



121/1 MS
MATHEMATICS
Paper 1
June 2026
MARKING SCHEME

THE MARANDA HIGH SCHOOL MOCK COMMITTEE
MOCK EXAMINATIONS 2026
MATHEMATICS
Paper 1

MARKING SCHEME
(CONFIDENTIAL)

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121/1 MS

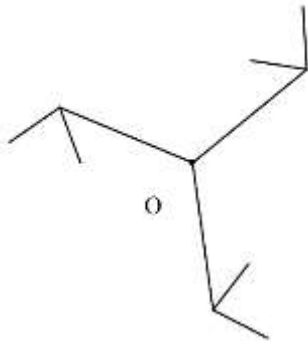


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	MARKING SCHEME		COMMENTS
1	$\frac{-4(5) - \sqrt{3} + 5}{14 + \sqrt{3}}$ $= \frac{-12}{11}$ $\therefore \frac{-12}{11} = -1 \frac{1}{11}$	M1 M1 A1	Resolution of the Numerator Resolution of the Denominator C.A.O
		03	
2	$2T = \sqrt{6 \left(\frac{8+7}{10} \right)}$ $2T = \sqrt{\left(\frac{6 \times 15}{10} \right)}$ $2T = \pm 3$ $T = \pm 1.5$	M1 M1 A1	Resolution of the fraction Square root C.A.O
		03	
3	$4200 - 3x = 3200 + x$ $x = 250$ $\text{B.P} = 3200 + 250$ $= 3450$	M1 M1 A1	Equating the expressions of the B.P 4200 - 250(3) C.A.O
		03	
4	$Y(1,3)$ $m_{AB} = \frac{4}{3}$ $m_{XY} = -\frac{3}{4}$ $-\frac{3}{4} = \frac{y-3}{x-1}$ $y = -\frac{3}{4}x + 3\frac{3}{4}$	B1 M1 A1	Coordinates of Y and Gradient of AB Substitution into the equation of line XY C.A.O
		03	
5	$8\mathbf{p} - 6\mathbf{q} = \begin{pmatrix} 20 \\ 10 \end{pmatrix}$ $3\mathbf{p} + 6\mathbf{q} = \begin{pmatrix} -42 \\ 45 \end{pmatrix}$ $11\mathbf{p} = \begin{pmatrix} -22 \\ 55 \end{pmatrix}$ $\mathbf{p} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$	M1	Attempt to get p

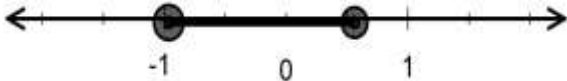


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	$\begin{pmatrix} -2 \\ 5 \end{pmatrix} + 2\mathbf{q} = \begin{pmatrix} -14 \\ 15 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -6 \\ 5 \end{pmatrix}$ $\begin{pmatrix} -2 \\ 5 \end{pmatrix} - 2\begin{pmatrix} -6 \\ 5 \end{pmatrix} = \begin{pmatrix} 10 \\ -5 \end{pmatrix}$ $\sqrt{10^2 + 5^2}$ $= 11.18 \text{ units}$	M1 M1 A1	Attempt to get q Attempt to get the modulus C.A.O																											
		04																												
6	<table><tr><th>Marks</th><th>Area</th><th>Cum. Area</th></tr><tr><td>10.5-20.5</td><td>60</td><td>60</td></tr><tr><td>20.5-30.5</td><td>80</td><td>140</td></tr><tr><td>30.5-40.5</td><td>100</td><td>240</td></tr><tr><td>40.5-50.5</td><td>120</td><td>360</td></tr><tr><td>50.5-60.5</td><td>90</td><td>450</td></tr><tr><td>60.5-70.5</td><td>70</td><td>520</td></tr><tr><td>70.5-80.5</td><td>50</td><td>570</td></tr><tr><td>80.5-90.5</td><td>30</td><td>600</td></tr></table> $\frac{1}{2} \times 600 = 300$ $360 - 300 = 60$ $12x = 60$ $x = 5$ $40.5 + 5$ $= 45.5$	Marks	Area	Cum. Area	10.5-20.5	60	60	20.5-30.5	80	140	30.5-40.5	100	240	40.5-50.5	120	360	50.5-60.5	90	450	60.5-70.5	70	520	70.5-80.5	50	570	80.5-90.5	30	600	B1 M1 M1 A1	Areas of the bars Attempt to use the areas of the bars Attempt to get the width of the strip in the median class C.A.O
Marks	Area	Cum. Area																												
10.5-20.5	60	60																												
20.5-30.5	80	140																												
30.5-40.5	100	240																												
40.5-50.5	120	360																												
50.5-60.5	90	450																												
60.5-70.5	70	520																												
70.5-80.5	50	570																												
80.5-90.5	30	600																												
		04																												
7	$\frac{360^\circ}{3} = 120^\circ$ 	B1 B1 B1	120° seen or implied in the diagram First image Second image																											
		03																												

