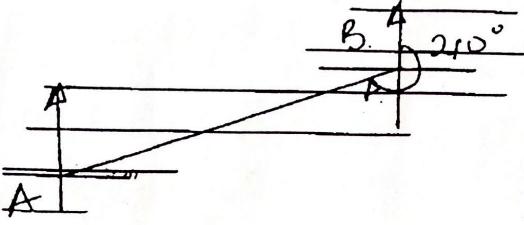
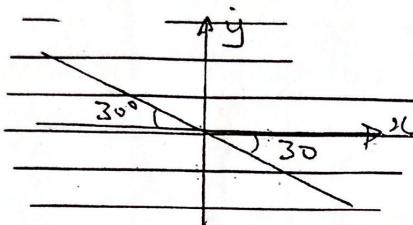
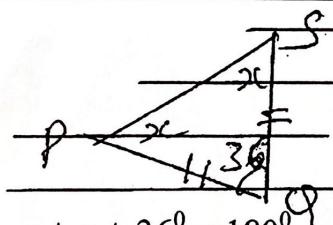
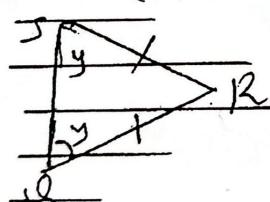
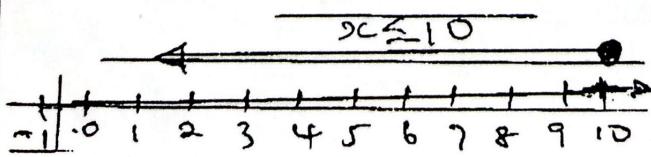




WAKISSHA JOINT MOCK EXAMINATIONS
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MATHEMATICS 456/1

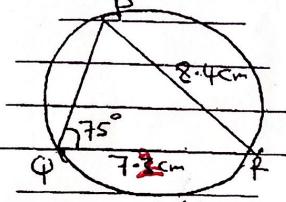
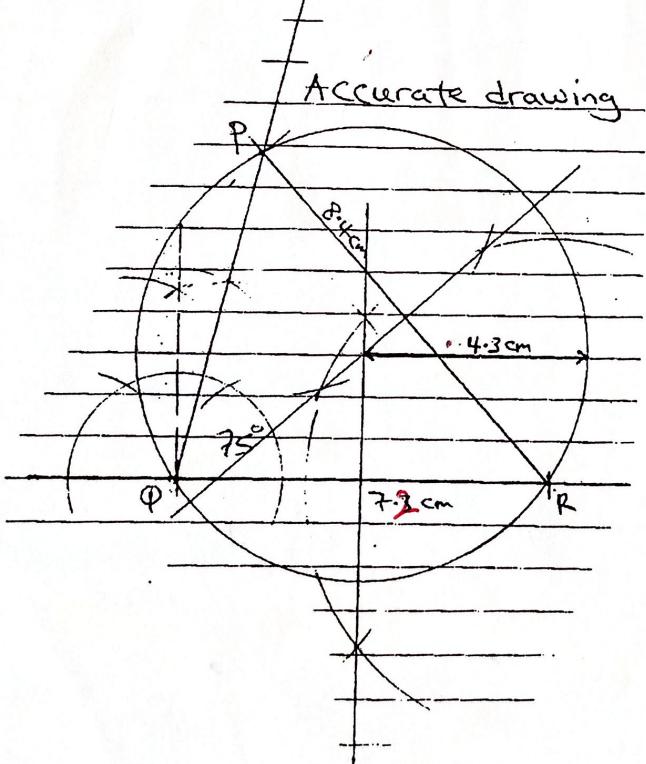
QN.	SECTION A	Marks	Comment
1.	$3 \Delta 6 = (3)^2 - 6(6)^2$ $= 9 - 216$ $= -207$ $-207 \Delta 4 = (-207)^2 - 6(4)^2$ $42,849 - 96$ $= 42,753$	M1 A1 M1✓	C's (-207) CAO
		A1 04	
2.	 Bearing of B from A is 030^0 .	B1 B2 B1 B2	For sketch with angle of 210^0 For bearing
		04	
3.	$\begin{pmatrix} 3 & 0 \\ 5 & 1 \end{pmatrix} \begin{pmatrix} 3 & 0 \\ 5 & 1 \end{pmatrix} - 4 \begin{pmatrix} 3 & 0 \\ 5 & 1 \end{pmatrix} + 3 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = 0$ $\begin{pmatrix} 9 & 0 \\ 20 & 1 \end{pmatrix} - \begin{pmatrix} 12 & 0 \\ 20 & 4 \end{pmatrix} + \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix} = 0$ $\begin{pmatrix} -3 & 0 \\ 0 & -3 \end{pmatrix} + \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix} = 0$ $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} = 0$	B1 M1 M1 A1	Correct substitution For multiplication For simplifying
		04	
4.	$3(4p^2 - 9q^2)$ $3[(2p)^2 - (3q)^2]$ $3(2p - 3q)(2p + 3q)$	M1 M1 A1	M1
		04	
5.	Let the 3 passengers seat be x Let the 2 passenger seat be y $x + y = 30$ $3x + 2y = 78$	B1	For both equations

