

**2023 MAY MATHEMATICS**  
**SECTION A**  
**OBJECTIVE TEST**  
**[40 MARKS]**

|     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1D  | 2A  | 3D  | 4A  | 5B  | 6C  | 7B  | 8A  | 9C  | 10D |
| 11B | 12D | 13A | 14C | 15A | 16D | 17B | 18B | 19A | 20A |
| 21A | 22C | 23B | 24D | 25B | 26C | 27C | 28B | 29D | 30D |
| 31C | 33C | 33B | 34D | 35D | 36D | 37C | 38D | 39B | 40A |

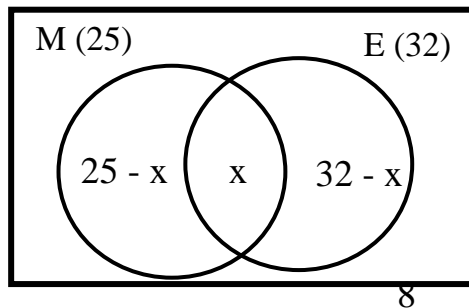
**SECTION B**  
**[60 MARKS]**

**SOLUTION**

1. a) i) Let  $U = \{\text{Total number of pupils in the class}\} = 47$   
 $M = \{\text{Pupils who study Mathematics}\} = 25$   
 $E = \{\text{those who study English}\} = 32$

$$M \cap E = x$$

$$U = 47$$



**B2 (1/2 mark for each region)**

- ii)  $25 - x + x + 32 - x + 8 = 47$     **M1**  
 $65 - x = 47$     **M1**  
 $65 - 47 = x$   
 $x = 18$     **M1**

Those who study one subject =  $(25 - x) + (32 - x)$   
 $(25 - 18) + (32 - 18)$     **M1**  
 $7 + 14 = 21$     **A1**

- b)  $\frac{2a}{3} - \frac{a-b}{2}$   
 $\frac{2(a)-3(a-b)}{6}$     **M1**  
 $\frac{4a-3a+3b}{6}$     **M1**

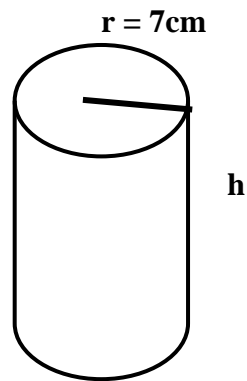
$$\frac{a+3b}{6} \quad \text{A2}$$

1. c)  $(2y + 60) + (3y + 40) + (y - 40) = 360$  M1  
 (sum of angle at a point is 360)  
 $2y + 3y + y + 60 + 40 - 40 = 360$   
 $6y + 60 = 360$  M1  
 $6y = 360 - 60$   
 $\frac{6y}{6} = \frac{300}{6}$   
 $y = 50^\circ$  A1

2. a)  $\frac{7.54 \times 4.8}{0.12}$   
 $\frac{754 \times 10^{-2} \times 48 \times 10^{-1}}{12 \times 10^{-2}}$  M1 (divided 48 by 12)  
 $754 \times 4 \times 10^{-2} \times 10^{-1} \times 10^2$  M1 (add exponent)  
 $3016 \times 10^{-1}$  M1  
 $3.016 \times 10^3 \times 10^{-1}$  M1 (add exponent)

b)  $2ap + aq - bq + 2bp$   
 $(2ap + aq) - (bq - 2bp)$  M1  
 $a(2p + q) - b(q - 2p)$  M1  
 $= (2p + q)(a - b)$  A2

c)



|  |   |  |
|--|---|--|
| Volume of cuboid                           | = | volume of cylinder                               |
| $L \times W \times H$                      |   | $\pi r^2$ but $r = \frac{14}{2} = 7\text{cm}$ M1 |
| $7 \times 5 \times 22$                     | = | $\frac{22}{7} \times 7 \times 7 \times h$ M1     |
| $7 \times 5 \times 22$                     | = | $22 \times 7 \times h$ M1                        |
| $\frac{7 \times 5 \times 22}{22 \times 7}$ | = | $\frac{22 \times 7 \times h}{22 \times 7}$ M1    |

3. a) i)  $h = 5\text{cm}$  A2 make h the subject  
 Cost price of the books =  $160 \times \text{GH}\text{¢} 3.50$  M1  
 =  $\text{GH}\text{¢} 560.00$  A1

ii) Selling price of the books = 160 x GH¢ 4.30 M1

Profit = Selling price - Cost price

GH¢ 688 - GH¢ 560 M1

GH¢ 128.00

Percentage profit =  $\frac{\text{profit}}{\text{cost price}} \times 100$

$\frac{128}{560} \times 100$  M1

= 22.9% A1

b)  $c = 2 \pi r$

$44 = 2 \times \frac{22}{7} \times r$  M1

$\frac{44 \times 7}{44} = \frac{44r}{44}$

$r = 7\text{cm}$  A1

Area of circle =  $\pi r^2$

$\frac{22}{7} \times 7 \times 7$  M1

$22 \times 7$

=  $154\text{cm}^2$  A1

c) First find  $3q - 2p$  where  $p = \left(\frac{2}{-3}\right)$  and  $q = \left(\frac{-1}{6}\right)$

$3 \left(\frac{-1}{6}\right) - 2 \left(\frac{2}{-3}\right)$  M1

$\cdot \left(\frac{-3}{18}\right) - \left(\frac{4}{-6}\right)$

$\cdot \left(\frac{-3}{18} - \frac{4}{-6}\right) = \left(\frac{-7}{24}\right)$  A1