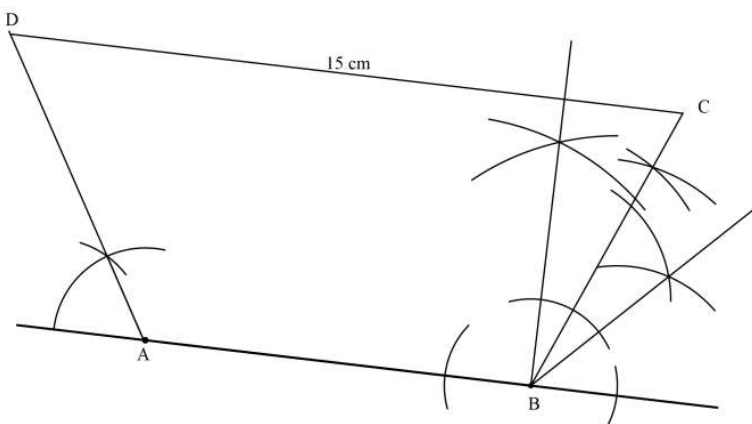


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8	$2^{-x-2} \leq 2^{2x+1} \leq 2^{-4x+4}$ $-x - 2 \leq 2x + 1 \leq -4x + 4$ $-x - 2 \leq 2x + 1$ $-1 - 2 \leq 3x$ $-1 \leq x$ $2x + 1 \leq -4x + 4$ $6x \leq 3$ $x \leq \frac{1}{2}$ $-1 \leq x \leq \frac{1}{2}$ 	M1 M1 A1 B1	Resolution of 1 st inequality $-1 - 2 \leq 2x - x$ $-3x \leq 3$ Resolution of 2 nd inequality $1 - 4 \leq -4x - 2x$ $4x + 2x \leq 4 - 1$ C.A.O (complex inequality) Illustration on the number line
		04	
9	$\log_{\sqrt{t}} 3^2 = 1$ $3^2 = \sqrt{t}$ $t = 81$	M1 A1	change from logarithmic to index C.A.O
		02	
10	$\begin{pmatrix} -4 \\ 3 \end{pmatrix} + \begin{pmatrix} -2 \\ 2 \end{pmatrix} = \begin{pmatrix} -6 \\ 5 \end{pmatrix}$ $\begin{pmatrix} 3 \\ 2 \end{pmatrix} + \begin{pmatrix} -2 \\ 2 \end{pmatrix} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ $\begin{pmatrix} 1 \\ -2 \end{pmatrix} + \begin{pmatrix} -2 \\ 2 \end{pmatrix} = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$ $A^I(-6,5), B^I(1,4) \text{ and } C^I(-1,0)$ $A^{II}(-6,-5), B^{II}(1,-4) \text{ and } C^{II}(-1,0)$	M1 A1 B1	Translation of any of the three points Coordinates of $A^I B^I C^I$ Coordinates of $A^{II} B^{II} C^{II}$
		03	
11	$x + 2(x - 6) = 86 \times 3$ $x + 2x - 12 = 258$ $x = 90$	M1 M1 A1	Equation Simplification C.A.O
		03	
12	$-3h - 8 = -3$ $h = -\frac{5}{3}$ $K^{-1} = \frac{1}{-3} \begin{bmatrix} -\frac{5}{3} & -2 \\ -4 & -3 \end{bmatrix}$	M1 M1	Equation of the determinants Attempt to get the inverse



