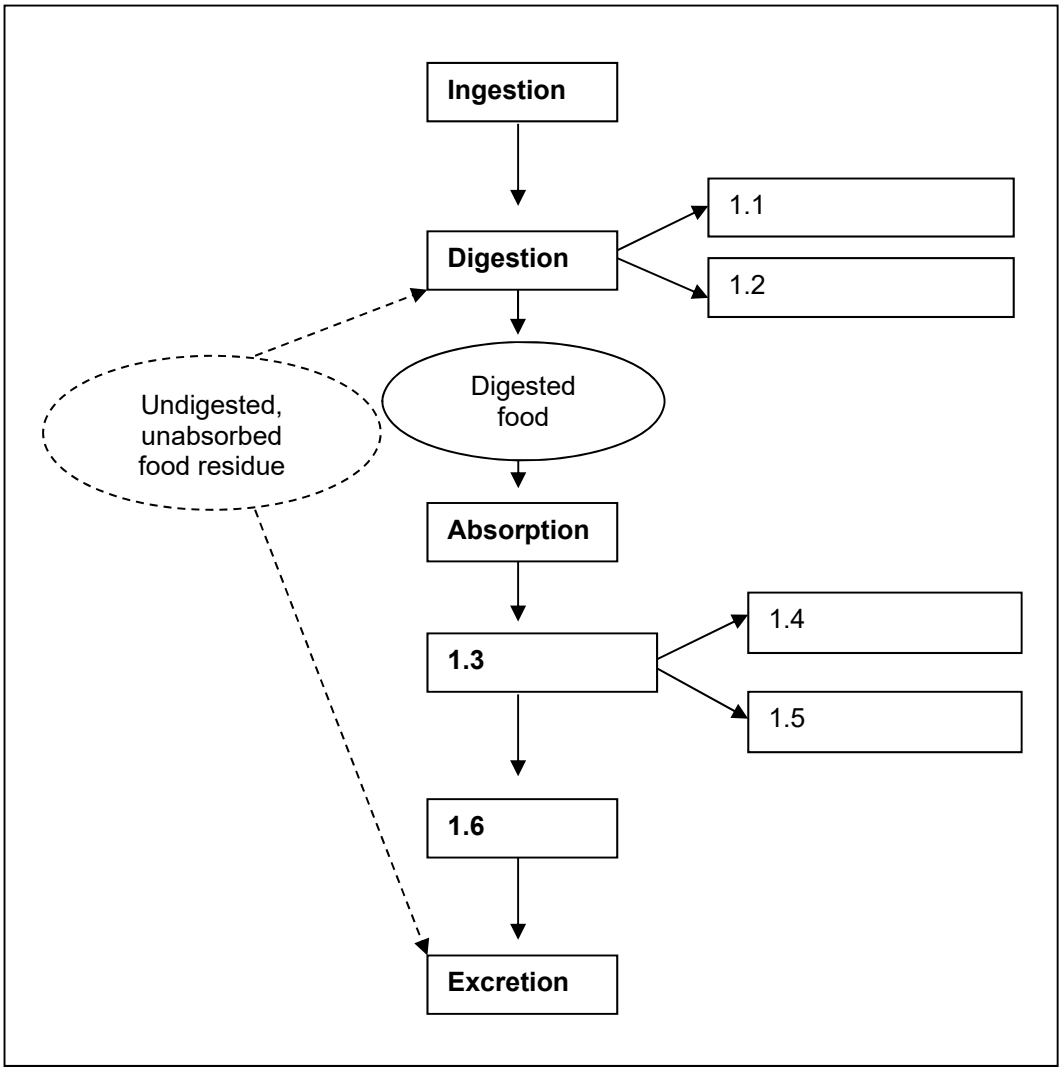
NUTRITIONAL CARE
NUT2601
SEMESTER 2

MEMORANDUM 4
2018

QUESTION 1 [54]

After reading through the relevant sections in the prescribed book, label the sections A-F in the following diagram. (6)



Answer:
1.1: Chemical digestion
1.2: Mechanical digestion (order of 1.1 and 1.2 does not matter)
1.3: Transportation
1.4: Vascular system
1.5: Lymphatic system (order of 1.4 and 1.5 does not matter)
1.6: Metabolism

