# BASIC NUMERACY BNU1501

## ASSIGNMENT 2 POSSIBLE SOLUTIONS-SEMESTER 1/2018

**Question 1**

Perimeter of any given shape is the total distance around the boundaries or edges of that shape.

Of all the sides of the given shape, only the perimeter (or circumference) of the semi-circle BC needs to be calculated. The other sides are given.

Perimeter of semi-circle BC is given by:

$\boldsymbol{C = \frac{1}{2} \times 2\pi r}$, where $\boldsymbol{r}$ is the radius of the semi-circle

$$C = \frac{1}{2} \times 2 \times \pi \times 9 = 28.2743$$

Total perimeter is therefore:

$$P = AB + BC + CD + DE + EA = 12 + 28.2743 + 12 + 16.1 + 8.1$$

$\boldsymbol{P = 76.4743 = 76.47cm}$ to 2 decimal digits **[3]**

**Question 2**

$$Area\ of\ shaded\ region = Area\ of\ triangle\ AED + Area\ of\ rectangle\ ABCD - Area\ of\ semi - circle\ BC$$

$$= \left(\boldsymbol{\frac{1}{2} \times base \times height}\right) + (\boldsymbol{length \times width}) - \left(\boldsymbol{\frac{1}{2} \times \pi r^2}\right)$$

$$= \left(\frac{1}{2} \times 18 \times 6\right) + (18 \times 12) - \left(\frac{1}{2} \times \pi \times 9^2\right)$$

$$= \boldsymbol{54 + 216 - 127.2345 = 142.7655 = 142.77cm^2} \quad \textbf{[2]}$$



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**Question 3**

$Volume\ of\ water = Volume\ of\ rectangular\ container - Volume\ of\ 12\ cans$

$= (\boldsymbol{length} \times \boldsymbol{breadth} \times \boldsymbol{height}) - (\mathbf{12} \times \boldsymbol{\pi r^2 h})$

$= (40 \times 30 \times 10) - (12 \times \pi \times 5^2 \times 10)$

$= 12\,000 - 9\,424.777961 = 2\,575.222 cm^3$

Convert the volume to litres by dividing by 1 000 since

$1\ litre = 1\,000 cm^3$

$\boldsymbol{Capacity\ of\ water = \frac{2\,575.222}{1\,000} = 2.575\ l = 2.58\ l}$ **[4]**

**Question 4**

$\boldsymbol{Change\ in\ volume\ in\ the\ tank = Volume\ of\ cylindrical\ piece}$

Assume that the volume in tank rises by a height of ***x*** after the cylindrical piece has been dropped.

$Change\ in\ volume = length \times breadth \times height = 25 \times 20 \times x = 500x$

$Volume\ of\ cylinder = \pi r^2 h = \pi \times 3^2 \times 10 = 90\pi$

But

$Change\ in\ volume\ in\ the\ tank = Volume\ of\ cylindrical\ piece$

Thus

$500x = 90\pi$

$\boldsymbol{x = \frac{90\pi}{500} = 0.5655\ cm = 0.57\ cm}$ **[1]**



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**Question 5**

Total area to be sealed is given by:

$$\boldsymbol{A = Area\ of\ curved\ sides + Area\ of\ circular\ floor}$$

$$A = (2\pi r \times depth) + (\pi r^2)$$

$$A = 2 \times \pi \times 1.5 \times 1.5) + (\pi \times 1.5^2)$$

$$\boldsymbol{A = 14.13717 + 7.06858 = 21.2\ m^2}$$

If 1 litre covers 3 sq. metres, find how many litres are required to ***complete*** the job.

$$\boldsymbol{Number\ of\ litres\ required = \frac{21.2\ m^2}{3\ m^2/litre} = 7.067\ litres}$$

Given that the sealer comes in two-litre tins, find how many of these are required to complete the sealing job.

$$\boldsymbol{Number\ of\ two-litre\ tins\ required = \frac{7.067}{2} = 3.53\ tins}$$

Therefore 4 tins have to be purchased to complete the job. **[4]**

**Question 6**

Area of shaded region is given by:

$$\boldsymbol{A = Area\ of\ circle - Area\ of\ triangle}$$

The base and height of the triangle are equal to the radius of the circle of 40 mm.

