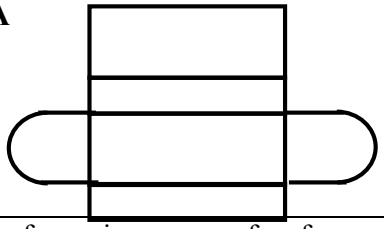
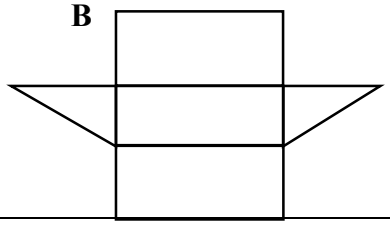
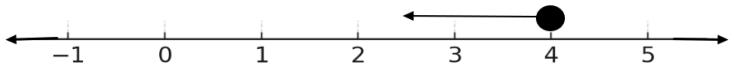
BEST BRAIN EXAMINATIONS KONSORTIUM
SPECIAL PRIVATE MOCK FOR BECE CANDIDATES – APRIL 2025
MARKING SCHEME - MATHEMATICS

PAPER 2

GENERAL NOTES ON PAPER II

1. Marks are subdivided into marks for method (**M**), marks for accuracy (**A**) and marks for accuracy not preceded by **M** marks (**B**).
2. The **M** marks should be given for a particular stage if the method is correct, that is, it would yield the right answer, if correctly carried out without numerical errors. **M** marks are not generally subdivided and unless the **M** mark for a preceding stage has been awarded, no **A** marks can be gained for that stage. (No deduction should be made from **M**.
3. Deduct 1 mark for omission of units or for wrong units not more than once in one whole question.
4. Give '0' (zero) for results obtained for work that is indecipherable or wholly suppressed.
5. If more questions are attempted than the rubric allows, delete the marks given for these extra questions which have the lowest marks. This rule implies that for candidates attempting more than **four** questions, consider only their best four and ignore the remaining questions by writing "MQA". (MQA denotes More Questions Answered than allowed)
6. Do **not** mark beyond the first appearance of a correct answer, i.e. ignore any further work beyond the correct answer.

QUESTION 1		SOLUTION	Marks
(a)		Amount shared = ¢ 990, 000 oranges Felix = $2\left(\frac{1}{3}x\right)$, Yasmin = $\frac{1}{3}x$, Zambo = x $2\left(\frac{1}{3}x\right)+\frac{1}{3}x+x=990,000$ $\frac{2}{3}x+\frac{1}{3}x+x=990,000$ Multiply through by 3 $(3)\frac{2x}{3}+(3)\frac{1}{3}x+x(3)=990,000\times 3$ $2x+x+3x=2970000$ $6x=2970000$ $\frac{6x}{6}=\frac{2,970000}{6}$ x = ¢ 495, 000	**B ½** **B ½** **B ½**
	(i)	Yasmin's share = $\frac{1}{3}x = \frac{1}{3}\times$ ¢ 495, 000 = ¢ 165000 Felix = $2\left(\frac{1}{2}x\right)$ = 2 (¢ 165, 000) = ¢ 330, 000 Zambo = x = ¢ 495, 000	**B½** **M1** **A½**
	(ii)	Amount Zambo received more than Felix ¢ 495, 000 – ¢ 330, 000 ¢ 165, 000 Zambo received GH¢ 165, 000 more than Felix	**M1** **A½**
(b)	**(i)**	**A**  **B** 	**B1B1**
	(ii)	Surface prism = sum of surface are of all 5 faces = surface area of 2 triangular faces + surface area of 3 rectangular faces = $2\left(\frac{1}{2}\times 4\times 5\right)+(4\times 6)+(5\times 6)+(3\times 6)$ = 20+ 24 + 30 + 18 = 92	**B 1** **M ½** **A ½ for 92**

