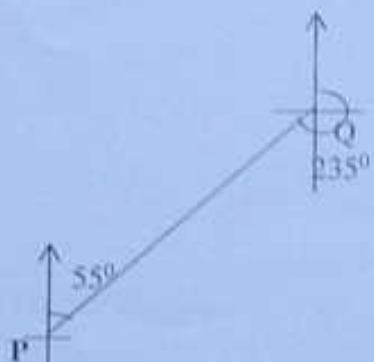
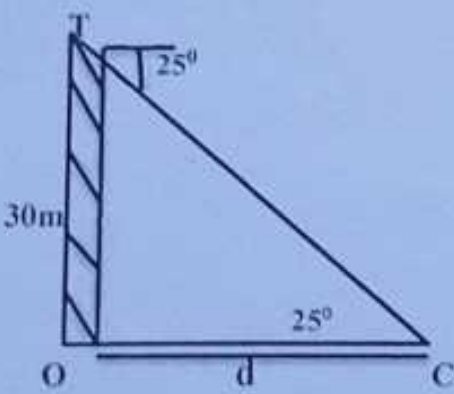




JINJA JOINT EXAMINATION BOARD
MOCK EXAMINATIONS 2023
456/1 MATHEMATICS
MARKING GUIDE

NO.	SOLUTIONS	MARKS	COMMENTS
Q.1	$a^2 - b^2 = (a + b)(a - b)$ $6.762 - 3.242 = (6.76 + 3.24)(6.76 - 3.24)$ $= (10.00)(3.52)$ $= 35.2$	M ₁ M ₁ M ₁ A ₁	
		04	
Q.2	$\frac{2n-1}{4} - \frac{2n-3}{5} = \frac{3}{4}$ $5(2n - 1) - 4(2n - 3) = 3(5)$ $10n - 5 - 8n + 12 = 15$ $2n = 8$ $n = 4$	M ₁ M ₁ M ₁ A ₁	
		04	
Q.3	S = {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20} E = {3, 4, 6, 9, 12, 15, 16, 18} $P(E) = \frac{8}{19}$	B ₁ B ₁ M ₁ A ₁	
		04	
Q.4	$a \cdot b = a^2 - 2b$ $4 \cdot 5 = 4^2 - 2 \times 5$ $= 16 - 10$ $= 6$ $6 \cdot 9 = 6^2 - 2 \times 9$ $= 36 - 18$ $= 18$	M ₁ A ₁ M ₁ A ₁	For his 6
		04	

Q.5	 <p>The bearing is 055°</p>	<p>B_1</p> <p>B_1</p> <p>B_2</p>	<p>$Q - 235^\circ$</p> <p>$P - 55^\circ$</p>
		04	
Q.6	<p>Points are $(2, 0)$ and $(0, 3)$</p> <p>Grad = $\frac{3-0}{0-2} = \frac{3}{2}$</p> <p>Equation of line is</p> $\frac{y-0}{x-2} = \frac{3}{2}$ $2y = -3x + 6$ $2y + 3x = 6$ <p>Inequality is $2y + 3x \geq 6$</p>	<p>M_1</p> <p>M_1</p> <p>B_2</p>	
		04	
Q.7	 <p>$\tan 25^\circ = \frac{30}{d}$</p> <p>$d = \frac{30}{\tan 25^\circ}$</p> <p>$= 64.34m = 64.3cm$</p>	<p>B_1</p> <p>M_1</p> <p>A_1</p> <p>A_1</p>	
		04	

