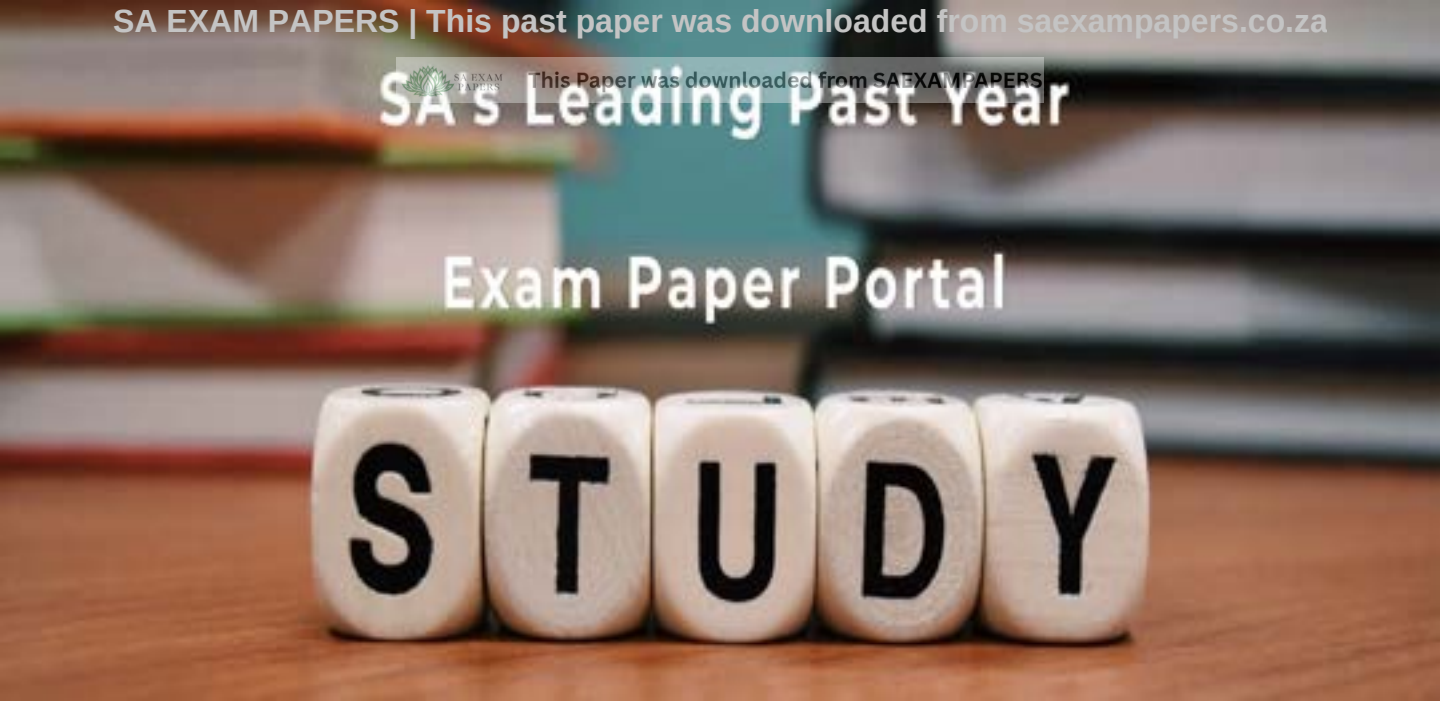


education
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS P2

AUGUST 2025 (PRE -TRIAL)

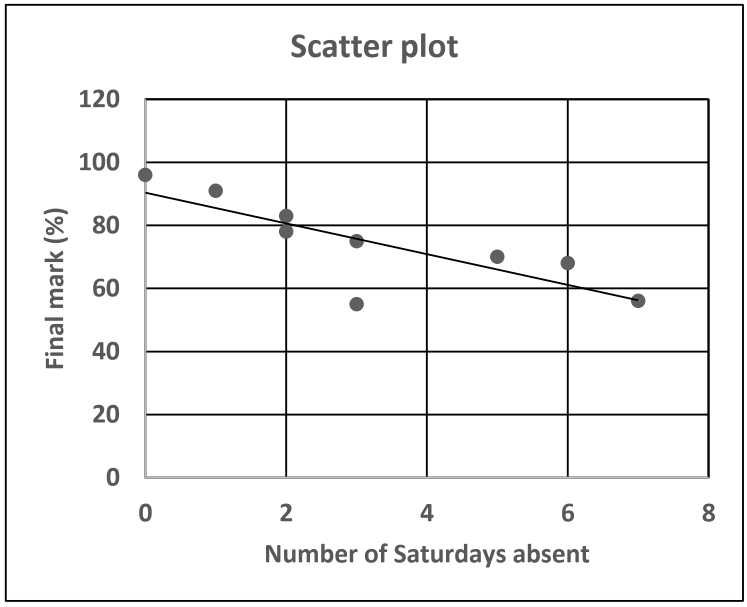
MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 17 pages.