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	$K^{-1} = \begin{bmatrix} \frac{5}{9} & \frac{2}{3} \\ 1\frac{1}{3} & 1 \end{bmatrix}$	A1	C.A.O
		03	
13	$\frac{dh}{dt} = -20t$ $v = -20(1)$ $= -20\text{ms}^{-1}$	M1 A1	Differentiation C.A.O
		02	
14		B1 B1 B1	Construction of $112\frac{1}{2}^\circ$ at B Construction of 120° at A Dropping of perpendicular from C onto 90° $15.0 \pm 0.1\text{cm}$
		04	
15	$\frac{x}{50} - \frac{x}{70} = 4$ $\frac{70x - 50x}{350} = 4$ $x = 700\text{km}$	M1 M1 A1	Equation on difference in time Simplification C.A.O
		03	
16	$\sqrt{810^2 + 650^2 - 2 \times 810 \times 650 \cos 54^\circ}$ $= 677.9838709999$ $677.9838709999 \times 1,780,000$ $= 1,206,811,000$	M1 M1 A1	Substitution into the cosine rule Attempt to get the cost C.A.O
		03	
17	a) $\frac{45}{x} \times \frac{15}{x} \times \frac{27}{x} = 675$ $x^3 = \frac{3^6 \times 5^2}{3^3 \times 5^2}$	M1 M1	Equation of the volumes Simplification($x^3 = 27$)



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	$x = 3$ $\text{Radius} = 1.50\text{cm}$ b) $45 \times 15 \times 27 - \frac{4}{3} \times \frac{22}{7} \times 1.5^3 \times 675$ $= 8678.5714285714$ $8678.5714285714 \times 0.55$ $= 4773.2142857143$ $\frac{4773.2142857143}{1000}$ $= 4.77\text{kg}$ c) $\frac{22}{7} \times r^2 \times \frac{4}{3} \times 100 = \frac{4}{3} \times \frac{22}{7} \times 1.5^3 \times 675$ $r = \sqrt{\frac{1.5^3 \times 675}{100}}$ $r = 4.77\text{cm}$	A1 M1 M1 M1 A1 M1 M1 A1	✓ C.A.O ✓ Expression of the volume of the cotton ✓ Expression of the mass of the cotton ✓ Conversion of mass to kgs ✓ C.A.O ✓ Equation of the volumes ✓ Attempt to get the radius ✓ C.A.O
		10	
18	a) i) $\frac{dy}{dx} = 3ax^2 + 2x + 8$ $3a(2)^2 + 2(2) + 8 = -3$ $a = -1\frac{1}{4}$ ii) when $x = 2$ $y = -1\frac{1}{4}(2)^3 + (2)^2 + 8(2) + 2$ $= 12$ $-3 = \frac{y - 12}{x - 2}$ $-3x + 6 = y - 12$ $y = -3x + 18$ b) $\frac{dy}{dx} = 4x - 4$ $4x - 4 = 0$ $\text{when } x = 1 \quad y = 1$ $\text{turning point is } (1,1)$	M1 M1 A1 B1 M1 M1 A1 M1 A1	✓ Gradient function ✓ Attempt to solve for a ✓ C.A.O ✓ y-ordinate of the point ✓ Attempt of getting the eqn of the tangent ✓ Simplification ✓ C.A.O ✓ Attempt to get x-ordinate of the turning point ✓ co-ordinates of the turning point



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	<table border="1"> <tr> <td>x</td><td>0</td><td>1</td><td>2</td></tr> <tr> <td>$\frac{dy}{dx}$</td><td>-4</td><td>0</td><td>4</td></tr> <tr> <td>Nature</td><td></td><td></td><td></td></tr> </table>	x	0	1	2	$\frac{dy}{dx}$	-4	0	4	Nature					
x	0	1	2												
$\frac{dy}{dx}$	-4	0	4												
Nature															
	The point (1,1) is a minimum point	B1	Testing of the turning point and conclusion												
		10													
19	a) i) $\frac{5}{x}$ ii) $\frac{7}{x+24}$ b) $\frac{5}{x} - \frac{7}{x+24} = \frac{3}{5}$ $25x + 600 - 35x = 3x^2 + 72x$ $3x^2 + 82x - 600 = 0$ $x = \frac{-82 \pm \sqrt{82^2 + 4 \times 3 \times 600}}{6}$ $x = \frac{-82 \pm 118}{6}$ $x = 6$ or $x = \frac{-200}{6}$ $\therefore x = 6\text{km/h}$ Hence $6 + 24 = 30\text{km/h}$ c) $\frac{5}{6} \times 60 = 50$ $50 - 5 = 45$ $\frac{5 \times 4}{3} = 6\frac{2}{3}$	B1 Expression of time when walking B1 Expression of time when using bus M1 Attempt to form the quadratic equation M1 Quadratic equation (Accept equivalent quadratic equations) M1 Resolution of the discriminant or factorisation A1 Roots of the quadratic equation B1 Speed of the bus M1 Usual time M1 Attempt to calculate the speed A1 C.A.O													
		10													
20	a) $\frac{x}{y} = \frac{3}{7}$	M1	Equation representing the number of livestock as at the start of the year												