Q.8	$\det = (-1 \times 2) - (4 \times -1)$ $= -2 + 4$ $= 2$ $\text{Inverse} = \frac{1}{2} \begin{pmatrix} 2 & -4 \\ 1 & -1 \end{pmatrix}$ $= \begin{pmatrix} 1 & -2 \\ \frac{1}{2} & -\frac{1}{2} \end{pmatrix}$	M_1 A_1 M_1 A_1	
Q.9	<p>Let $P(a, b)$</p> $\begin{pmatrix} a \\ b \end{pmatrix} - \begin{pmatrix} 4 \\ 5 \end{pmatrix} = 2 \left[\begin{pmatrix} a \\ b \end{pmatrix} - \begin{pmatrix} 1 \\ 4 \end{pmatrix} \right]$ $a - 4 = 2a - 2$ $-2 = a \text{ OR } a = -2$ <p>And $b - 5 = 2b + 8$</p> $5 - 8 = b$ $b = -3$ <p>centre is $(-2, -3)$</p>	M_1 A_1 A_1 B_1	
		04	
Q.10	<p>let the six mark be m</p> $\frac{m + 63 + 87 + 39 + 81 + 54}{6} = 71$ $M + 344 = 426$ $M = 82$	M_1 $M_1 M_1$ A_1	
Q.11(i)	$\frac{d}{4C} = B + \frac{1}{a}$ $\frac{1}{a} = \frac{d}{4C} - B$ $a = \frac{1}{\frac{d}{4C} - B}$	M_1 $M_1 A_1$	
(ii)	$a = \frac{1}{\frac{170 - 2}{4 \times 20}}$ $= \frac{1}{\frac{170 - 2}{80}}$ $= \frac{1}{\frac{170 - 160}{80}}$	M_1 M_1	

	$= \frac{1}{\frac{10}{80}} \text{ or } \frac{1}{\frac{1}{8}}$ $= 8$	A ₁							
b(i)	<p>Let Peter be P years.</p> <table> <tr> <td>P</td> <td>M</td> <td>T</td> </tr> <tr> <td>P</td> <td>P - 7</td> <td>2(P - 7)</td> </tr> </table> <p> $P + P - 7 + 2(P - 7) = 43$ $2P - 7 + 2P - 14 = 43$ $4P = 64$ $P = 16 \text{ years}$ Mary is 16 - 7 $= 9 \text{ years}$ </p>	P	M	T	P	P - 7	2(P - 7)	B ₁ M ₁ M ₁ A ₁ M ₁ A ₁	
P	M	T							
P	P - 7	2(P - 7)							
		12							
Q.12	$A^2 = \begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$ $= \begin{pmatrix} 9 & 8 \\ 16 & 17 \end{pmatrix}$ $2B = 2 \begin{pmatrix} -2 & 3 \\ 2 & 1 \end{pmatrix}$ $= \begin{pmatrix} -4 & 6 \\ 4 & 2 \end{pmatrix}$ $M = \begin{pmatrix} 9 & 8 \\ 16 & 17 \end{pmatrix} + \begin{pmatrix} -4 & 6 \\ 4 & 2 \end{pmatrix} - \begin{pmatrix} -10 & 4 \\ 5 & 9 \end{pmatrix}$ $M = \begin{pmatrix} 15 & 10 \\ 15 & 10 \end{pmatrix}$	M ₁ A ₁ M ₁ A ₁ M ₁ A ₁	For his $\begin{pmatrix} 9 & 8 \\ 16 & 17 \end{pmatrix}$ OR $\begin{pmatrix} -4 & 6 \\ 4 & 2 \end{pmatrix}$						
(b)	$5x + 2y = 2$ $3x + 5y = 24$	M ₁	Rearranging						

$\begin{pmatrix} 5 & 2 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 24 \end{pmatrix}$	M ₁	
$\begin{pmatrix} 5 & -2 \\ -3 & 5 \end{pmatrix} \begin{pmatrix} 5 & 2 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 & -2 \\ -3 & 5 \end{pmatrix} \begin{pmatrix} 2 \\ 24 \end{pmatrix}$	M ₁	
$\begin{pmatrix} 19 & 0 \\ 0 & 19 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -38 \\ 114 \end{pmatrix}$	M ₁	
$\begin{pmatrix} 19x \\ 19y \end{pmatrix} = \begin{pmatrix} -38 \\ 114 \end{pmatrix}$		
$19x = -38 \Rightarrow x = -2$	A ₁	
$19y = 114 \Rightarrow y = 6$	A ₁	•
	12	