NOTE:

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/ answers to solve a problem is unacceptable.

QUESTION 1		
		✓ y-intercept ✓ *passing through mean pt* $(3{,}2; 74{,}67)$) (2)
1.1	$A = 90{,}375$ $B = -4{,}875$ $\hat{y} = 90{,}38 - 4{,}88x$	✓ *value of A* ✓ *value of B* ✓ *equation* (3)
1.2	$r = -0{,}80$	✓ *answer* (1)
1.3	Negative strong correlation	✓ *negative* ✓ *strong* (2)
1.4	$52 = 90{,}38 - 4{,}88x$ $x = 7{,}86$ 8 days	✓ $52 = 90{,}38 - 4{,}88x$ ✓ $x = 7{,}86$ (2)
1.5	The answer is reliable since there is a strong negative correlation.	✓ Reliable ✓ Explanation (2)
		[10]

QUESTION 2

2.1

Marks	Frequency	Cumulative frequency
$0 < x \leq 10$	20	20
$10 < x \leq 20$	40	60
$20 < x \leq 30$	60	120
$30 < x \leq 40$	50	170
$40 < x \leq 50$	20	190
$50 < x \leq 60$	10	200
	$n = 200$	

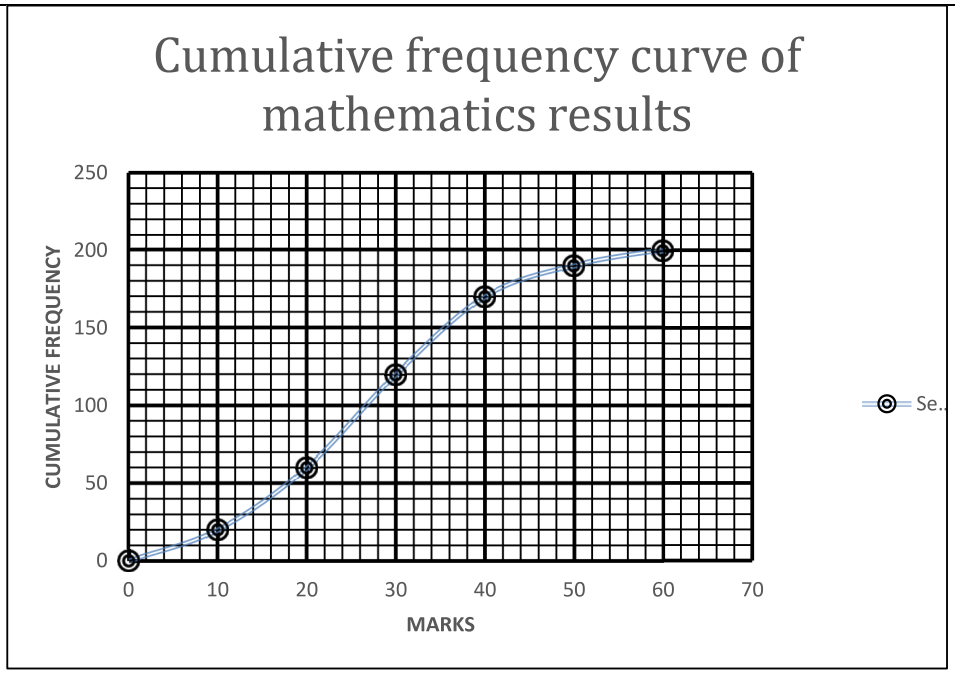
✓ 20
✓ Other vales
(2)

2.2

200

✓ *answer*
(1)

2.3



✓ All points
✓ Shape
✓ Grounding
(3)

2.4

$200 - 60$
$= 140$

✓ 60
✓ 140
(2)