1.7 Explain the form in which protein is excreted and describe how these products are formed. (4)

Students were expected to explain the following in full sentences:
Amino acid → deaminated to → ammonia (toxic) [1]→ liver removes ammonia from circulation [1] → liver convert it to ammonium (less toxic) → ammonium is converted to urea [1]→ urea is excreted by the kidney [1]

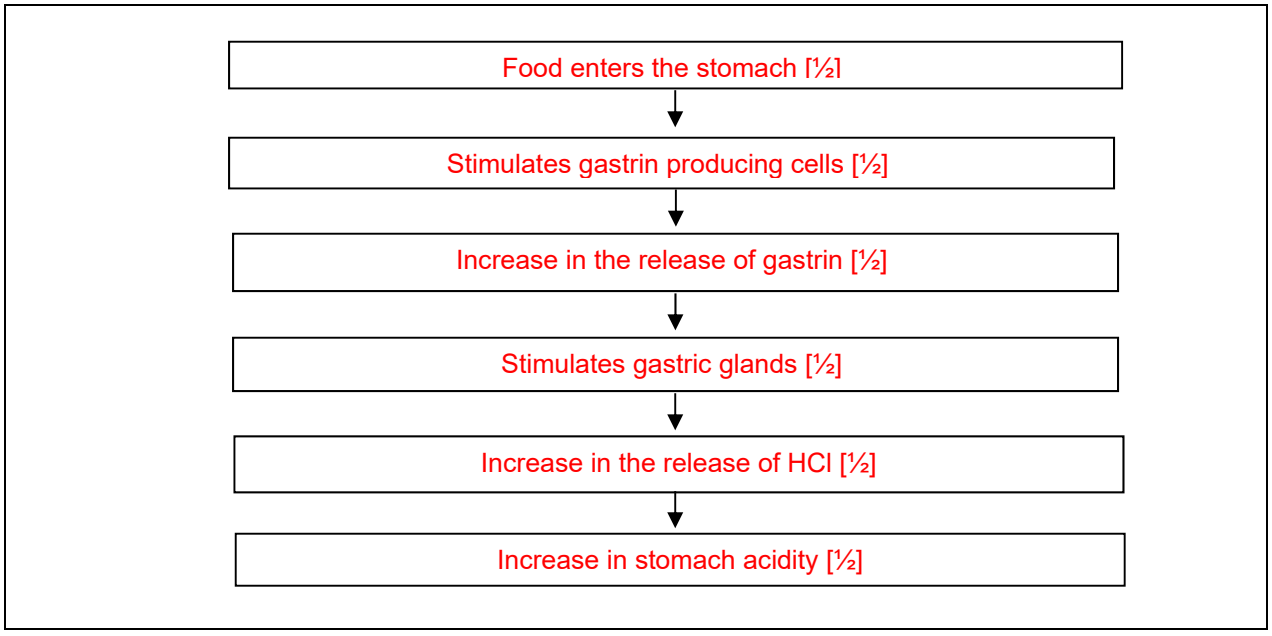
1.8 Explain how the fat in your diet would be metabolised and stored as fat in his body. (4)

Answer should be based on Rolfes et al., 2012: 144:
Students are only expected to a brief summary/ preview of lipid metabolism
Adipose cells store fat after meals when a heavy traffic of chyomicrons and VLDL loaded with TG passes by [1]. An enzyme lipoprotein lipase (LPL) hydrolyzes TG from lipoproteins, releasing fatty acids, diglycerides and monoglycerides that enters the adipose cells [1]. Inside the cells, other enzymes reassemble these lipids into TG from glycerol and fatty acids [1]. TG fill the adipose cells, storing a lot of energy in a relatively small space [1].

1.9 Draw a diagram to illustrate the hormonal regulation of the pH of the stomach.

6 x ½ = (3)

Answer:



1.10 Nutrients are absorbed and transported via the blood and lymph to all the body cells where it will be utilised for metabolic functions. What is the difference between the vascular and the lymphatic system? (4)

Answer:
The vascular system transports monosaccharides, aminoacids, water soluble vitamins and smaller lipids (glycerol, SCFA and MCFA) [1] and the nutrients are first transported to the liver before it goes to the heart [1]. The nutrients transported by the lymphatic system are larger fat molecules (monoglycerides and LCFA) [1] and fat soluble vitamins and the lymphatic system bypass the liver and go directly to the heart [1] (Rolfes et al, 2009: 83, 85 & 149).