Q.13(a)	<table><tr><th>CLASS</th><th>C.f</th><th>f</th><th>x</th><th>fx</th></tr><tr><td>145- 149</td><td>2</td><td>2</td><td>147</td><td>294</td></tr><tr><td>150- 154</td><td>7</td><td>5</td><td>152</td><td>760</td></tr><tr><td>155- 159</td><td>16</td><td>9</td><td>157</td><td>1413</td></tr><tr><td>160- 164</td><td>26</td><td>10</td><td>162</td><td>1620</td></tr><tr><td>165- 169</td><td>33</td><td>7</td><td>167</td><td>1169</td></tr><tr><td>170- 174</td><td>38</td><td>5</td><td>172</td><td>860</td></tr><tr><td>175- 179</td><td>40</td><td>2</td><td>177</td><td>354</td></tr><tr><td></td><td>$\Sigma f= 40$</td><td></td><td></td><td>$\Sigma fx=6,470$</td></tr></table>	CLASS	C.f	f	x	fx	145- 149	2	2	147	294	150- 154	7	5	152	760	155- 159	16	9	157	1413	160- 164	26	10	162	1620	165- 169	33	7	167	1169	170- 174	38	5	172	860	175- 179	40	2	177	354		$\Sigma f= 40$			$\Sigma fx=6,470$	M ₁	For his f
	CLASS	C.f	f	x	fx																																											
	145- 149	2	2	147	294																																											
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		$\Sigma f= 40$			$\Sigma fx=6,470$																																											
	M ₁	For his x																																														
	M ₁	For his fx																																														
	A ₁	For his $\Sigma fx=6,470$																																														
(i)	Modal height $= 159.5+ \left(\frac{1}{1+3} \right) 5$ $= 159.5+ \frac{5}{4}$ $= 160.75$	M ₁																																														
		A ₁																																														
(ii)	Mean = $\frac{6470}{40}$ $= 161.75$	M ₁																																														
		A ₁																																														
(b)	Labeling axes as c.f V ^s Heights or class boundaries. -smooth curve drawn All points plotted correctly smooth curve drawn.	B ₁ B ₁ B ₁																																														

