2015 BECE MATHEMATICS 2 SOLUTION
MATHEMATICS 2

1. **(a)** Product of 2.5 and 7.5

$= 2.5 \times 7.5$

$= \frac{25}{10} \times \frac{75}{10}$

$= \frac{1875}{100}$

$= 18.75$

Sum of 2.75 and 9.55

=
$$\begin{array}{r} 2.75 \\ +\ \underline{9.55} \\ \underline{12.30} \end{array}$$

Difference between 18.75 and 12.30

=
$$\begin{array}{r} 18.75 \\ -\ \underline{12.30} \\ \underline{\mathbf{6.45}} \end{array}$$

(b) Solving $\frac{3x+2}{3} - \frac{3-x}{8} = \frac{1}{6}$

$\Rightarrow \quad 24\left(\frac{3x+2}{3}\right) - 24\left(\frac{3-x}{8}\right) = 24\left(\frac{1}{6}\right)$

$\Rightarrow \quad 8(3x+2) - 3(3-x) = 4(1)$

$\Rightarrow \quad 24x + 16 - 9 + 3x = 4$

$\Rightarrow \quad 24x + 3x = 4 - 16 + 9$

$\Rightarrow \quad 27x = -3$

$\Rightarrow \quad \frac{27x}{27} = \frac{-3}{27}$

$\Rightarrow \quad \boldsymbol{x = -\frac{1}{9}}$

(c) Volume of container = length × width × height

= 24m × 9m × 8m

= 2400cm × 900cm × 800cm

= <u>1728000000 cm^3</u>

Volume of each book = 20 cm × 16 cm × 6 cm

= 320 cm^2 × 6 cm

= <u>1920 cm^3</u>

No. of books the container can hold = $\frac{Volume\ of\ container}{Volume\ of\ each\ book}$

$= \frac{1728000000\ cm^3}{1920\ cm^3}$

= **900,000 books**

2. **(a)** **(i)** **No.of questions Ama answered correctly out of first 40 questions**

= 75% of first 40 questions

$= \frac{75}{100} \times 40$

$= \frac{75 \times 4}{10}$

= <u>30 questions</u>

(ii) To score 80% in the test, then she needs to answer

= 80% × 90 questions

$= \frac{80}{100} \times 90$

= 8 × 9

= <u>72 questions correctly</u>

(iii) No. of questions she must answer correctly in the remaining 50 questions

= 72 – 30 questions

= 42 questions

Percentage of 42 out of 50 questions

$= \frac{42}{50} \times 100\%$

= 42 × 2%

= <u>84%</u>

(b) Sum of interior angles of a pentagon (5-sided polygon)

= (n – 2) × 180° , where n = no.of sides

= (5 – 2) × 180° [n = 5 sides]

= 3 × 180°

= <u>540°</u>

Let size of smaller missing angle = x

then, size of bigger missing angle = $3x$

Now, if sum of interior angles = 540°,

⇒ $100° + 120° + 108° + x + 3x = 540°$

⇒ $328° + 4x = 540°$

⇒ $4x = 540° - 328°$

⇒ $4x = 212°$

⇒ $x = \frac{212}{4}$

⇒ $x = 53°$

Hence, the other missing angle = $3x$

= 3 × 53°

= 159°

The sizes of the two remaining interior angles = <u>53° and 159°</u>

3. **(a)** **(i)** If **q – p** = $\begin{pmatrix} 12 \\ 9 \end{pmatrix}$

Then, $\begin{pmatrix} x \\ y \end{pmatrix} - \begin{pmatrix} 2 \\ 2 \end{pmatrix} = \begin{pmatrix} 12 \\ 9 \end{pmatrix}$

⇒ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 12 \\ 9 \end{pmatrix} + \begin{pmatrix} 2 \\ 2 \end{pmatrix}$

⇒ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 12+2 \\ 9+2 \end{pmatrix}$

$\Rightarrow \quad \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 14 \\ 11 \end{pmatrix}$

$\Rightarrow \mathbf{q} = \begin{pmatrix} \mathbf{14} \\ \mathbf{11} \end{pmatrix}$

(ii) Magnitude of vector **q** – **p**

= magnitude of $\begin{pmatrix} 12 \\ 9 \end{pmatrix}$

$= \sqrt{12^2 + 9^2}$

$= \sqrt{144 + 81}$

$= \sqrt{225}$

= 15 units

(b) (i) Since |AB| = |AC|

⇒ angle ABC = angle ACB [Base angles of isosceles triangle equal]

Let angle ABC = angle ACB = y

Then, $y + y + 50° = 180°$ [interior angles of a triangle =180°]