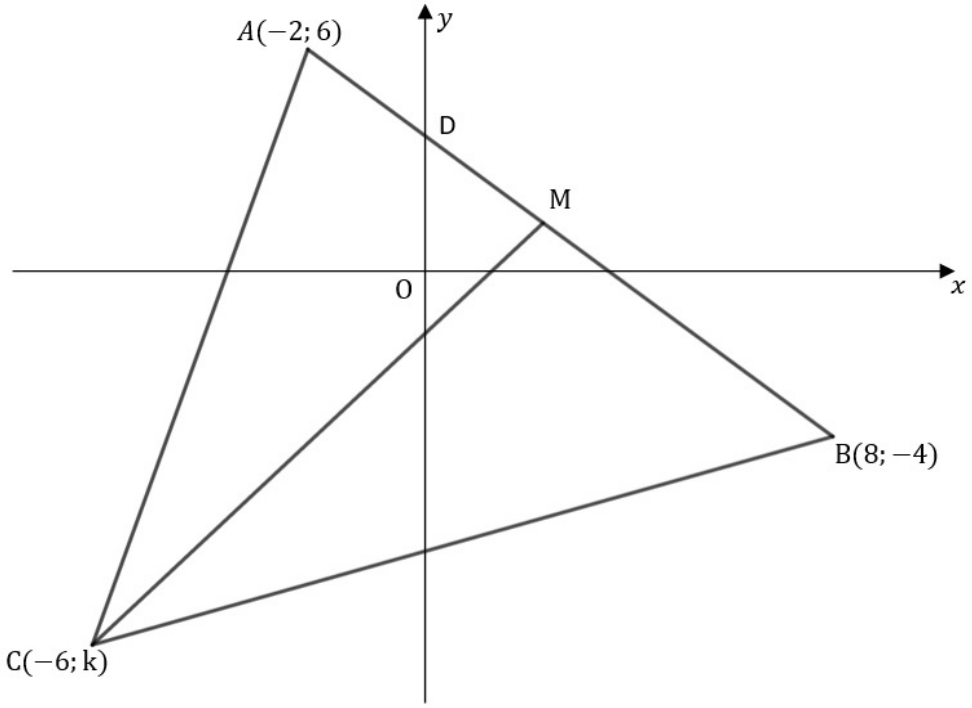
2.5

$$\bar{x} = \frac{(5 \times 20) + (15 \times 40) + (25 \times 60) + (35 \times 50) \ldots + (55 \times 10)}{200}$$
$$= \frac{5400}{200}$$
$$= 27$$

✓ *midpoints*
✓ *sum*
✓ Answer
(3)

[11]