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UACE

Candidate's Name Q.13

Signature

Subject Name

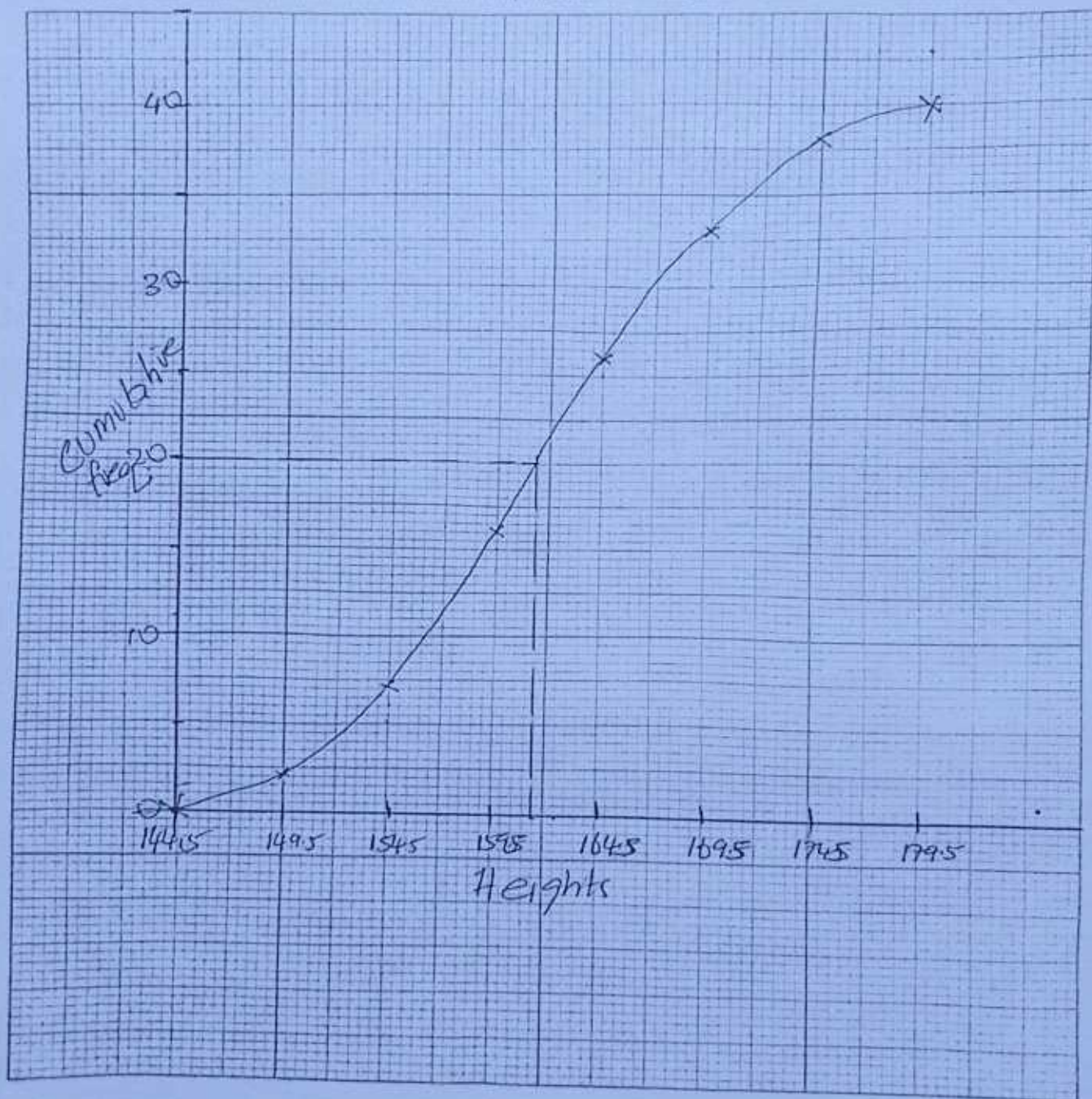
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	Median = $159.5 + 2.0$ $= 161.5 \pm 0.5$	A ₁																																																			
		12																																																			
14(a)	<table><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>x²</td><td>4</td><td>1</td><td>0</td><td>1</td><td>4</td><td>9</td><td>16</td><td>25</td><td>36</td></tr><tr><td>-4x</td><td>8</td><td>4</td><td>0</td><td>-4</td><td>-8</td><td>-12</td><td>-16</td><td>-20</td><td>-24</td></tr><tr><td>+2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>y</td><td>14</td><td>7</td><td>2</td><td>-1</td><td>-2</td><td>-1</td><td>2</td><td>7</td><td>14</td></tr></table>	x	-2	-1	0	1	2	3	4	5	6	x ²	4	1	0	1	4	9	16	25	36	-4x	8	4	0	-4	-8	-12	-16	-20	-24	+2	2	2	2	2	2	2	2	2	2	y	14	7	2	-1	-2	-1	2	7	14	B ₁ B ₁	
x	-2	-1	0	1	2	3	4	5	6																																												
x ²	4	1	0	1	4	9	16	25	36																																												
-4x	8	4	0	-4	-8	-12	-16	-20	-24																																												
+2	2	2	2	2	2	2	2	2	2																																												
y	14	7	2	-1	-2	-1	2	7	14																																												
(b)	Label axes as x and y.	B ₁																																																			
	Use of given scale.	B ₁																																																			
	All points correctly plotted.	B ₁																																																			
	Smooth curve joining all points.	B ₁																																																			
(c)	Solution for $x^2 - 4x + 2 = 0$																																																				
	$x = 0.7 \pm 0.1$	B ₁	0.6 – 0.8																																																		
	and $x = 3.3 \pm 0.1$	B ₁	3.2 – 3.4																																																		
(d)	Line $y = 6 - x$ (3, 3) (6,0)	B ₁																																																			
(e)	$x^2 - 4x + 2 = 6 - x$ $x^2 - 3x - 4 = 0$ OR Solution occurs where the line meets the curve.	M ₁																																																			
	$x = -1$ and $x = 4$	A ₁ A ₁	For each																																																		
		12																																																			