$\Rightarrow 2y = 180° - 50°$

$\Rightarrow 2y = 130°$

$\Rightarrow y = \frac{130}{2}$

$\Rightarrow y = 65°$

Now, $65° + (7x - 25°) = 180°$ [angles at a point on a straight line=180°]

$\Rightarrow 7x + 65° - 25° = 180°$

$\Rightarrow 7x + 40 = 180°$

$\Rightarrow 7x = 180° - 40°$

$\Rightarrow 7x = 140°$

$\Rightarrow x = \frac{140°}{7}$

$\Rightarrow x = 20°$

(ii) Angle DAC $+ 7x - 25° + 30° = 180°$ [interior angles of a triangle =180°]

Let angle DAC = a

$\Rightarrow a + 7x - 25° + 30° = 180°$

$\Rightarrow a + 7(20°) - 25° + 30° = 180°$

$\Rightarrow a + 140° - 25° + 30° = 180°$

$\Rightarrow a + 115° + 30° = 180°$

$\Rightarrow a + 145° = 180°$

$\Rightarrow a = 180° - 145°$

$\Rightarrow a = 35°$

⇒ **angle DAC** = 35°

(iii) **angle BAD** = angle BAC + angle DAC

= 50° + 35°

= 85°

4. **(a)** **(i)** If (VAT) 15% → GH¢ 90.00

Then (Original price) 100% → ? (more)

If more, less (15%) divides, hence

$$= \frac{100\%}{15\%} \times GHc\ 90$$

$= \quad 100 \times \text{GHc } 6$

$= \quad \text{GHc } 600$

Original price $= \quad \underline{\text{GHc } 600.00}$

(ii) Total amount paid $=$ Original price $+$ VAT

$=$ GHc 600.00 $+$ GHc 90.00

$= \quad \underline{\text{GHc } 690.00}$

(b) If the average of 8 no.s: 5, 7, 2, 6, x, (x+1), 7 and 4 = 5, then

$$\Rightarrow \quad \frac{5+7+2+6+x+x+1+7+4}{8} = 5$$

$$\Rightarrow \quad \frac{32+2x}{8} = 5$$

$$\Rightarrow \quad 8\left(\frac{32+2x}{8}\right) = 8\,(5)$$

$$\Rightarrow \quad 32 + 2x = 40$$

$$\Rightarrow \quad 2x = 40 - 32$$

$$\Rightarrow \quad 2x = 8$$

$$\Rightarrow \quad x = 8/2$$

$$\Rightarrow \quad \underline{\underline{x = 4}}$$

(c) Simplification of $\boldsymbol{\frac{mn+mp+nq+pq}{n+p}}$

$$= \frac{m(n+p)+q(n+p)}{n+p}$$

$$= \frac{(n+p)(m+q)}{n+p}$$

$$= \frac{\cancel{(n+p)}(m+q)}{\cancel{n+p}}$$

$$= \underline{\underline{m + q}}$$

5. **(a)** **(i)** h = 90cm, d = 14 cm,

$\Rightarrow$ r = 14cm÷2

r = 7cm

Total Surface Area of closed cylinder

$= \quad 2\pi r^2 + 2\pi rh$, where r = radius, h = height

$$= \left(2 \times \frac{22}{7} \times 7 \times 7\right) + \left(2 \times \frac{22}{7} \times 7 \times 90\right)$$

$= \quad (2 \times 22 \times 7) + (2 \times 22 \times 90)$

$= \quad 308 + 3960$

$= \quad \underline{\underline{4268 \text{ cm}^2}}$

(ii) **Volume of cylinder**

$= \quad \pi r^2 h$, where r = radius, h = height

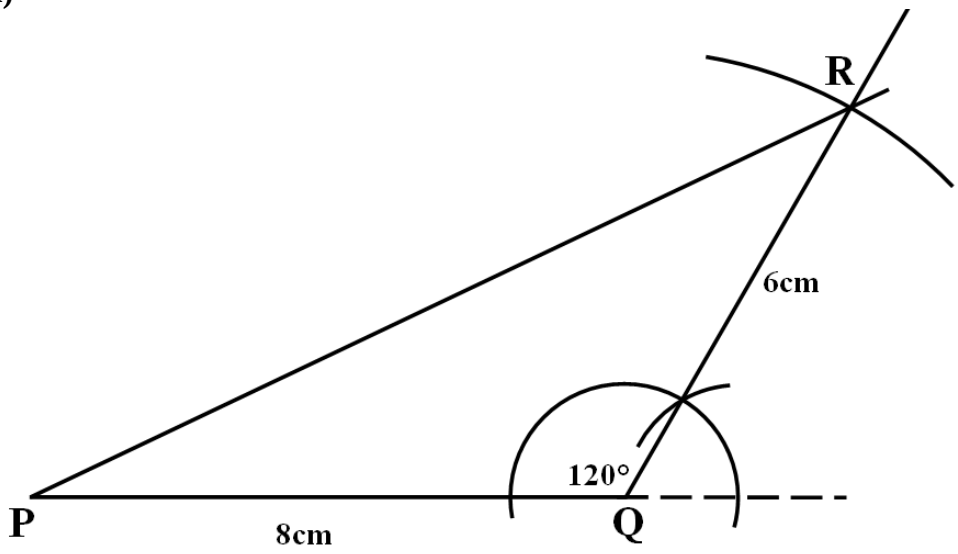
$= \frac{22}{7} \times 7 \times 7 \times 90$