(c)		$\frac{1}{2}x-2\geq\frac{1}{2}\left(\frac{7}{4}x-9\right)+1 \Rightarrow \frac{1}{2}x-2\geq\frac{7}{8}x-\frac{9}{2}+1$ $\Rightarrow \frac{1}{2}x-\frac{7}{8}x\geq-\frac{9}{2}+1+2 \Rightarrow \frac{1}{2}x-\frac{7}{8}x\geq-\frac{9}{2}+3$ $\Rightarrow -\frac{3}{8}x\geq-\frac{9}{2}+3 \Rightarrow -\frac{3}{8}x\geq-\frac{3}{2}$ $\Rightarrow -3x\geq-\frac{3}{2}\times 8 \Rightarrow -3x\geq-3\times 4 \Rightarrow -3x\geq-12 \Rightarrow x\leq\frac{-12}{-3}$ $\Rightarrow x\leq 4$ 	**M ½** **M ½** **M 1** **A 1** **B 1**
(d)		$2\frac{2}{3}\div\left(3\frac{2}{3}\times 1\frac{1}{6}\right) = \frac{8}{3}\div\left(\frac{11}{3}\times\frac{7}{6}\right) = \frac{8}{3}\div\frac{77}{18}$ $= \frac{8}{3}\times\frac{18}{77} = 8\times\frac{6}{77} = \frac{48}{77}$	**M1** **A1**
			TOTAL FOR QUESTION 1= 15 MARKS
QUESTION TWO			
(a)	**(i)**	Given Mama's gross salary = Gh¢ 2400 National insurance allowance = 5% of gross salary Personal allowance = 3000 per year Mama's yearly gross salary = 12×2400 = 28800 :. Mama's gross yearly salary = Gh¢ 28,800	**M ½** **A ½**
	(ii)	Mama's total tax-free allowance for the year = 5% yearly gross salary + 3000 $= \frac{5}{100}\times 28800 + 3000$ = 1440 + 3000 = 4440 :. Mama's total tax-free allowance for the year = Gh¢4,440	**B ½** **M ½** **A ½**
	(iii)	Mama's taxable yearly income = gross salary – tax-free allowance = 28800 – 4440 = 24360 :. Mama's taxable yearly income = Gh¢ 24,360	**B ½** **M ½** **A ½**
	(iv)	Tax on Mama's first Gh¢20,000 $= \frac{10}{100}\times 20000$ = Gh¢ 2000 Tax on portion of taxable income above 20,000 Taxable income above 20,000 = yearly taxable income – 20000 = 24360 – 20000 = 4360 20% tax on 4360 $= \frac{20}{100}\times 4360 = 872$ Total income tax = 2000 + 872 = 3760 :. Mama's total income tax = Gh¢ 2,872	**M ½** **B ½** **M ½** **M 1** **A ½**
(b)		Let x = numerator of the fraction => Denominator = $2x-2$ => Original fraction = $\frac{x}{2x-2}$ ***Adding 7 to both the numerator and the denominator, resulting fraction is*** $\frac{4}{5}$ $\Rightarrow \frac{x+7}{2x-2+7}=\frac{4}{5} \Rightarrow \frac{x+7}{2x+5}=\frac{4}{5}$ $5(x+7)=4(2x+5) \Rightarrow 5x+35=8x+20$ $8x-5x=35-20 \Rightarrow 3x=15$ $x=\frac{15}{3}=5$ Original fraction = $\frac{5}{2(5)-2} = \frac{5}{10-2} = \frac{5}{8}$	**B ½** **M 1** **A ½**
(c)	**(i)**	$y = k\times x^2$ Equation for the statement = $y = kx^2$	**A ½**
	(ii)	Value of y when x = 9 and $k = \frac{1}{3} \Rightarrow y = kx^2$ $y = \frac{1}{3}(9)^2 \Rightarrow y = \frac{1}{3}(81) \Rightarrow y = 27$ The value of y is 27	**B ½** **M ½** **A ½**

(d) (i)

Die 1 /Die 2	**1**	**2**	**3**	**4**	**5**	**6**
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

B1

(ii) Probability of a total score of 12 $= \frac{Number\ of\ favorable\ outcomes}{Number\ of\ possible\ outcomes} = \frac{1}{36}$ — **M ½ A ½**