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Candidate's Name

Q.14

UACE

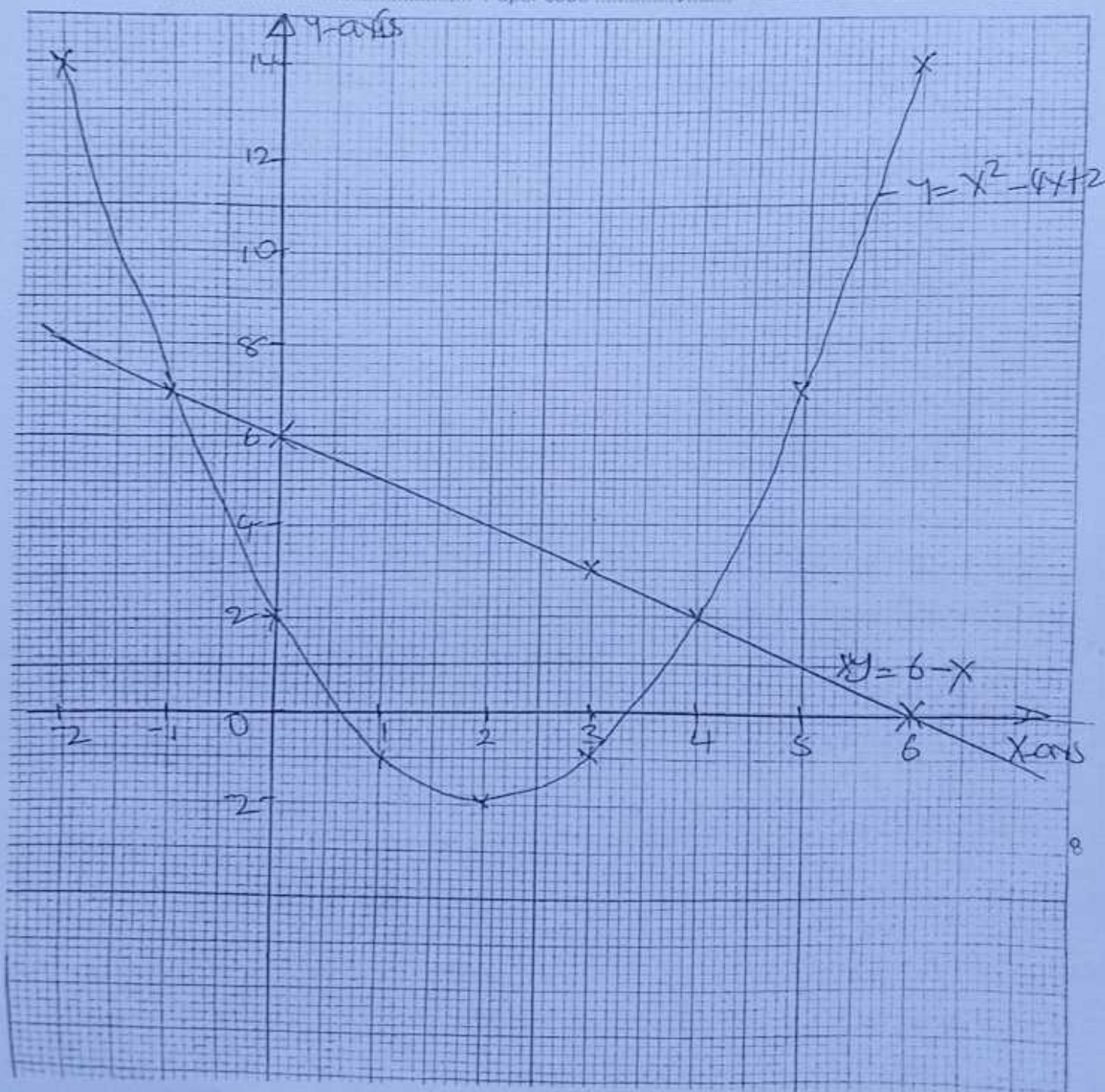
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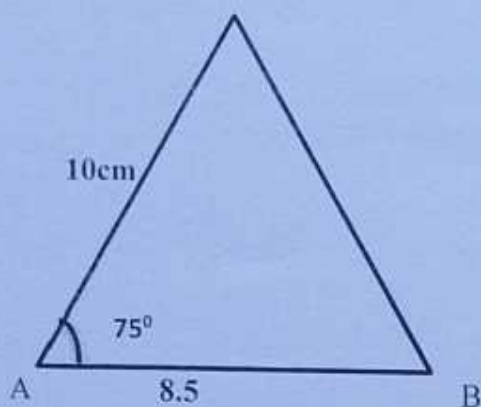
Subject Name