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	$x = \frac{3}{7}y$ $\frac{x - 20}{y - 40} = \frac{5}{12}$ $12x - 240 = 5y - 200$ $12x - 5y = 40$ $12\left(\frac{3}{7}y\right) - 5y = 40$ $\frac{1}{7}y = 40$ $y = 280$ $x = \frac{3}{7} \times 280$ $= 120$ b) $\frac{8}{5} \times 100$ $= 160$ $\frac{85}{100} \times 240$ $= 204$ $51:40$ c) $78,474,000 - 315,000 \times 204$ $= 14,214,000$ $\frac{14,214,000}{160}$ $= 88,837.50$	M1 M1 A1 M1 M1 A1 M1 M1 A1	Equation representing the number of livestock after selling some in early February Attempt to solve for one unknown C.A.O (for both 120 and 280) Expression of the number of bulls as at the end of June Expression of the number of camels as at the end of June C.A.O (simplified ratio) Attempt to calculate the money received from the sale of bulls Attempt to determine the average price of each bull C.A.O
		10	
21	a) i) 49° ii) $\angle AOC = 49^\circ \times 2$ $= 98^\circ$ Reflex angle $AOC = 360^\circ - 98^\circ$ $= 262^\circ$ $\angle ABC = \frac{1}{2} \times 262^\circ$ $= 131^\circ$ b) $(AC + 5.7)5.7 = 8.1^2$	B1 M1 M1 A1 M1	C.A.O Relation between angle subtended to the centre and circum. Expression of the reflex angle at the centre C.A.O Relation on externally intersecting chords



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	$AC = \frac{8.1^2 - 5.7^2}{5.7}$ $= 5.8\text{cm}$ c) $\frac{5.8}{\sin 49^\circ} = 2R$ $R = \frac{2.9}{\sin 49^\circ}$ $= 3.8\text{cm}$	M1 A1 M1 M1 A1	Attempt to get AC C.A.O Application of sine Rule Attempt to get the radius C.A.O (38mm or 0.038m)
		10	
22	a) $(r - 1)^2 + 2.5^2 = r^2$ $r = 3.625$ $\sin \theta = \frac{2.5}{3.625}$ 43.602818975° $\frac{87.20563795^\circ}{360^\circ} \times 3.142 \times 3.625^2$ $= 10.00147987$ $\frac{1}{2} \times 3.625^2 \sin 87.20563795^\circ$ $= 6.5625$ $A = 40 + (10.00147987 - 6.5625)$ $= 43.43897987$ b) $\frac{320}{8} = 40$ $40^2 = 1600$ 1600×43.43897987 $= 69502.36779$ 69502.36779×4 $= 278009$ c) $\frac{278009}{1000000} \times 587,200$ $= 163,246.8848$ $\frac{130}{100} \left(\frac{120}{100} \times 163,246.8848 \right)$ $= 254,700$	M1 M1 M1 M1 A1 B1 M1 A1 M1 A1	Application of the Pythagorean in calculating the radius Attempt to get angle subtending the arc Attempt to get area of the segment Attempt to get area of the triangle. Follow through ASF Attempt Area of cross section Follow through Expression for the cost of the timber Price of the door
		10	