	$x = 30 - y$ $3(30 - y) + 2y = 78$ $90 - 3y + 2y = 78$ $-y = -12$ $y = 12$ $x = 30 - 12$ $\therefore x = 18$	M1 A1 A1	For substitution Accept alternative methods.
		04	
6.	$x = \tan^{-1}(0.5774)$ $x = 30^\circ$  $x_1 = 180^\circ - 30^\circ = 150^\circ$ $x_2 = 360^\circ - 30^\circ = 330^\circ$	B ₁ B ₁ B ₁ B ₁	For reading $x = 30^\circ$ For drawing For $x_1 = 150^\circ$ For $x_2 = 330^\circ$
		04	
7.	 $x + x + 36^\circ = 180^\circ$ $2x = 144^\circ$ $x = 72^\circ$ $\angle SRQ = 180^\circ - 72^\circ$ $\angle SRQ = 108^\circ$  $2y + 108^\circ = 180^\circ$ $2y = 72^\circ$ $y = 36^\circ$	M1 A1 M1 A1	For forming equation in x For $x = 72^\circ$ For forming equation in y For $y = 36^\circ$
		04	
8.	$4 \times \frac{1}{4}(2x+3) \leq 4 \times 4 - 4 \times \frac{1}{4}(3-x)$ $2x+3 \leq 16 - 3+x$ $x \leq 10$ 	M1 M1 A1 B1	Use of proper L.C.M Simplification Correct number line.
		04	

	$\frac{T}{2\pi} = \sqrt{\frac{L^2 + M}{MH}}$	M1	For division																																																						
9.	$\frac{T^2}{4\pi^2} = \frac{L^2 + M}{MH}$	M1	Squaring both sides																																																						
	$\frac{T^2 MH}{4\pi^2} = L^2 + M$	M1	for L^2																																																						
	$L = \sqrt{\frac{T^2 MH}{4\pi^2} - M}$	A1																																																							
10.	$\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ $F_{10} = \{1, 2, 5, 10\}$ $\text{Prime} = \{2, 3, 5, 7\}$ $P(F_{10} \cup \text{prime}) = \frac{6}{10} = \frac{3}{5}$	04 B1 B1 B1 B1																																																							
11.	<table border="1"> <thead> <tr> <th>Marks</th> <th>Cf</th> <th>f</th> <th>$(x - A)$</th> <th>$(x - A)^2$</th> <th>$f(x - A)$</th> </tr> </thead> <tbody> <tr><td>29.5 - 34.5</td><td>2</td><td>2</td><td>32</td><td>-15</td><td>-30</td></tr> <tr><td>34.5 - 39.5</td><td>7</td><td>5</td><td>37</td><td>-10</td><td>-50</td></tr> <tr><td>39.5 - 44.5</td><td>17</td><td>10</td><td>42</td><td>-5</td><td>-50</td></tr> <tr><td>44.5 - 49.5</td><td>32</td><td>15</td><td>47</td><td>0</td><td>0</td></tr> <tr><td>49.5 - 54.5</td><td>40</td><td>8</td><td>52</td><td>5</td><td>40</td></tr> <tr><td>54.5 - 59.5</td><td>44</td><td>4</td><td>57</td><td>10</td><td>40</td></tr> <tr><td>59.5 - 64.5</td><td>46</td><td>2</td><td>62</td><td>15</td><td>30</td></tr> <tr><td></td><td></td><td>46</td><td></td><td></td><td>-20</td></tr> </tbody> </table>	Marks	Cf	f	$(x - A)$	$(x - A)^2$	$f(x - A)$	29.5 - 34.5	2	2	32	-15	-30	34.5 - 39.5	7	5	37	-10	-50	39.5 - 44.5	17	10	42	-5	-50	44.5 - 49.5	32	15	47	0	0	49.5 - 54.5	40	8	52	5	40	54.5 - 59.5	44	4	57	10	40	59.5 - 64.5	46	2	62	15	30			46			-20	04	
Marks	Cf	f	$(x - A)$	$(x - A)^2$	$f(x - A)$																																																				
29.5 - 34.5	2	2	32	-15	-30																																																				
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39.5 - 44.5	17	10	42	-5	-50																																																				
44.5 - 49.5	32	15	47	0	0																																																				
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59.5 - 64.5	46	2	62	15	30																																																				
		46			-20																																																				
(a)	$\text{Mean} = A + \frac{\sum f(x-A)}{\sum f}$ $= 47 + \frac{-20}{46}$ $= 46.565 \text{ marks}$	B1 B1 M1 A1 B1 B1	For x For f For $(x - A)$ For $f(x - A)$ $\sum f(x - A)$ $\sum f$ For plotting all correctly For curve C's -20 - Correct Substitution																																																						
(b)	$= 46 - 25 = 21 \text{ students}$	B1	Labeling both axes																																																						
		12																																																							