Paper code

Personal Number



SKETCH



Drawing line $AB = 8.5 \pm 0.2$

$\angle BAC = 75^\circ$

Line $AC = 10\text{cm} \pm 0.2$

$\angle ABC = 62^\circ \pm 1.2$

(iii)

(b)

Bisecting any two angles.

Dropping a perpendicular to the base.

Drawing an inscribed circle

Radius $= 2.5\text{cm} \pm 0.1$

Area of circle

$$= 3.14 \times 2.5^2$$

$$= 19.625$$

$$= 20$$

B₁

Sketch to include
 $AB = 8.5\text{cm}$

$AC = 10\text{cm}$

$\angle BAC = 75^\circ$

B₁

8.3 - 8.7

B₁

9.8 - 10.2

B₁

$61^\circ - 63^\circ$

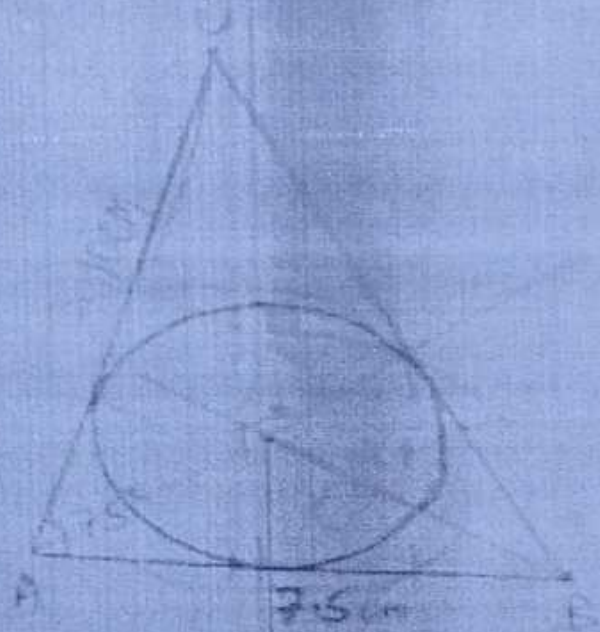
B₁B₁B₁B₁B₁M₁

$$\begin{aligned} & 3.14 \times 2.4^2 \\ & 3.14 \times 2.6^2 \\ & 18.086 \\ & 21.226 \\ & 18\text{cm}^2 \\ & 21\text{cm}^2 \end{aligned}$$