1.11 Paula is overweight and complains of food cravings and wants to know why this happens. Explain to her what factors override the hunger and satiety signals? (6)

Answer should be based on the following:

- Mainly by cognitive influences such as the emotional state of an individual such as anxiety, boredom, happiness or stress
- Celebrations and special occasions
- Availability, site, smell and taste of food
- Response to external cues e.g. time of the day to eat (breakfast, lunch or supper)
- Environmental influences e.g. large portion sizes, favorite food, abundance or variety of food
- Disease conditions or eating disorders

(Rolfes et al, 2009: 251-252).

1.12 Explain to Paula how fat affects satiety. (1)

Answer:
When fat enters the small intestine it stimulates CCK release in the bloodstream which provides a strong satiety signal and inhibit food intake (Rolfes et al, 2009: 252).

1.13 What are the main function(s) of the hormone secretin and what stimulates its secretion? (2)

Answer:
The presence of chyme stimulates the cells of the duodenum wall to release the hormone secretin into the blood [1]. When secretin reaches the pancreas it stimulates the pancreas to release its bicarbonate juices [1].

1.14 Describe how monoglycerides and long-chain fatty acids are absorbed. (7)

Answer:

- Monoglycerides and fatty acids are emulsified by bile to form micelles.
- Emulsification enhances the solubility of monoglycerides and fatty acids in watery digestive enzymes such as pancreatic lipase so that it can be hydrolyzed into smaller molecules.
- Emulsification also allows movement of monoglycerides and fatty acids in the watery GIT lumen to the microvilli of the intestinal cell border.
- The content of micelles (monoglycerides and LCFA) diffuse into the intestinal cells and the bile salt are released and return to the lumen if the GIT.
- Inside the intestinal cells the lipid components is reassembled into triglycerides.
- The triglycerides together with other lipids (cholesterol and phospholipids) are packed into chylomicrons
- Chylomicrons are transported in the lymphatic system until it enters the blood stream.

1.15 Why do absorbed nutrients firstly go to the liver and not directly to the heart? (2)

Answer:
The liver prepares absorbed nutrients for use by the body [1] and it also defends the body against substances such as poison, viruses, drugs, alcohol and toxins that might be harmful especially to the heart and brain [1] (Rolfes *et al,* 2009: 84).

1.16 Explain what you understand by “facilitated diffusion of nutrients” and give an example of a nutrient that is transported in this way (4)

Answer:
It is when molecules move from a high concentration in the gastro-intestinal lumen to a low concentration in the gastro-intestinal cells [1]. The molecules move with the concentration gradient but require a specific membrane carrier protein to transport it across the cell membrane [1]. Therefore it can be said that the transport is facilitated by a membrane carrier protein. This type of transport doesn’t require energy [1]. The monosaccharide fructose and water soluble vitamins are absorbed this way [1]
(Rolfes *et al,* 2009: 81 & 108).

QUESTION 2: **[23]**

Mr Maponya is a 40 year old male, with a weight of 106 kg, a height of 1.82 m and a waist circumference of 135 cm

2.1. Calculate and interpret his body mass index. (3)

Answer:

BMI = kg/ $(m)^2$

= 106 / $(1.82m)^2$

= 106 (3.31) OR = 106/ (3.3124)

= 32.02 kg/m^2 [1] OR = 32 kg/m^2

Mr Maponya falls into Obesity class I [1] and is at moderate risk for developing chronic diseases of lifestyle [1]

2.2. Interpret Mr Maponya's waist circumference measurement. (2)

Answer:

>102 cm[1] indicating substantial risk [1]

2.3 You provide Mr Maponya dietary suggestions and as a result thereof, he tells you that he has lost 9 kg in the last three months. Calculate and interpret his percentage weight loss over three months. (3)

Answer:

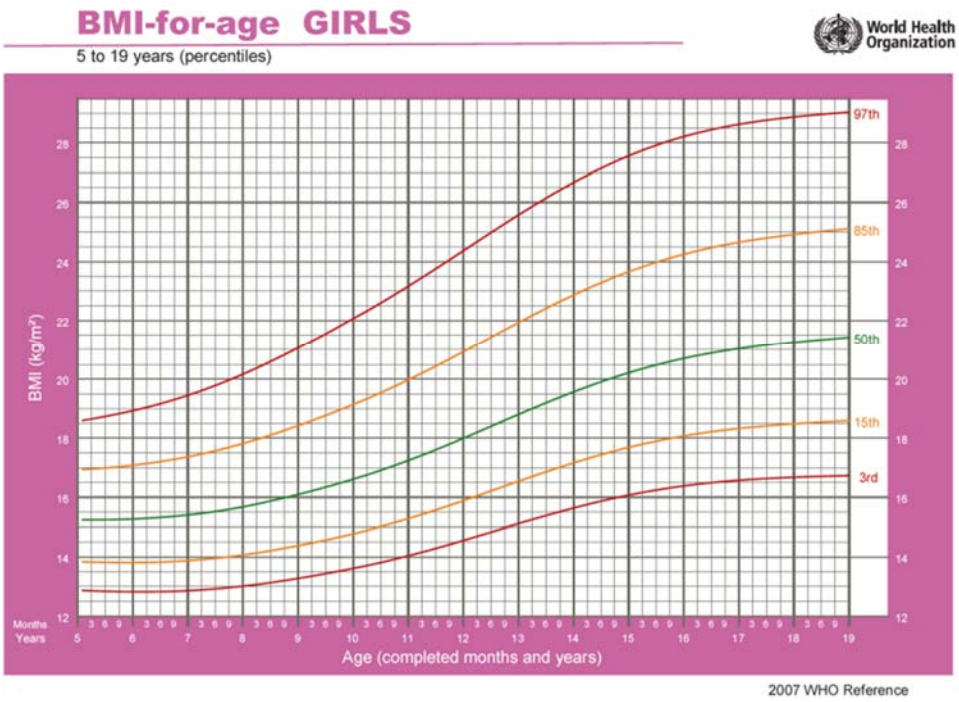
$$\% \text{ weight loss} = \frac{\text{usual weight} - \text{actual weight}}{\text{usual weight}} \times 100 \text{ [1]}$$

= [(106 kg – 97 kg) / 106 kg] x 100

= 8.49 % [1]

His weight loss is severe, since he has lost >7.5 % of weight in 3 months [1].

2.4. Thandi is Mr Maponya's 8 year old girl who weighs 40 kg and is 1.55 m tall. Calculate and interpret her BMI with the use of the relevant WHO growth chart (BMI-for-age) (3)



Answer:

BMI = kg/ $(m)^2$

= 40 / $(1.55m)^2$

= 16.65 kg/m^2

= 17kg/m^2 [1]

BMI-for-age: between 50^{th} and 85^{th} percentile [1]: Normal, but should be monitored [1]

2.5. Complete the shortened food frequency questionnaire (FFQ) of a family member or friend. Submit the FFQ as you recorded it. (2)

HINT: Use the FFQ form attached in Addendum C of this tutorial letter as a template. Use the guidelines in Addendum B in study guide 1 on how to conduct a successful interview to help you complete the questionnaire.

Answer:

Students were awarded 2 marks for showing attempt to complete the shortened QFFQ.

2.6. In practice the shortened FFQ should always be done together with a 24-hour recall. Therefore, conduct a 24-hour recall with the same family member or friend referred to in question 2.6. Submit the 24-hour recall as you recorded it. Note that negative marking will apply, which means that a mark will be deducted if you leave out important information. For example, when recording "bread" as the type of food consumed, a mark will be deducted if you do not state whether it is white, brown or whole-wheat bread or even if you do not state the number of slices. Use the 24-hour recall form attached in Addendum C of this tutorial letter as a template.

(10)

HINT: Use the tips on how to conduct a successful interview in addendum C of Study Guide 2 to assist you in conducting the interview and also refer to the section on 24-hour recalls on pages 543-544 of your textbook. Practice how to avoid asking leading or closed-ended questions.