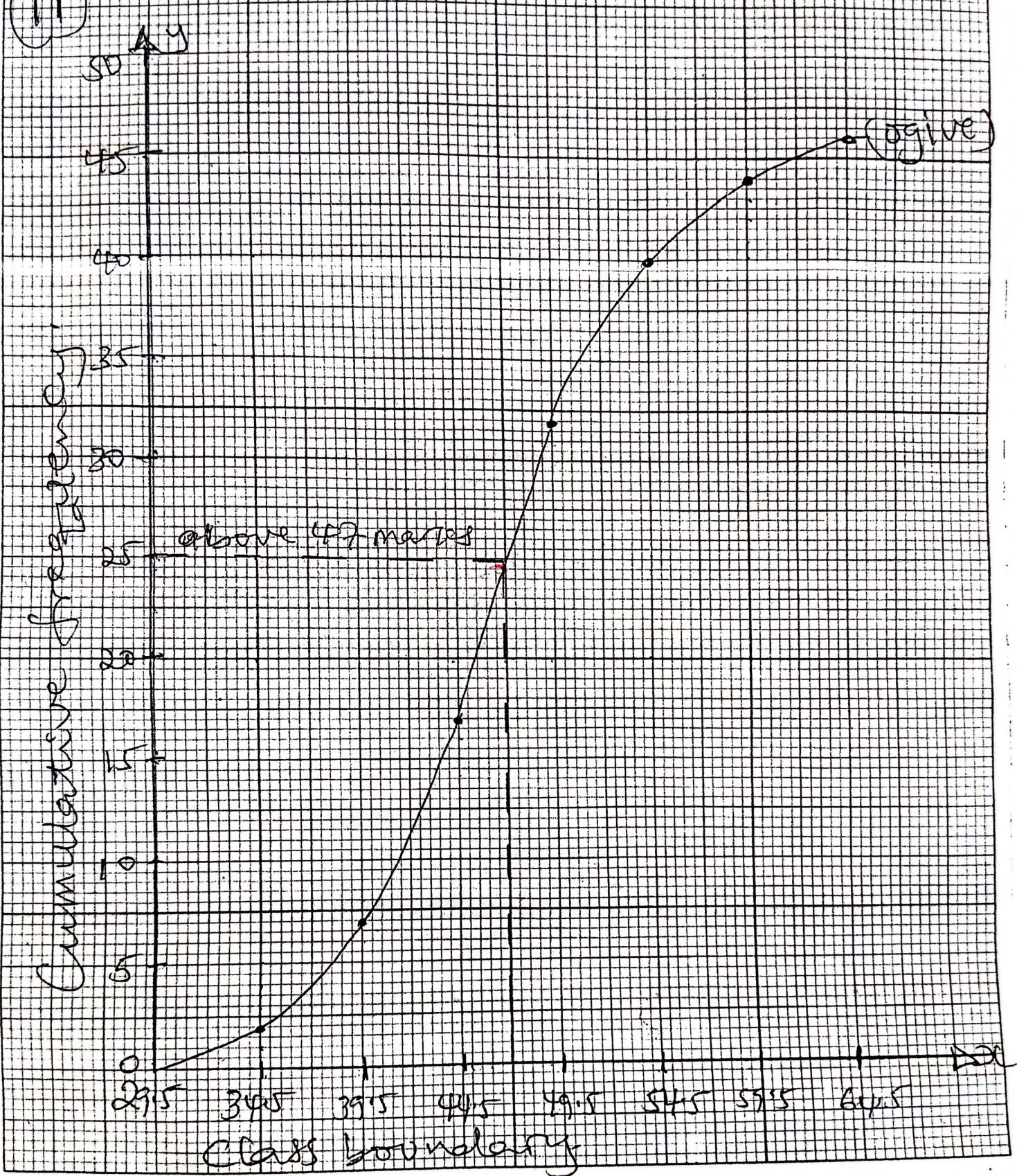
12.	<table border="1"> <tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>y</td><td>5</td><td>0</td><td>-3</td><td>-4</td><td>-3</td><td>0</td><td>5</td></tr> </table> <p>b (i) $x^2 - 2x - 3 = 0$ $\therefore x = 3, x = -1$</p> <p>(ii) $x^2 - 3x = 0$ $(y + 2x + 3) - 3x = 0$ $Y = x - 3$</p> <p>Intercepts</p> <table border="1"> <tr><td>x</td><td>0</td><td>3</td></tr> <tr><td>y</td><td>-3</td><td>0</td></tr> </table> <p>$\therefore x = 3, x = 0$</p>	x	-2	-1	0	1	2	3	4	y	5	0	-3	-4	-3	0	5	x	0	3	y	-3	0	B1B2 B1 $-x^2$ B1 $-2x$ B1 $-b$ B1 B1 B1 M1 A1 B1 B1 M1 12	B1 $-x^2$ B1 $-2x$ B1 $-b$ Proper use of scale For plotting correctly For smooth curve B1 For $x = 3$ B1 For $x = -1$ M1 For generating equation A1 For $y = x - 3$ B1 For line $y = x - 3$ on graph B1 For $x = 3$ and $x = 0$ 12
x	-2	-1	0	1	2	3	4																		
y	5	0	-3	-4	-3	0	5																		
x	0	3																							
y	-3	0																							
13.	<p>(a)</p> $3p + 4 = q$ $P + O = 3$ $P = 3$ $3(3) + 4 = q$ $q = 13$	M1 A1 A1																							
	<p>(b) (i)</p> <p>Kikubo market</p> $(40 \quad 25 \quad 40) \begin{pmatrix} 20,000 \\ 15,000 \\ 25,000 \end{pmatrix}$ $(800,000 + 375,000 + 1,000,000)$ <p>Shs. 2,175,000</p> <p>Nakasero Market</p> $(40 \quad 25 \quad 40) \begin{pmatrix} 21,000 \\ 14,000 \\ 26,000 \end{pmatrix}$ $(840,000 + 350,000 + 1,040,000)$ <p>Shs. 2,230,000</p>	B1 B1 M1 M1 M1 M1 M1 M1	<p>For column matrices</p> <p>For row matrices</p> <p>Multiplication</p> <p>Simplification</p> <p>Multiplication</p> <p>Simplification</p>																						
	<p>(ii)</p> <p>Difference</p> $2,230,000 - 2,175,000$ <p>Shs. 55,000</p> <p>Therefore it is cheaper to buy paint from Kikubo market</p>	M1 ✓ A1 B1	difference stating																						
		12																							

