.

1.10 Strategies that are developed to set the company apart from its competitors will focus on price and product.

QUESTION 2

This question consists of eight multiple-choice questions. Carefully read the information provided and select only the most correct option as your answer.

2.1 Long-term planning, where the focus is on economic and business issues facing the company, is referred to as … .

(a) operational planning
(b) strategic planning
(c) posh planning
(d) unnecessary planning

2.2 The logical first step in the planning process is to … .

(a) establish an action plan
(b) set goals and objectives
(c) allocate financial resources
(d) assess current conditions

2.3 Unisa's statement *The African University shaping futures in the service of humanity* is an example of a … .

(a) goal
(b) objective
(c) mission statement
(d) vision statement

2.4 The … management set the strategic objectives of the company.

(a) senior
(b) middle
(c) junior
(d) operational

2.5 Which of the following objectives set by a company would be the most difficult to measure?

(a) profitability objectives
(b) quality objectives
(c) financial objectives
(d) social responsibility objectives

2.6 A company realises that paper is a fire risk and installs smoke detectors and water sprinklers in its paper store. This is an example of a/an … risk.

(a) avoided
(b) mitigated
(c) transferred
(d) accepted

2.7 Risk evaluation attempts to assess each risk according to … .

(a) probability and likelihood
(b) probability and availability
(c) probability and impact
(d) probability and mitigation

2.8 All of the following, except … are external stakeholders of the company.

(a) shareholders
(b) government
(c) customers
(d) the environment

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14.5 SOLUTIONS TO SELF-ASSESSMENT QUESTIONS

QUESTION 1

1.1 F A SWOT analysis means an analysis of the strengths, weaknesses, opportunities and *threats* of the company.
1.2 T
1.3 F The stakeholders of a company *do* have a legitimate interest in the affairs of the company.
1.4 T
1.5 T
1.6 T
1.7 T
1.8 F Only external factors can be opportunities or threats, and only internal factors can be strengths or weaknesses.
1.9 T
1.10 T

QUESTION 2

2.1 (b)
2.2 (d)
2.3 (d)
2.4 (a)
2.5 (d)
2.6 (b)
2.7 (c)
2.8 (a)

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