Answer:

Example

24-Hour recall

Name: Mrs. Van der Merwe **Date:** 31 Januarie 2011
Age: 29 years **Weight:** 61kg **Height:** 1.64m
For which day of the week is this record? Wednesday
Is this a representation of a typical day? Yes/ No
(If not, give am example of what you would eat in a typical day)

Time	Amount	Food	Preparation
6:30	1 cup	Corn flakes	-
	100mL	Milk, full cream	-
	2 tsp	Sugar, white	-
	200mL	Orange Juice	-
10:15	2 (+/- 40g)	Ouma Rusks, White	-
	1 cup	Coffee	-
	50mL	Milk (in coffee), full cream	-
	2 tsp	Sugar, white	-
13:00	2 slices	Bread, white	-
	2 tsp	Margarine, brick	
	1	Egg	Fried, sunflower oil
	2 slices	Tomato	Fresh
18:00	2 (60g each)	Chicken thighs	Fried, olive oil
	6 (=/- 100g)	Potato wedges	Deep-fried, sunflower oil
	½ cup	Sweet carrots	Cooked with sugar & butter
	½ cup	Green salad	Fresh, no dressing
	20g	(Regular fat feta cheese in salad)	-
21:00	1 cup	Tea, Rooibos	-
	50mL	Milk, full cream	-
	2 tsp	Sugar, white	-

2.7. Differentiate between a sign and a symptom with the use of an example. (No marks will be awarded for examples provided in your Study guide). (4)

Answer from SG:

There is a **difference** between a **clinical sign** and a **symptom**. In medicine, a **symptom** is generally subjective while a **sign** is objective. Any objective evidence of a disease (e.g. a skin rash) can only be recognised by a doctor, a nurse, family members and the patient [1]. However, a subjective observation can only be detected or sensed by the patient and others can only know about it if the patient tells them [1].

For instance, fatigue is a symptom commonly associated with iron deficiency. However, because a clinician will generally not notice this, the patient must, therefore, report it – award 2 marks if students' example was correct and relevant

2.8 Explain the role biochemical and clinical measurements play in the nutrition assessment process. (6)

Answer:

Biochemical measurements are often used to assess the nutritional status beyond anthropometrical measurements, whereas, it seems that most of the information one can obtain through clinical assessment corresponds with the information one can obtain through historical information and anthropometric data as well [1].

A biochemical measurement involves a biological sample such as blood or urine being sent for laboratory analysis [1], in some cases, to analyse a specific nutrient or substance relating to the nutrient's function [1]. These measurements are essential to nutritional assessment because they can help diagnose a specific nutrient deficiency or excess [1].

What makes the clinical assessment unique is the fact that during such an assessment, the clinician will probably notice the visible signs of illness [1] such as a pale skin, which is a clinical sign of iron deficiency. Furthermore, clinicians may ask patients whether they are experiencing anything unusual in their health – in other words whether they are experiencing any symptoms of a disease or malnutrition [1].

QUESTION 3: **[54]**

3.1 At lunch time Mrs Hlabisa is having a whole-wheat roll with margarine, cold ham, salad and a glass of milk. Re-draw and complete the following table (grey blocks) in order to determine the macronutrient and energy content of what she is consuming. (12)

Food	Size	Exchanges	CHO (g)	Prot (g)	Fat (g)	Energy (kJ)
1 whole wheat bread roll	60g	2			-	
margarine	5g		-	-	5	
Cold ham	30g	1		7	3	
Mixed salad	1 cup			2	-	
Full cream milk	125ml		6	4		320

Answer:

Food	Size	Exchanges	CHO (g)	Prot (g)	Fat (g)	Energy (kJ)
1 whole wheat bread roll	60g	2	30	4	-	560
margarine	5g	1	-	-	5	190
Cold ham	30g	1	-	7	3	230
Mixed salad	1 cup	1	5	2	-	120
Full cream milk	125ml	½	6	4	4	320

You take a diet history from Mr Maponya and this shows that his diet is currently providing 9195kJ and is made up of 375g carbohydrates, 72g protein and 42g fat.

3.2 Calculate the energy distribution of Mr Maponya's diet and show all calculations. (6)

Answer:
Carbohydrates = 375g x 17kJ = 6375kJ from CHO [1]
Protein = 72g x 17kJ = 1224kJ from protein [1]
Fat = 42g x 38kJ = 1596kJ from fat [1]

Carbohydrates = 6375kJ/9195kJ x 100 = 69.33% → **69%** [1]
Protein = 1224kJ/9195kJ x 100 = 13.31% → **13%** [1]
Fat = 1596kJ/9195kJ x 100 = 17.36% → **17%** [1]

3.3 Based on your answer from question 1.4.1, interpret the macronutrient distribution by comparing each nutrient's energy distribution to the Acceptable Macronutrient Distribution Ranges (AMDR) and then make recommendations to Mr Maponya accordingly. (6)