<p>14</p> <p>(a)</p> <p>Determinant $(2 \times 2) - (3 \times 1) = 1$</p> <p>Inverse = $\frac{1}{1} \begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix} = \begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix}$</p> $\begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix} \begin{pmatrix} 13 & 21 & 33 & 25 \\ 8 & 12 & 20 & 16 \end{pmatrix}$ $= \begin{pmatrix} 2 & 6 & 6 & 2 \\ 3 & 3 & 7 & 7 \end{pmatrix}$ <p>A(2,3) B(6,3), C(6,7), D (2,7)</p>	<p>B1</p> <p>For determinant</p>
<p>(b)</p> $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 13 & 21 & 33 & 25 \\ 8 & 12 & 20 & 16 \end{pmatrix}$ $= \begin{pmatrix} 8 & 12 & 20 & 16 \\ -13 & -21 & -33 & -25 \end{pmatrix}$ <p>A'' (8, -13), B'' (12, -21), C'' (20, -33) D'' (16, -25)</p>	<p>M1</p> <p>Pre multiplication of matrices</p> <p>A1</p> <p>A2</p> <p>A1 for each two</p>
<p>(c)</p> $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 2 & 3 \\ -1 & -3 \end{pmatrix} \quad \begin{pmatrix} 1 & 2 \\ -2 & -3 \end{pmatrix}$ <p>Det. $(-3 \times 1) - (2 \times -2) = 1$</p> $\frac{1}{1} \begin{pmatrix} -3 & -2 \\ 2 & 1 \end{pmatrix} = \begin{pmatrix} -3 & -2 \\ 2 & 1 \end{pmatrix}$	<p>M1</p> <p>Accept alternatives.</p> <p>M1</p> <p>A1</p>
<p>12</p>	
<p>15</p> <p>(a)</p> $(2x)^2 + (2x+2)^2 = (3x+1)^2$ $4x^2 + 4 + 8x + 4x^2 = 9x^2 + 6x + 1$ $x^2 - 2x - 3 = 0$ $x = 3 \text{ or } x = -1$ $\therefore x = 3$ <p>Height = $2 \times 3 = 6\text{cm}$</p>	<p>M1</p> <p>Pythagoras theorem</p> <p>M1</p> <p>For quadratic</p> <p>M1</p> <p>For factorizing</p> <p>A1</p> <p>A1</p> <p>C.A.O</p>
<p>15</p> <p>(b)</p>	<p>B1</p> <p>For sketch</p>