Since the area is required in square centimetres, convert the millimetres to centimetres before calculating the area.

$$\boldsymbol{A = (\pi r^2) - (\frac{1}{2}bh)}$$

$$A = (\pi \times 4^2) - \left(\frac{1}{2} \times 4 \times 4\right)$$

$$\boldsymbol{A = 16\pi - 8 = 42.265 = 42.3\ cm^2}$$ **[3]**

**Question 7**

Solve the following equation

$$\boldsymbol{2(2y-1)-3y=4-y}$$

Remove brackets and group like terms.

$4y-2-3y=4-y$

$4y-3y+y=4+2$

$2y=6$

$\frac{2y}{2}=\frac{6}{2}$

$\boldsymbol{y=3}$ **[2]**

**Question 8**

Solve for x in the following equation

$$\boldsymbol{\frac{2x}{5}-\frac{1}{2}=\frac{x}{5}}$$

Remove fractions by multiplying every term by the LCM of 2 and 5 which is 10.

$10\left(\frac{2x}{5}\right)-10\left(\frac{1}{2}\right)=10\left(\frac{x}{5}\right)$

$2(2x)-5(1)=2(x)$

$4x-5=2x$

$4x-2x=5$

$2x=5$

$\frac{2x}{2}=\frac{5}{2}$

$\boldsymbol{x=2\frac{1}{2}}$ **[1]**

**Question 9**

If $\boldsymbol{F = \frac{9}{5}C + 32}$, make $\boldsymbol{C}$ the subject of the formula.

Start by removing fractions by multiplying every term by 5.

$$5(F) = 5\left(\frac{9}{5}C\right) + 5(32)$$

$$5F = 9C + 160$$

Isolate the term with the subject, *C*.

$$5F - 160 = 9C$$

$$\frac{5F - 160}{9} = \frac{9C}{9}$$

$$\frac{5F - 160}{9} = C$$

Express as separate fractions.

$\boldsymbol{C = \frac{5}{9}F - \frac{160}{9}}$ **[3]**

**Question 10**

If $V = l \times b \times h$, make *h* the subject of the formula.

$$V = l \times b \times h$$

$$\frac{V}{l \times b} = \frac{l \times b \times h}{l \times b}$$

$$\frac{V}{l \times b} = h$$

$\boldsymbol{h = \frac{V}{l \times b}}$ **[2]**

**Question 11**

Determine the equation of the straight line that passes through points (3; -2) and (5; -6)

Equation of straight line is given by:

$\boldsymbol{y - y_1 = m(x - x_1)}$ where $\boldsymbol{m = slope = \frac{y_2 - y_1}{x_2 - x_1}}$

$$m = \frac{-6 - (-2)}{5 - 3} = \frac{-4}{2} = -2$$

Therefore the equation of the straight line is

$$y - (-2) = -2(x - 3)$$

$$y + 2 = -2x + 6$$

$$y = -2x + 6 - 2$$

$$\boldsymbol{y = -2x + 4} \qquad \textbf{[4]}$$

**Question 12**

P = 8 350

S = 12 859

t = 6

r = ?

$$S = P(1 + rt)$$

Make *r* the subject in the above formula.

$$S = P + Prt$$

$$S - P = Prt$$

$$\frac{S - P}{Pt} = \frac{Prt}{Pt}$$

$$\boldsymbol{\frac{S-P}{Pt} = r = \frac{12\,859 - 8\,350}{8\,350 \times 6} = 0.09 = 9\%} \qquad \textbf{[1]}$$

**Question 13**

S = 10 000

t = 8/12

r = 9.75% = 0.0975

P = ?