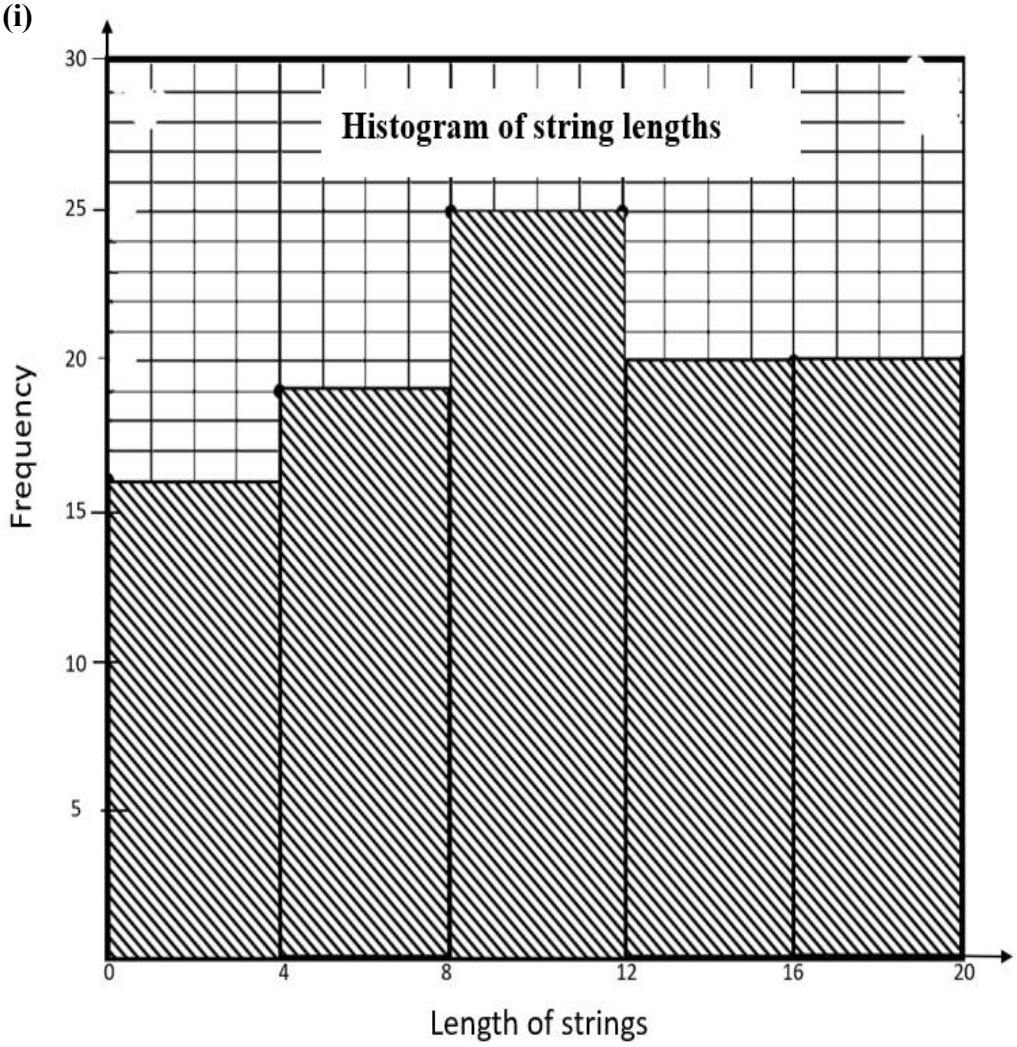
(iii) Probability of obtaining a score of more than 8 $= \frac{10}{36} = \frac{5}{18}$ — **M ½ A ½**

(iv) Probability of an even number $= \frac{16}{36} = \frac{1}{2}$ — **M ½ A ½**

TOTAL FOR QUESTION 2= 15 MARKS

QUESTION THREE

(a) (i)



Graph title- **B ½**

Vertical axis – ***B2(– ½ ee)***

Horizontal axis- ***B2 (– ½ ee)***

Drawing bars correctly = ***½ each x 5 = 2½ marks***

Penalties

- ***Wrong/non-labeling of vertices*** $-\frac{1}{2}$ **ee**
- ***Non-joining/ non-use of straight edge*** $-\frac{1}{2}$ **ee**
- ***Non-calibration of axes*** $-\frac{1}{2}$ **ee**
- ***Non-labelling of axes*** $-\frac{1}{2}$ **ee**

(ii) Modal length range : $8 < l \leq 12$ — **A 1**

(iii) Fraction of the pieces of string between 4 and 12 in length

$= \frac{Number\ of\ strings\ between\ 4\ nd\ 12\ in\ length}{Total\ number\ of\ strings}$