Answer:
Carbohydrate: AMDR: 45-65%, CHO is too high as Mr. Maponya's CHO intake is 69% [1],
Recommendation: decrease CHO intake, but choose complex, wholegrain CHO which are high in fiber instead of refined CHO. Ensure that fruit and vegetable intake is adequate. [1]

Protein: AMDR: 10-35%, protein intake is adequate but almost low, since his protein intake is 13% [1].
Recommendation: should assure that his diet supplies high quality protein by including foods such as milk, lean meat, chicken and fish in his diet, but he should increase the portion sizes and number of portions of foods rich in proteins. [1]

Fat: AMDR: 20-35%, fat intake too low since his fat intake is 17% [1].
Recommendation: With the reduction of the CHO intake the fat intake should be increased slightly. He should focus on reducing SFA and TFA intake and choose food items rich in PUFAs and MUFAs instead [1].

3.4 Which aspects of the guideline "enjoy a variety of food" make it difficult to implement? (3)

Answer:

- Not all people in South Africa (SA) have access to food all times and because of this high levels of food insecurity people in SA find it difficult to include a variety of food from the various food groups in their diet [1].
- Increased dietary variety might be misinterpreted which can lead to increased intake of unhealthy and processed foods [1]
- Increased dietary variety can lead to increased energy intake which can lead to development of obesity and chronic lifestyle diseases [1]

3.5. Name three of the health benefits of regular fish intake. (4)

Answer: (any 3)

- Increase HDL cholesterol concentrations [1];
- reduce TG concentrations [1];
- decrease risk for CVD and atherosclerosis [1];
- prevent thrombosis; prevent hypertension [1];
- prevent autoimmune disease and allergic problems; [1]
- protect against several cancers [1] (Scholtz *et al*, 2001: S44).

3.6. Summarise the possible anticarcinogenic mechanisms of action of substances in vegetables and fruits (8)

Any 8:

- Anti-oxidant effects
- Effects on cell differentiation
- Increased activity of enzymes that detosify carcinogens
- Inhibition of formation of cnitrosamines
- Altered oestrogen metabolism
- Binding and dilution of carcinogens in the digestive tract
- Altered colonic milieu (including bacterial flora, bile acid composition, pH, faecal bulk)
- Preserved integrity of intraceullular matrices
- Effects on DNAmethylation
- Maintenance of normal DNA repair
- Increased apoptosis of cancer cells

3.7. Give four (4) practical recommendations on how people can increase their fruit and vegetable intake. (4)

Answer: (any 4)

- Eat vegetables in at least one or two mixed meals a day. Fruit can be eaten with meals, or as a snack between meals.
- Vegetables should be eaten every day, and not only on weekends.
- Everyone should have one unit of vegetable or fruit a day that provides beta carotene (which becomes vitamin A in the body). Examples are carrots, pumpkin, butternut, spinach, *imifino*, mango, pawpaw, yellow peaches and nectarines. (Note: oranges and cabbage do not contain beta carotene).
- Prepare vegetables and fruit with little (if any) added fat, sugar and salt. Vegetables with beta carotene should be lightly boiled and served in a meal that has fat, or else have a little oil added.
- Make soup from fresh vegetables instead of using packet soup; this will be nutritious and low in salt.

3.8 The Dietary Reference Intakes (DRIs) contain four reference values. Write out the abbreviation of and explain the difference between the following 2 DRIs: EAR and the AI. (4)

Answer:

The EAR is the Estimated Average Requirement [1] and is used to examine the likelihood that intake is adequate in a population [1].

The AI is the Adequate Intake [1] and is used to examine the likelihood that intake is adequate when no RDS is set for a nutrient [1].

3.9 Indicate whether the following statements are true or false. For each answer of "**false**", you need to explain **why** the statement is incorrect. (7)

3.9.1. The DRIs only consist of three reference values, including: EAR, RDA and AI
3.9.2. DRIs are ideal for direct use by the consumer.
3.9.3. DRIs are used to set guidelines for the formulation of new food products.
3.9.4 The DRI for folate if a woman is pregnant is 400mcg/day

3.9.1. False [1], DRIs consist of four reference values, including: EAR, RDA, AI and UL [1]
3.9.2. False [1], DRIs are TOO COMPLEX for direct use by consumers [1]
3.9.3. True [1]
3.9.4. False [1], 600mcg per day [1]

TOTAL MARKS: [130]