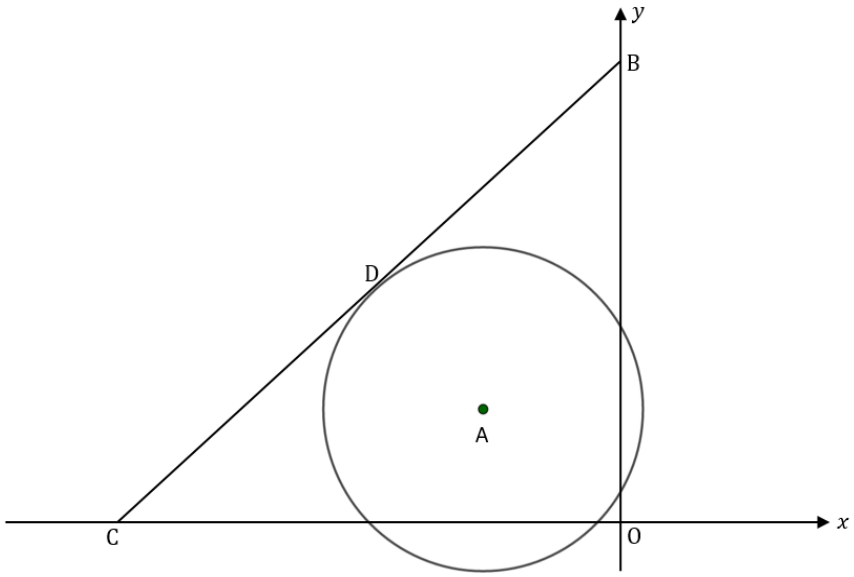
QUESTION 3



3.1	$M\left(\frac{-2+8}{2}; \frac{6-4}{2}\right)$ $M(3; 1)$	✓ *substitution* ✓ *answer* (2)
3.2	$AB = \sqrt{(-2+8)^2 + (6-4)^2}$ $AB = 10\sqrt{2}$ units $10\sqrt{2} = \sqrt{(-6+8)^2 + (k+4)^2}$ $200 = 196 + (k+4)^2$ $4 = k^2 + 8k + 16$ $0 = k^2 + 8k + 12$ $(k+6)(k+2) = 0$ $k = -6$ OR $k \neq -2$	✓ *substitution* ✓ *Length of AB* ✓ *Equating* ✓ *Simplification* ✓ *Factorisation* ✓ *Conclusion* (6)
3.3	$m_{cm} = \frac{1+6}{3+6} = \frac{7}{9}$ $y = mx + c$ $1 = \frac{7}{9}(3) + c$ $c = \frac{-4}{3}$ $y = \frac{7}{9}x - \frac{4}{3}$	✓ *substitution* ✓ *Gradient* ✓ *Substitution* ✓ *Value of c* ✓ *Equation* ✓ *Answer* (5)
3.4	(12; 8)	✓ *x − value* ✓ *y-value* (2)

3.5	$2y = mx + 1$ $y = \frac{1}{2}mx + \frac{1}{2}$ $\tan 116{,}56 = \frac{m}{2}$ $m = -4$ $y = \frac{1}{2}(-4)x + \frac{1}{2}$ $y = -2x + \frac{1}{2}$	✓ *dividing by 2* ✓ *equation* ✓ *gradient* ✓ *equation* (4)
3.6	$D(3;9)$	✓ 3 ✓ 9 (2)
3.7	$m_{AB} = \frac{3-(-3)}{-5-(-3)} = -3$ $\tan\beta = -3$ $\beta = 108{,}43°$ $\tan\alpha = \frac{3}{4}$ $\alpha = 36{,}87°$ $\hat{B} = 108{,}43° - 36{,}87°$ $= 71{,}56°$ OR $AB = \sqrt{(-5+3)^2 + (-3-3)^2} = 2\sqrt{10}$ $AC = 10 \quad and\ BC = 10$ $(10)^2 = (10)^2 + \left(2\sqrt{10}\right)^2 - 2(10)(2\sqrt{10})\cos B$ $\cos B = \frac{\sqrt{10}}{10}$ $\hat{B} = 71{,}57°$	✓ $m_{AB} = -3$ ✓ $\tan\beta = -3$ ✓ $108{,}43°$ ✓ $36{,}87°$ ✓ *answer* (5) OR ✓ *substitution* ✓ $AB = 2\sqrt{10}$ ✓ $AC = 10$ ✓ $\cos B = \frac{\sqrt{10}}{10}$ ✓ *answer* (5)
3.8	area $\Delta ABC = \frac{1}{2}(10)\left(2\sqrt{10}\right)\sin 71{,}57°$ $= 30\ units^2$ OR $h_{\perp} = 6$ $AC = 10$ area $\Delta ABC = \frac{1}{2}(10)(6)$ $= 30\ units^2$	✓ $2\sqrt{10}$ ✓ *substitution* ✓ *answer* (3) OR ✓ $h_{\perp} = 6$ ✓ *substitution* ✓ *answer* (3)
		[24]