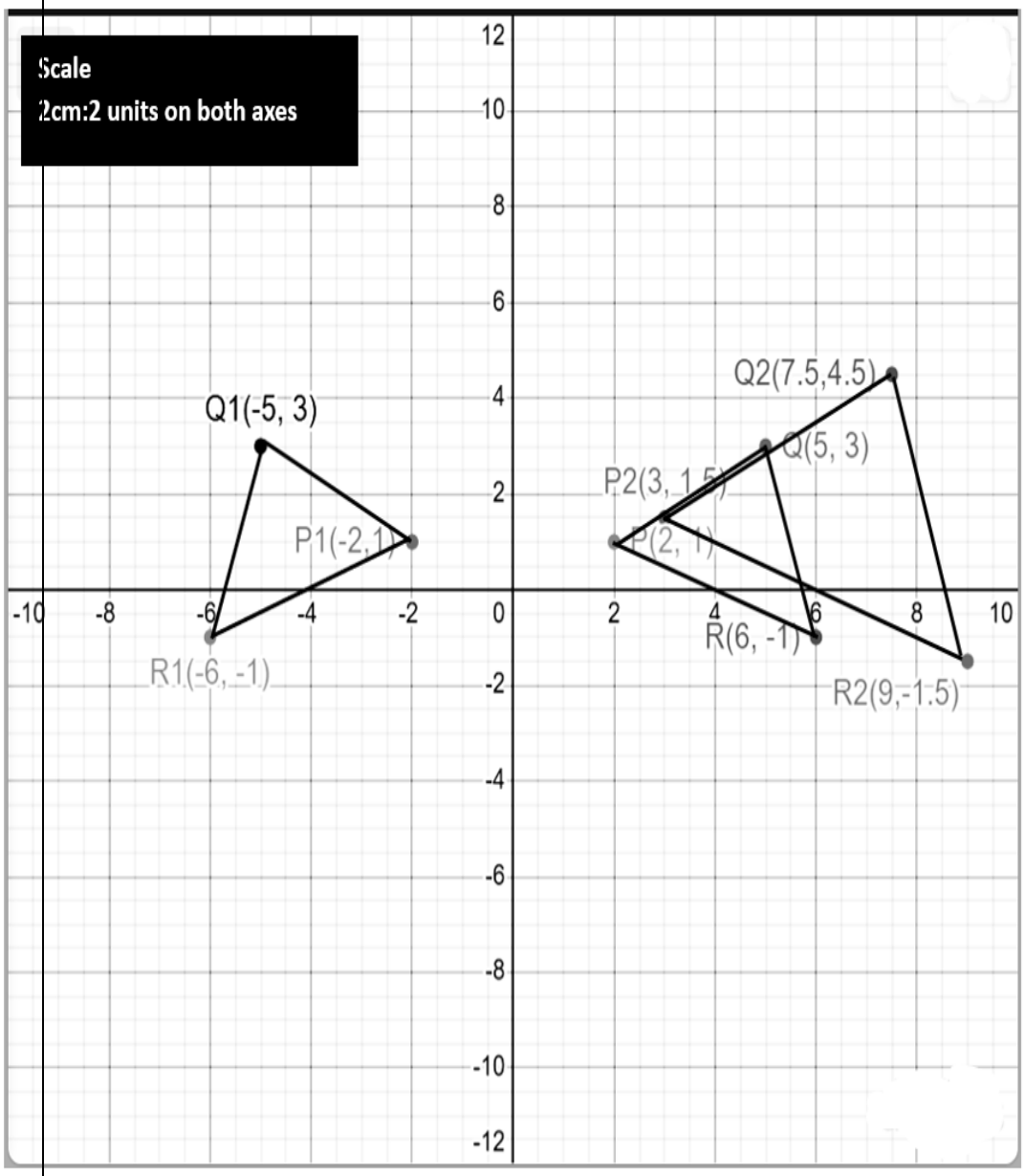
$= \frac{19+25}{16+19+25+20+20} = \frac{44}{100} = \frac{11}{25}$