$= 22 \times 7 \times 90$

$= 154 \times 90$

$= \underline{\underline{13860\ cm^3}}$

(b) (i)



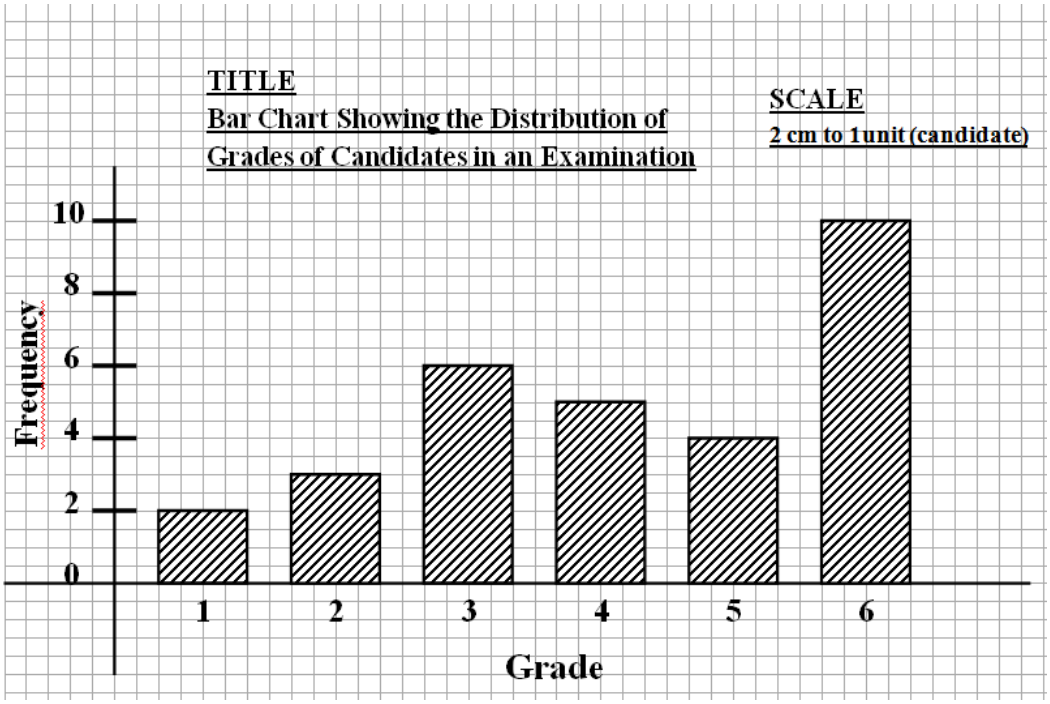
(ii) Measure:

(α) |PR| = 12.1 cm (± 0.1cm)

(β) angle QPR = 25° (± 1°)

6. (a) Bar chart for the frequency distribution table below

Grade	1	2	3	4	5	6
Frequency	2	3	6	5	4	10



(b) **Number of candidates who obtained credit** (grades above grade 3 for the distribution)

= Frequencies of Grade 1 and Grade 2

= 2 + 3

= 5

Total number of candidates = 2 + 3 + 6 + 5 + 4 + 10

= 30

Probability of selecting a candidate who obtained credit

$$= \frac{No.of\ candidates\ who\ obtained\ credit}{Total\ no.of\ candidates}$$

$$= \frac{5}{30} = \frac{1}{6}$$

(c) **Mean grade** $= \frac{Sum\ of\ all\ grades}{Total\ no.\ of\ candidates}$

$$= \frac{(1\times2)+(2\times3)+(3\times6)+(4\times5)+(5\times4)+(6\times10)}{2+3+6+5+4+10}$$

$$= \frac{2+6+18+20+20+60}{2+3+6+5+4+10}$$

$$= \frac{126}{30} = \frac{42}{10} = 4\frac{2}{10}$$

$$= 4\frac{1}{5} \text{ or } 4.2$$

$\approx \underline{\underline{4}}$ (to nearest whole number)