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23	a) b) N21°E c) $A = \frac{1}{2} \times 69 \times 12 \sin 59^\circ + \frac{1}{2} \times 69 \times 55 \sin 30^\circ$ $= 1303.6172624907 \text{ km}^2$ $= 1303.6172624907 \times 100 \text{ ha}$ $= 130362 \text{ ha}$ d) 130362×260 $= 33,894,120$	B1 ✓ Location A from X B1 ✓ Location W from A B1 ✓ Location Y from A B1 ✓ Location Z from W B1 ✓ compass bearing of Estate X from Estate z M1 ✓ Expression of the area of two triangles M1 ✓ Correct conversion of area A1 ✓ Follow through M1 ✓ Attempt to get the population A1 ✓ Follow through																																	
		10																																	
24	<table><tr><th>x</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th></tr><tr><td>Curve A</td><td>6.6</td><td>6.4</td><td>6.3</td><td>6.3</td><td>6.4</td><td>6.5</td><td>6.8</td><td>7.2</td><td>7.7</td><td>8.2</td></tr><tr><td>Curve B</td><td>8.2</td><td>9.4</td><td>10.2</td><td>10.6</td><td>10.9</td><td>11.0</td><td>10.9</td><td>10.6</td><td>10.2</td><td>9.4</td></tr></table> b) $h = \frac{10 - 2}{4}$ $= 2 \text{ units}$ $A_A = \frac{1}{2} \times 2 \{ (6.6 + 7.7) + 2(6.3 + 6.4 + 6.8) \}$ $= 53.3$ $A_B = \frac{1}{2} \times 2 \{ (8.2 + 10.2) + 2(10.2 + 10.9 + 10.9) \}$ $= 82.4$ $A = 82.4 - 53.3$ $= 29.1$ c) $w = \frac{11 - 3}{4}$	x	2	3	4	5	6	7	8	9	10	11	Curve A	6.6	6.4	6.3	6.3	6.4	6.5	6.8	7.2	7.7	8.2	Curve B	8.2	9.4	10.2	10.6	10.9	11.0	10.9	10.6	10.2	9.4	B1 ✓ Values of y-ordinates on curve A B1 ✓ Values of y-ordinates on curve B M1 ✓ Attempt to determine the perpendicular height of each trapezium M1 ✓ Area under curve A using trapezoidal rule M1 ✓ Area under curve B using trapezoidal rule A1 ✓ C.A.O M1 ✓ Attempt to determine the width of each rectangle
x	2	3	4	5	6	7	8	9	10	11																									
Curve A	6.6	6.4	6.3	6.3	6.4	6.5	6.8	7.2	7.7	8.2																									
Curve B	8.2	9.4	10.2	10.6	10.9	11.0	10.9	10.6	10.2	9.4																									