B ½

M 1 A ½

	(iv)	Probability that the length of a string falls between 18 and 16 $=\frac{25+20}{100}$ $=\frac{45}{100}$ $=\frac{9}{20}$	 **M ½** **M ½** **A ½**
(b)		**Midpoint of AB** Using the midpoint formula: $M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)\ M=\left(\frac{2+8}{2},\frac{3+9}{2}\right)=(5,6)$	**M ½** **M ½** **A ½**
(c)		**Standard Form of 0.0045** $0.0045=4.5\times10^{-3}$	**M ½ A ½**
(d)		Median = 85 (middle value)	**B1**
		TOTAL FOR QUESTION 3= 15 MARKS	
QUESTION FOUR			
(a)		Mean $(\bar{x})$ = 5 Mean $(\bar{x})=\frac{Sum\ of\ items\ (\sum x)}{Number\ of\ items\ (n)}$ $\frac{(2x-2)+(x+1)+(x+2)+5+5+6+5x}{7}=5$ $\frac{2x-2+x+1+x+2+5+5+6+5x}{7}=5$ $\frac{2x+x+x+5x-2+1+2+5+5+6}{7}=5$ $9x+17=5\times7$ $9x+17=35$ $9x=35-17$ $\frac{9x}{9}=\frac{18}{9}$ $x=2$ ∴ The value of x is 2	**B ½** **M ½** **M ½** **M ½** **M ½** **A ½**
(b)	**(i)**	$\frac{1}{3}x+\frac{1}{5}=\frac{1}{5}x-1$ $\frac{1}{3}x-\frac{1}{5}x=-1-\frac{1}{5}$ $\frac{2}{15}x=\frac{-6}{5}x$ $15\ \mathrm{X}=\frac{2}{15}x=\ 5\mathrm{x}\frac{-6}{5}$ $2x=3(-6)$ $\frac{2x}{2}=\frac{-18}{2}$ $x=9$	 **M½** **M½** *Multiplying through by 15* **M½** **A½**
	(ii)	$3\left(-\frac{1}{3}\right)^2-2\left(-\frac{1}{3}\right)$ $=3\left(\frac{1}{9}\right)+\frac{2}{3}$ $=\frac{1}{3}+\frac{2}{3}$ $=\frac{3}{3}=1$	**M½** **M½** **A½**

(c)	**(i)**	$9 + 2x + 9 + (2x + 5) = 55$ $9 + 9 + 2x + 2x + 5 = 55$ $18 + 5 + 4x = 55$ $23 + 4x = 55$ $4x = 55 - 23$ $\frac{4x}{4} = \frac{32}{4}$ $x = 8$ Value of x is 8	**M½** **M½** **A½**
	(ii)	**Perpendicualr Height** $(x - 1)$m $(8 - 1)$m 7m	**B½** **M ½** **A ½**
	(iii)	Area of the plot = $\frac{1}{2}$ × (sum of the parallel sides) × (perpendicular heigh) $= \frac{1}{2} \times \mathbf{((2x) + (2x + 5))m \times 7m}$ $= \frac{1}{2} \times \mathbf{[(2(8) + (2(8) + 5)]m \times 7m}$ $= \frac{1}{2} \times \mathbf{[16 + 21]m \times 7m}$ $= \frac{1}{2} \times \mathbf{37m \times 7m}$ $= \frac{\mathbf{259m^2}}{\mathbf{2}}$ Area of the plot = $129.5m^2$	**B½** **M1** **M½** **A½**
(d)	**(i)**	Mean number of mobile phones sold between January and March $= \frac{70+64+73}{3}$ $= \frac{207}{3}$ =69	**M 1** **A ½**
	(ii)	Percentage increase in number of mobile phones sold from April to May $= \frac{91-85}{85} \times 100$ $= \frac{6}{85} \times 100$ =7.0588 = 7.06 correct to 3 significant figures	**M 1** **A ½**
			TOTAL FOR QUESTION 4= 15 MARKS
QUESTION FIVE			
(a)	**(iv)**	Reflection on the $y - axis$ $(x, y) \rightarrow (-x, y)$ $=> P(2, 1) \rightarrow P^1(-2, 1)$ $Q(5, 3) \rightarrow Q^1(-5, 3)$ $R(6, -1) \rightarrow R^1(-6, -1)$	**M ½** **M ½** **A ½**
	(v)	Image under enlargement with scale factor 1.5 about the origin $P(2, 1) \rightarrow P^2(3, 1.5)$ $Q(5, 3) \rightarrow Q^2(7.5, 4.5)$ $R(6, -1) \rightarrow R^2(9, -1.5)$	**M ½** **M ½** **A ½**

	Not drawn to scale  	- *Two perpendicular axes with correct labels,scale and interval* = **B2 (–½ee)** for y; = **B2 (–½ee)** for x - *Plotting of points* **P**(2,1), ***Q***(5,3), (3, 10) *and* ***R****(7, -7)*=**B2 (–½ee)** - *Drawing a straight line through the points* =**B1 (-½ee)** - *Plotting of points and drawing of* $P^1Q^1R^1$ = **B2 (-½ee)** - *Plotting of points and drawing of* $\mathbf{P^2Q^2R^2}$ = **B2 (-½ee)** ***Penalties*** • ***Wrong/non-labeling of vertices*** $-\frac{1}{2}$ **ee** • ***Non-joining/ non-use of straight edge*** $-\frac{1}{2}$ **ee** • ***Non-calibration of axes*** $-\frac{1}{2}$ **ee** • ***Non-labelling of axes*** $-\frac{1}{2}$ **ee**
(b)	$4(x-2) < 3(x-3)$ $4x - 8 < 3x - 9$ $4x - 3x < -9 + 8$ $x < -1$	 **M ½** **M ½** **A½**
(c)	Bearing of Q from P = 068° Bearing of P from Q = $\theta + 180°, where\ \theta = 68°$ $= 68° + 180°$ Bearing of P from Q = 248°	 **M ½** **A½**
(d)	$81 \times 27 \times 9 \times 3$ $3^4 \times 3^3 \times 3^2 \times 3$ $3^{(4+3+2+1)}$ 3^{10}	**M ½** **M ½** **A½**
		TOTAL FOR QUESTION 5= 15 MARKS