$S = P(1 + rt)$

$$\frac{S}{(1+rt)} = \frac{P(1+rt)}{(1+rt)}$$

$$\frac{S}{1+rt} = P = \frac{10\,000}{1+0.0975\times\frac{8}{12}} = R9\,389.67 \qquad \textbf{[1]}$$

**Question 14**

P/Y = 4

FV = 20 000

I/Y = 15

N = 3 x P/Y = 12

PV = ?

The last computation for N can be avoided by using the xP/Y key on the financial calculator. For the sake of those who will be using formulas I will pre-multiply the number of years by the P/Y value on the given information, but on the actual computation I will employ the xP/Y key.

2ndF CA

2ndF P/Y 4 ENT ON/C

+/- 20 000 FV

15 I/Y

3 2ndF xP/Y N

COMP PV: **PV = R12 857.98 = R12 858 to the nearest rand.** **[2]**

**Question 15**

P/Y = 4

PMT = 2 000

I/Y = 18

N = 10 x 4 = 40

PV = ?

2ndF CA

2ndF P/Y 4 ENT ON/C

+/-2 000 PMT

18 I/Y

10 2ndF xP/Y N

COMP PV:

**PV = R36 803.17 = R36 803 to the nearest rand. [3]**

**Question 16**

P/Y = 12

PV = 125 000 – 15% = 106 250

I/Y = 12.5

N = 6 x 12 = 72

PMT =?

2ndF CA

2ndF P/Y 12 ENT ON/C

+/-106 250 PV

12.5 I/Y

6 2ndF xP/Y N

COMP PMT

**PMT = R2 104.94 [2]**

**Question 17**

Without clearing the calculation for Q16 from the financial calculator and bearing in mind that after 3 years, Sam has actually made (3 x 12 = 36) payments.

| KEY | SCREEN DISPLAY |
|---|---|
| AMRT | AMRT P1 = 1.00 |
| DOWN ARROW | AMRT P2 = 1.00 |
| 36 ENT | AMRT P2 = 36.00 |
| DOWN ARROW | **BALANCE = - 62 920.99** |

Ignore the sign and choose the closest answer which is R62 921.07 **[3]**

**Question 18**

Draw up an amortisation schedule for the given options and draw the appropriate conclusion thereof.

| **Payment made (monthly period)** | **Outstanding principal (Balance in rand)** | **Interest (rand)** | **Payment (rand)** | **Principal repaid (rand)** |
|---|---|---|---|---|
| 1 | 106 250.00 | 1 106.77 | 2 104.94 | 998.17 |
| 6 | 100 102.84 | 1 053.69 | 2 104.94 | 1 051.25 |
| **7** | **99 040.64** | **1 042.74** | **2 104.94** | **1 062.20** |
| 12 | 93 561.33 | 986.25 | 2 104.94 | 1 118.69 |
| 36 | 62 920.99 | 670.37 | 2 104.94 | 1 434.57 |

According to the above table, the principal repaid will for the first time be more than the principal from the 7$^{th}$ month. Month 6 has also been included in the table for verification purposes. **[2]**

**Question 19**

P/Y = 12

PV = 106 250

PMT = 2 500

I/Y = 12.5

N =?

2ndF CA

2ndF P/Y 12 ENT ON/C

+/-106 250 PV

2 500 PMT

12.5 I/Y

COMP N

N = 56.42 monthly payments

**Therefore, number of years is given by** $\frac{N}{P/Y} = \frac{56.42}{12} = 4.70\ years$ **[1]**

**Question 20**

P/Y = 52

PMT = 500

I/Y = 8

N = 9 x 52 = 468

FV =?

2ndF CA

+/-500 PMT

8 I/Y

9 2ndF xP/Y N

COMP FV

**FV = R342 321.48** **[4]**

***For queries please contact 083 427 5621 or 081 215 3817***



***E & OE***