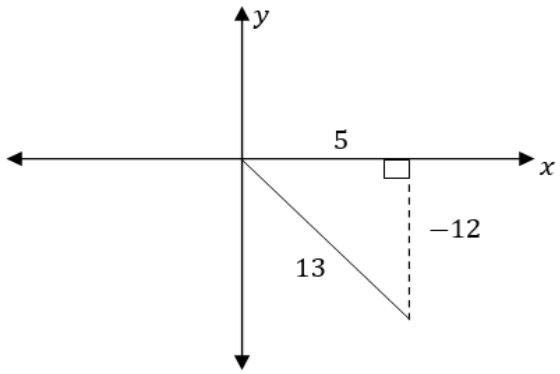
QUESTION 4



4.1	$x^2 + 6x + (3)^2 + y^2 - 6y + (-3)^2$ $= -1 + (3)^2 + (-3)^2$ $(x+3)^2 + (y-3)^2 = 17$ $A(-3;3)$	✓ $(x+3)^2 + (y-3)^2$ ✓ 17 ✓ $x = -3$ ✓ $y = 3$ (4
4.2	$r = \sqrt{17}$	✓ Answer
4.3	$m_{rad} = \dfrac{\frac{31}{5} - 3}{-\frac{28}{5} - (-3)}$ $= -\dfrac{16}{13}$ $m_{tan} = \dfrac{13}{16}$ $y = mx + c$ $y = \dfrac{13}{16}x + c$ $\dfrac{31}{5} = \dfrac{13}{16}\left(-\dfrac{28}{5}\right) + c$ $c = \dfrac{43}{4}$ $y = \dfrac{13}{16}x + \dfrac{43}{4}$	✓ Substitution ✓ $m_{rad} = \frac{13}{16}$ ✓ $m_{tan} = \frac{13}{16}$ ✓ $subst\ \frac{13}{16}\ and\ D\left(-\frac{28}{5};\frac{31}{5}\right)$ ✓ Equation (5)

4.4	$B\left(0;\frac{43}{4}\right) \Rightarrow OB = \frac{43}{4}$ $0 = \frac{13}{16}x + \frac{43}{4}$ $x = -\frac{172}{13} \Rightarrow OC = \frac{172}{13}$ Area $\triangle$BCO$= \frac{1}{2}\left(\frac{172}{13}\right)\left(\frac{43}{4}\right)$ $= \frac{1849}{26}\ units^2$	✓ $OB = \frac{43}{4}$ ✓ $x = -\frac{172}{13}$ ✓ Substitution into area formula ✓ Answer (4)
4.5	$(x+3)^2 + (y-3)^2 = 17$ $(x+3)^2 + (-y-3)^2 = 17$ $(x+3)^2 + (y+3)^2 = 17$ OR $x^2 + 6x + y^2 - 6y = -1$ $x^2 + 6x + y^2 + 6y = -1$	✓ $(y+3)^2$ ✓ Answer (2) OR ✓ $+6y$ ✓ Answer (2)
4.6	Let $y = 0$ $x^2 + 6x = -1$ $x^2 + 6x + 1 = 0$ $x = \frac{-6 \pm \sqrt{(6)^2 - 4(1)(1)}}{2(1)}$ $x = -3 - 2\sqrt{2}$ or $x = -3 + 2\sqrt{2}$ $chord = -3 + 2\sqrt{2} - (-3 - 2\sqrt{2})$ $= 4\sqrt{2}$	✓ $y = 0$ ✓ Standard form ✓ Substituon ✓ Both solutions ✓ $4\sqrt{2}$ (5)
		[21]

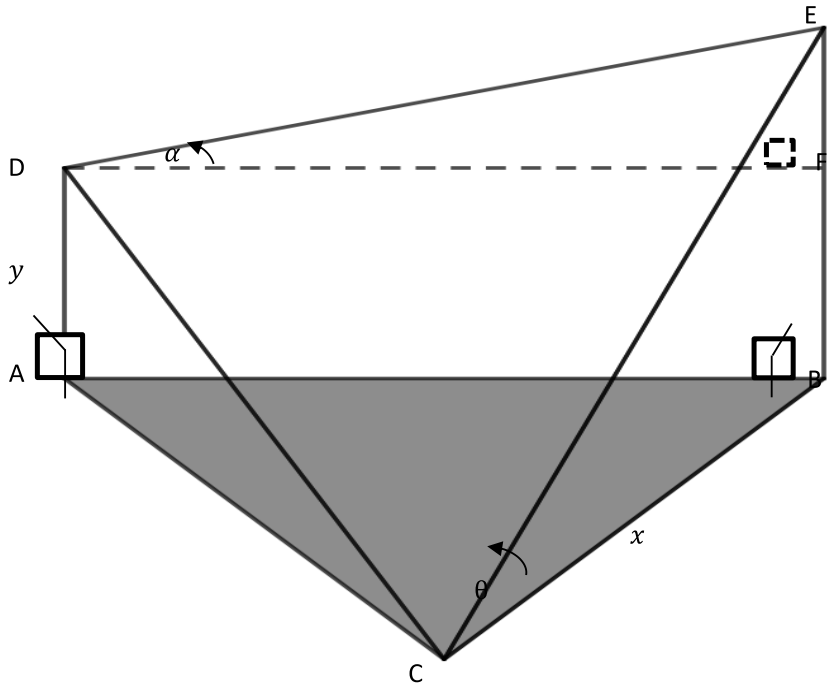
QUESTION 5		
5.1	$\sin(A-B) = \cos[90° - (A-B)]$ $= \cos[90° - A + B]$ $= \cos[(90° - A) - (-B)]$ $= \cos(90° - A)\cos(-B) + \sin(90° - A)\sin(-B)$ $= \sin A \cos B - \cos A \sin B$	✓ $\cos[90° - (A-B)]$ ✓ $\cos[(90° - A) - (-B)]$ ✓ *expansion* (3)