15 (b)	$\tan 47^\circ = \frac{y}{x}$ $y = x \tan 47^\circ \dots \text{(i)}$ $\tan 30^\circ = \frac{y}{400+x}$ $y = (400+x) \tan 30^\circ$ $x \tan 47^\circ = (400+x) \tan 30^\circ$ $x \tan 47^\circ = (400+x) \tan 30^\circ$ $x = \frac{400 \tan 30^\circ}{\tan 47^\circ - \tan 30^\circ}$ $x = 466.528 \text{m.}$ $\text{Height} = 466.528 \times \tan 47^\circ$ $= 500.290 \text{m}$	M1 M1 M1 A1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1	Minimum of 2 M1s accept other alternatives ✓
16 (a)	Sketch  Accurate drawing 	B1 B1 B2 B1 B1 B1 B1 B1	Sketch For 75° QR PR bisectors circle
(b)	Radius = 4.3cm Length PQ = 6.2cm	B1 B1	radius PR
(c)	Area = $3.143 \times 4.3 \times 4.3$ = 58.1cm ²	M1 A1	✓
		12	

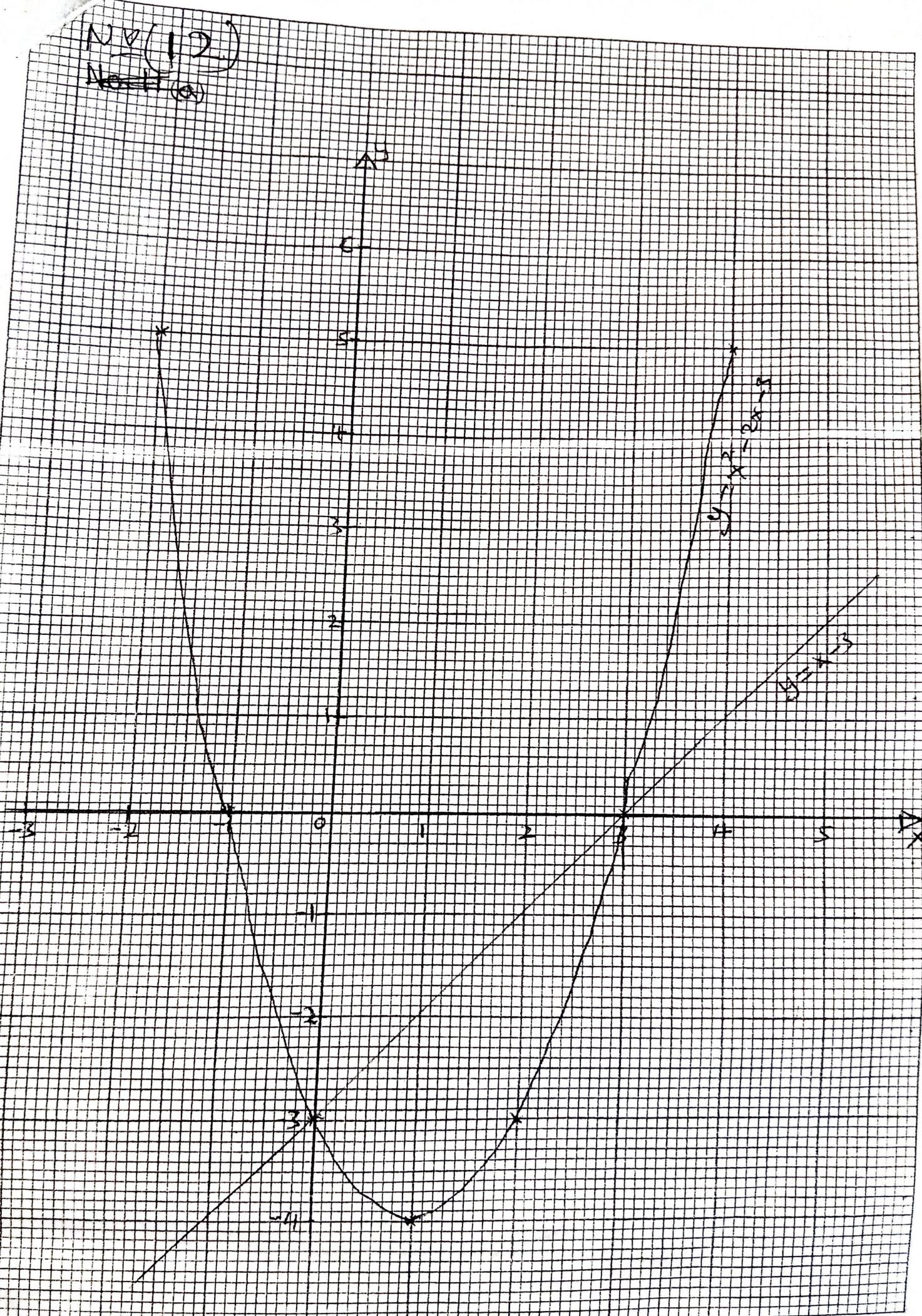
<p>17 (a)</p>	<p>(-3,3) and (7,0)</p> <p>Grad. $\frac{0-3}{7-(-3)} = \frac{-3}{10}$</p> <p>$0 = \frac{-3}{10}(7) + C$</p> <p>$C = \frac{21}{10}$</p> <p>$\therefore y = \frac{-3}{10}x + \frac{21}{10}$</p> <p>$\therefore