$\therefore |3q - 2p| = \sqrt{(-7)^2 + (24)^2}$  M1

=  $\sqrt{(49 + 576)}$  M1

=  $\sqrt{625} = 25$  units A1

4. i)

| Marks (x)    | Tally   | Frequency (f)   | F (x)            |                   |
|--------------|---------|-----------------|------------------|-------------------|
| 1            | ###     | 5               | 5                | A1                |
| 2            | ###     | 5               | 10               | A1                |
| 3            | ////    | 5               | 15               | A1                |
| 4            | ### /   | 6               | 24               | A1                |
| 5            | ////    | 4               | 20               | A1                |
| 6            | ///     | 3               | 18               | A1                |
| 7            | ### /// | 8               | 56               | A1                |
| 8            | ////    | 4               | 32               |                   |
| <b>Total</b> |         | $\Sigma f = 40$ | $\Sigma fx = 40$ | $\Sigma fx = 180$ |

**B8** (1 mark for each row if all is correct)

ii) The modal marks is 7 **A1**

iii) Mean  $(\bar{x}) = \frac{\Sigma fx}{\Sigma f}$

$$\bar{x} = \frac{180}{40} \quad \text{M1}$$

$$\bar{x} = 4.5 \quad \text{A1}$$

iv) Those who passed = 4 + 3 + 8 + 4 = 19 **M ½**

Percentage passed =  $\frac{19}{40} \times 100$  **M1**

$$= 47.5\% \quad \text{A1}$$

v) P (scoring not more than 4)

P (5 + 5 + 5 + 6) = 21 **M ½**

$$\frac{21}{40} \quad \text{A1}$$

5. a)  $\begin{pmatrix} 2x & + & 4 \\ y & - & 5 \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 8 \\ 4 \end{pmatrix}$  **M1**

$$\begin{pmatrix} 2x & + & 4 \\ y & - & 4 \end{pmatrix} = \begin{pmatrix} 4 \\ 2 \end{pmatrix} \quad \text{M1}$$

$$2x + 4 = 4 \quad \text{M1}$$

$$2x = 4 - 4$$

$$\frac{2x}{2} = \frac{0}{2}$$

$$x = 0 \quad \text{A1}$$

$$y - 4 = 2 \quad \text{M1}$$

$$y = 2 + 4$$

$$y = 6 \quad \text{A1}$$

b) (i) From the diagram  
angles  $73 + x$  is alternate to  $108$

$$\Rightarrow 73 + x = 108^\circ$$

$$x = 108^\circ - 73$$

$$x = 35^\circ \quad \text{M ½}$$

$$73 + x + \text{CBF} = 180$$

$$73 + 35 + \text{CBF} = 180$$

$$\text{CBF} = 180 - 108$$

$$\text{CBF} = 72^\circ \quad \text{A1}$$

OR

CBF and  $108^\circ$  are co-interior angles

$$\text{CBF} + 108^\circ = 180^\circ \quad \text{M ½}$$

$$\text{CBF} = 180^\circ - 108^\circ$$

$$\text{CBF} = 72^\circ \quad \text{A1}$$

(ii)  $73 + x + \text{CBF} = 180^\circ$  **M1**

$$73 + x + 72 = 180^\circ$$

$$x = 180 - 145$$

$$x = 35^\circ$$

$$\begin{aligned} \text{c) } & \frac{x+5}{4} - \frac{3x-5}{2} \\ & \frac{x+5-2(3x-5)}{4} \quad \text{M1} \\ & \frac{x+5-6x+10}{4} \quad \text{M1} \\ & \frac{x-6x+5+10}{4} \quad \text{M1} \\ & \frac{x+5-6x+10}{4} \quad \text{M1} \\ & \frac{x-6x+5+10}{4} \quad \text{M1} \\ & \frac{-5x+15}{4} \quad \text{A1} \end{aligned}$$

$$6. \quad \text{a) Length of semi-circle PTS} = \frac{1}{2} \times 2\pi r$$

$$\text{radius} = 49 \div 2 = 24.5\text{m}$$

$$= \frac{1}{2} \times 2 \times \frac{22}{7} \times 24.5 \quad \text{M1}$$

$$= 539\text{m} \quad \text{A1}$$

$$\text{Total length of two semi-circles} = 539\text{m} \times 2$$

$$= 1078\text{m} \quad \text{M1}$$

$$\text{Distance around the field} = 1078\text{m} + 77\text{m} + 77\text{m}$$

$$= 1,232\text{m} \quad \text{A1}$$

$$\text{b) Area of pond} = \pi r^2$$

$$\text{radius, } r = 14 \div 2 = 7\text{m}$$

$$= \frac{22}{7} \times 7^2 \quad \text{M1}$$

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

$$= 154\text{m}^2 \quad \text{A1}$$

$$\text{Area of PQRS} = 77\text{m} \times 49\text{m}$$

$$= 3773\text{m}^2$$

$$\text{Area of semi-circle} = \frac{1}{2} \pi r^2$$

$$= \frac{1}{2} \times \frac{22}{7} \times 24.5^2 \quad \text{M1}$$

$$= \frac{11}{7} \times 600.25 \quad \text{M1}$$

$$= \frac{6602.75}{7}$$

$$= 943.25\text{m}^2 \quad \text{A1}$$

$$\text{Area of two semi-circles} = 943.25\text{m}^2 \times 2 \quad \text{M1}$$

$$= 1886.5\text{m}^2 \quad \text{A1}$$

$$\text{Area of compound} = 1886.5\text{m}^2 + 3773\text{m}^2 \quad \text{M1}$$

$$= 5,659.5\text{m}^2 - 154\text{m}^2 \quad \text{M1}$$

$$= 5,505.5\text{m}^2 \quad \text{A1}$$