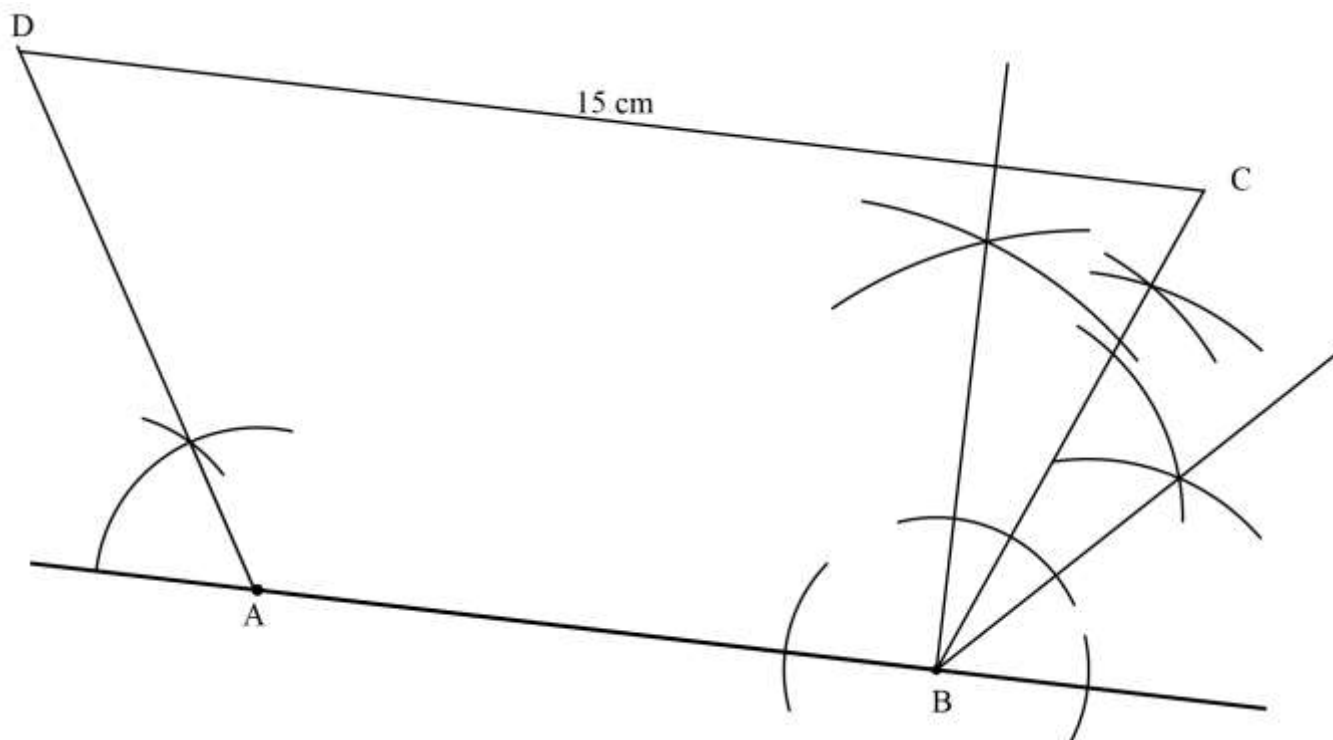


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	$= 2 \text{ units}$ $A_A = 2\{6.3 + 6.4 + 6.8 + 7.7\}$ $= 54.4$ $A_B = 2\{10.2 + 10.9 + 10.9 + 10.2\}$ $= 84.4$ $A = 84.4 - 54.4$ $= 30$	M1 M1 A1	Area under curve A using mid-ordinate rule Area under curve B using mid-ordinate rule C.A.O
		10	

Appendices:

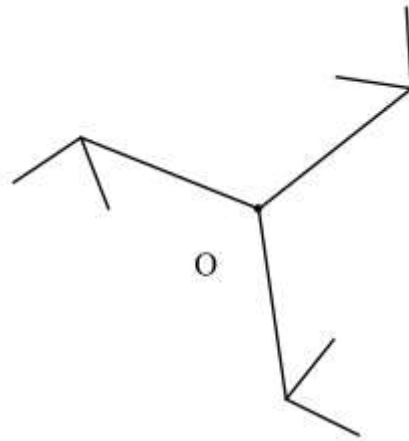
Question 14



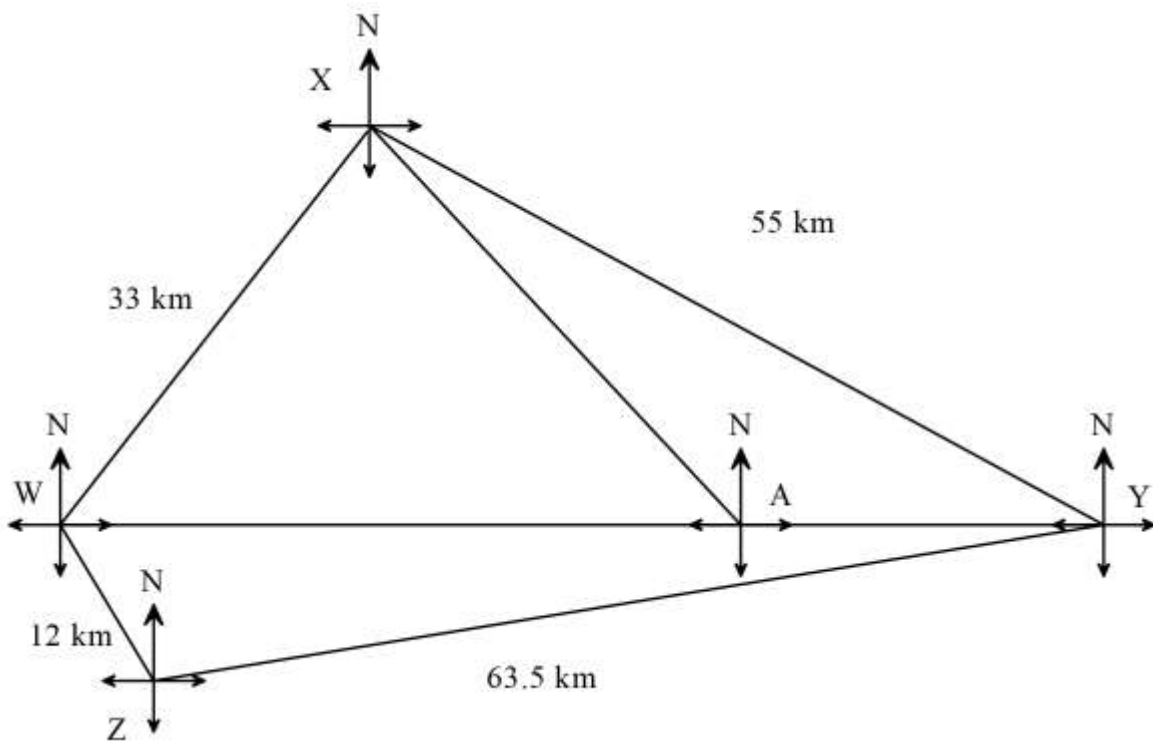
Question 7



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Question 22



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