5.2.1	 $\sin 2\theta = 2\sin\theta\cos\theta$ $= 2\left(-\frac{12}{13}\right)\left(\frac{5}{13}\right)$ $= -\frac{120}{169}$	✓ 4^{th} *quadrant* ✓ $x = 5$ ✓ $\sin 2\theta = 2\sin\theta\cos\theta$ ✓ *substitution* ✓ *answer* (5)
5.2.2	$\cos(\theta + 30°) = \cos\theta\cos 30° - \sin\theta\sin 30°$ $= \left(\frac{5}{13}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(-\frac{12}{13}\right)\left(\frac{1}{2}\right)$ $= \frac{5\sqrt{3}+12}{26}$	✓ *expansion* ✓ *subst* $-\frac{12}{13}$ *and* $\frac{5}{13}$ ✓ *subst* $\frac{\sqrt{3}}{2}$ *and* $\frac{1}{2}$ ✓ *answer* (4)
5.3(a)	$\frac{\sin 35°\cos 35°}{\tan 225°\cos 200°}$ $= \frac{\sin 35°\cos 35°}{\tan 45°(-\sin 70°)}$ $= \frac{\sin 35°\cos 35°}{(-1)\sin 70°)}$ $= \frac{\sin 35°\cos 35°}{(-1)2\sin 35°\cos 35°}$ $= -\frac{1}{2}$ **OR** $\frac{\sin 35°\cos 35°}{\tan 45°(-\cos 20°)} \times \frac{2}{2}$ $= \frac{\sin 70°}{2(-1)\cos 20°}$ $= \frac{\sin 70°}{-2\sin 70°}$ $= -\frac{1}{2}$	✓ $\tan 45°$ ✓ $-\sin 70°$ ✓ -1 ✓ $2\sin 35°\cos 35°$ ✓ $-\frac{1}{2}$ (5) **OR** ✓ $\tan 45°$ ✓ $-\cos 20°$ ✓ $\sin 70°$ *in numerator* ✓ $\sin 70°$ *in denominator* (4)
5.3(b)	$1 - \sin^2 22{,}5°$	

	$= \frac{2 - 2\sin^2 22{,}5°}{2}$ $= \frac{1 + (1 - 2\sin^2 22{,}5°)}{2}$ $= \frac{1 + \cos 45°}{2}$ $= \frac{1 + \frac{\sqrt{2}}{2}}{2}$ $= \frac{2 + \sqrt{2}}{4}$	✓ $\frac{2 - 2\sin^2 22{,}5°}{2}$ ✓ $\frac{1 + (1 - 2\sin^2 22{,}5°)}{2}$ ✓ $\frac{1 + \cos 45°}{2}$ ✓ $\frac{1 + \frac{\sqrt{2}}{2}}{2}$ (4)
5.4.1	$(3\sin P + 4\cos Q)^2 = (6)^2$ $9\sin^2 P + 24\sin P\cos Q + 16\cos^2 Q = 36$ $(4\sin Q + 4\cos P)^2 = (1)^2$ $16\sin^2 Q + 24\sin Q\cos P + 9\cos^2 P = 1$ *adding* $9(\sin^2 P + \cos^2 Q) + 16(\sin^2 Q + \cos^2 Q) +$ $24\sin P\cos Q + 24\sin Q\cos P = 37$ $9 + 16 + 24(\sin P\cos Q + \sin Q\cos P) = 37$ $24(\sin P\cos Q + \sin Q\cos P) = 12$ $\sin P\cos Q + \sin Q\cos P = \frac{1}{2}$ $\therefore \sin(P + Q) = \frac{1}{2}$	✓ *squaring both sides* ✓ *squaring both sides* ✓ *adding the equations* ✓ *simplification* ✓ $24(\sin P\cos Q +$ $\sin Q\cos P) = 12$ ✓ $\sin P\cos Q +$ $\sin Q\cos P = \frac{1}{2}$ (6)
5.4.2	$\hat{P} + \hat{Q} + \hat{R} = 180°$ $\hat{P} + \hat{Q} = 180° - \hat{R}$ $\sin(P + R) = \sin(180° - R)$ $\sin(P + R) = \sin R$ $\sin R = \frac{1}{2}$ $\hat{R} = 30°$	✓ $\sin(P + R) =$ $\sin(180° - R)$ ✓ $\sin(P + R) = \sin R$ ✓ $\sin R = \frac{1}{2}$ ✓ $\hat{R} = 30°$ (4)
		[30]