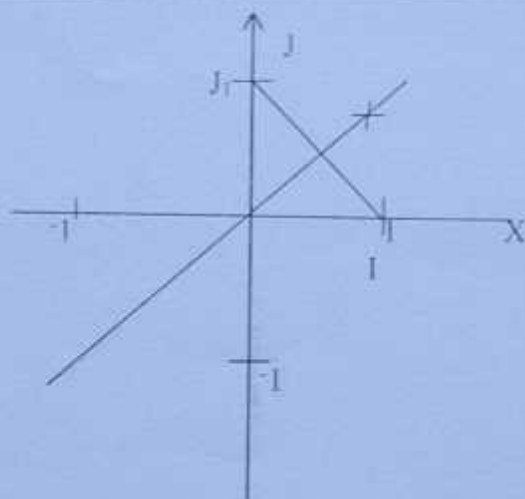
A₁

If is seen 19.625

Accurate drawing of IS



16 (a)



$$\begin{pmatrix} I & J \\ 1 & 0 \\ 0 & 1 \end{pmatrix} \longrightarrow \begin{pmatrix} I^1 & J^1 \\ 0 & 1 \\ 1 & 0 \end{pmatrix}$$

Matrix as $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

$$\text{b(i)} \quad \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} K & L & M \\ 0 & 4 & 1 \\ 1 & 1 & 2 \end{pmatrix} = \begin{pmatrix} K^1 & L^1 & M^1 \\ 1 & 1 & 2 \\ 0 & 4 & 1 \end{pmatrix}$$

$$K^1(1,0) \quad L^1(1,4) \quad M^1(2,1)$$

$$\text{(ii)} \quad \begin{pmatrix} -2 & 2 \\ -3 & 4 \end{pmatrix} \begin{pmatrix} K^1 & L^1 & M^1 \\ 1 & 1 & 2 \\ 0 & 4 & 1 \end{pmatrix} = \begin{pmatrix} K^{11} & L^{11} & M^{11} \\ -2 & 6 & -2 \\ -3 & 13 & -2 \end{pmatrix}$$

$$K^{11}(-2,-3) \quad L^{11}(6,13) \quad M^{11}(-2,-2)$$

$$\text{(c)} \quad \begin{pmatrix} -2 & 2 \\ -3 & 4 \end{pmatrix} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} = \begin{pmatrix} 2 & -2 \\ 4 & -3 \end{pmatrix}$$

$$\det \text{ of } \begin{pmatrix} 2 & -2 \\ 4 & -3 \end{pmatrix} = 6 - 8$$

$$= -2$$

$$\text{Inverse} = \frac{1}{-2} \begin{pmatrix} -3 & 2 \\ -4 & 2 \end{pmatrix}$$

$$= \begin{pmatrix} \frac{3}{2} & -1 \\ 2 & -1 \end{pmatrix}$$

 B_2 A_1 $M_1 A_1$ A_1 M_1 M_1 M_1 A_1

17	<p>-Drawing line $x = 0$ and shading correctly.</p> <p>-Drawing line $y = 0$ and shading correctly.</p> <p>-Drawing line $x + y = 6$ and shading correctly.</p> <p>-Drawing in $x + 2y = 8$ and shading correctly.</p> <p>-Correct an shaded region.</p> <p>(b) Identify the correct points to include (4,2)</p> <p>Maximum value obtained at(4,2) $x + y = 6$ and $x + 2y = 8$</p> <p>at(2,3) $x + y = 5$ and $x + 2y = 8$</p> <p>at(5,1) $x + y = 6$ and $x + 2y = 7$</p> <p>$x = 4$</p> <p>$y = 2$</p>	<p>B₁</p> <p>B₁</p> <p>B₂</p> <p>B₂</p> <p>B₂</p> <p>B₁</p> <p>M₁</p> <p>A₁</p> <p>A₁</p>	<p></p> <p>B₁- line drawn B₁ - shading B₁- line drawn B₁ - shading B₂ on sight</p> <p>correctly</p>
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