y \geq \frac{-3}{10}x + \frac{21}{10}$</p> <p>Another line (-3,3) & (6,6)</p> <p>Grad. $\frac{6-3}{6-(-3)} = \frac{3}{9} = \frac{1}{3}$</p> <p>$6 = \frac{1}{3}(6) + C$</p> <p>$C = 4$</p> <p>$\therefore y = \frac{1}{3}x + 4$</p> <p>$y \leq \frac{1}{3}x + 4$</p> <p>another line (0,0) & (6,6)</p> <p>grad = $\frac{6-0}{6-0} = 1$</p> <p>$0 = 0 + C, C = 0$</p> <p>$y = x$</p> <p>$y \geq x$</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>B1</p>	<p>gradient</p> <p>eqn</p> <p>Inequality</p> <p>gradient</p> <p>eqn</p> <p>Inequality</p> <p>gradient</p> <p>eqn</p> <p>Inequality</p>
<p>(b)</p>	<p>Feasible points.</p> <p>(2,4) (1,4) (3,5) (4,5) (6,6)</p> <p>$\therefore (4,5) \quad \quad (4 \times 5) + (5 \times 3) = 35$</p> <p>$(6,6) \quad \quad (6 \times 5) + (6 \times 3) = 48$</p> <p>$\therefore 48$ is maximum value</p>	<p>B1</p> <p>B1</p> <p>B1</p>	<p>Including (6,6) or (7,6)</p>
		<p>12</p>	

(ii)



AN(12)

~~Next~~(3)



END