QUESTION SIX			
(a)		$\vec{A}\|\|\vec{B}$ $=> \vec{A} = k\vec{B}$ where k is a non-zero constant $\begin{pmatrix}12\\8\end{pmatrix} = k\begin{pmatrix}3\\m\end{pmatrix}$ $=> 12 = 3k; k = \frac{12}{3} = 4$ $km = 8$ $4m = 8; m = \frac{8}{4} = 2$ $\vec{B} \perp \vec{C}$ $=>$ $\vec{B}.\vec{C} = 0$ $\begin{pmatrix}3\\2\end{pmatrix}.\begin{pmatrix}n\\9\end{pmatrix} = 0$ $3n + 18 = 0$ $3n = -18$ $n = -\frac{18}{3} = -6$ $n + m = 2 + (-6) = -4$	**B ½** for formula **M1** for m=2 **B ½** for setting up formula **M ½** for putting in vectors **M ½ for n=-6** **A ½ for -4**
(b)	**(i)**	Surface area of 1 box = $2(10 \times 6) + 2(6 \times 4) + 2(4 \times 10)$ = 120 + 48 + 80 = 248 in.^{2}	**M ½** **A ½**
	(ii)	Total surface area of 5 boxes = 5×248 = 1240 in.^{2}	**M ½** **A ½**
	(iii)	Given that each fabric costs 100 in.^{2} Number of fabric pieces needed = $\frac{Total\ surface\ area\ of\ five\ boxes}{area\ per\ piece\ of\ fabric}$ $= \frac{1240}{100}$ =12.4 Joe needs to buy 13 pieces of fabric Total cost of fabric Joe needs = $Number\ of\ fabric\ pieces\ Joe\ needs\ \times Cost\ per\ piece$ $= 13 \times 6.25$ =81.25 :. The fabric will cost Joe Gh¢ 81.25	**B ½** **M 1** **A½**
(c)	**(i)**	**Fraction of land for vegetables:** $1 - \left(\frac{3}{7} + \frac{2}{5}\right)$ Finding a common denominator for **7 and 5**: $\frac{3}{7} = \frac{15}{35}$, $\frac{2}{5} = \frac{14}{35}\frac{15}{35} + \frac{14}{35} = \frac{29}{35}$ Land for vegetables $= 1 - \frac{29}{35} = \frac{6}{35}$	**M 1** **A½**

	(ii)	**Calculating area per crop:** Maize: $\frac{3}{7} \times 140 = 60$ hectares Cassava: $\frac{2}{5} \times 140 = 56$ hectares Vegetables: $\frac{6}{35} \times 140 = 24$ hectare	**M ½** **M ½** **A½**
	(iii)	**Express maize portion as a percentage:** $\left(\frac{3}{7} \times 100\right) = 42.86\% \approx 42.9\%$	**M ½** **A½**
(d)	(i)	$\mathbf{r} = \begin{pmatrix} -3 \\ -5 \end{pmatrix}$ $\mathbf{t} = \begin{pmatrix} 3 \\ -5 \end{pmatrix}$ $\mathbf{r + t} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} + \begin{pmatrix} 3 \\ -5 \end{pmatrix}$ $= \begin{pmatrix} -3+3 \\ -5 \pm -5 \end{pmatrix}$ $\mathbf{r + t} = \begin{pmatrix} 0 \\ -10 \end{pmatrix}$	**M ½** **M ½** **A½**
	(ii)	15% of the length of a rope = 720m Full length (100%) = $100\% \times \frac{720m}{15\%}$ $= 100 \times 48$ Full length = 4800m Half of the length of the rope = $\frac{1}{2} \times 4800$m **Half of the length of the rope = 2400m**	**B½** **M 1** **A ½**
			TOTAL FOR QUESTION 6= 15 MARKS

PAPER I [40 MARKS]

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