QUESTION 6			
6.1.1	$y = -1$	✓ *answer*	(1)
6.1.2	$amplitude = 1$	✓ *answer*	(1)
6.1.3	$b = 2$	✓ *answer*	(1)
6.1.4	$(-45°; 0)$ *and* $(45°; 0)$	✓ $(-45°; 0)$ ✓ $(45°; 0)$	(2)
6.2	$-90° \leq x < 0$ *or* $0° < x \leq 90°$	✓✓ $-90° \leq x < 0$ ✓ $0° < x \leq 90°$	(3)
			[8]

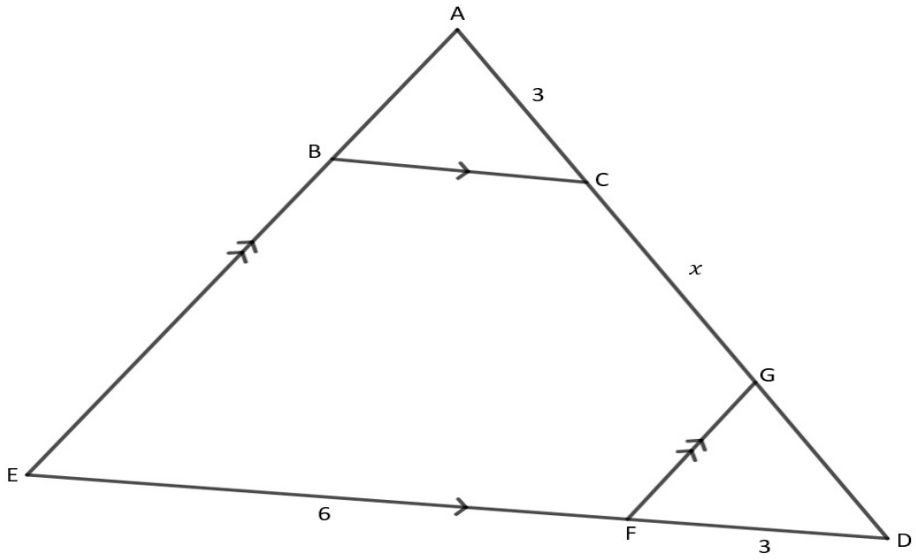
QUESTION 7



7.1	*In* ΔBCE: $\tan\theta = \frac{EB}{x}$ $EB = x\tan\theta$ *In* ΔDEF: $\sin\alpha = \frac{EF}{DE}$ $DE = \frac{EF}{\sin\alpha}$ $BF = AD = y$ ∣ *sides of rectangles* $EF = EB - y$ $= x\tan\theta - y$ $DE = \frac{x\tan\theta - y}{\sin\alpha}$ Q. E. D	✓ $\tan\theta = \frac{EB}{x}$ ✓ $EB = x\tan\theta$ ✓ $DE = \frac{EF}{\sin\alpha}$ ✓ $BF = y$ ✓ $EF = EB - y$ (5)
7.2	$DF^2 = DE^2 - EF^2$ ∣ *Pythagoras* $DF^2 = \left(\frac{x\tan\theta - y}{\sin\alpha}\right)^2 - (x\tan\theta - y)^2$ $= \left(\frac{1000\tan 45° - 250}{\sin 45°}\right)^2 - (1000\tan 45° - 250)^2$ $\therefore DF = 750m$ **OR**	✓ *subst given info* ✓ *subst into Pythagoras* ✓ *answer* (3) **OR**

	$\tan\alpha = \frac{EF}{DF}$ $DF = \frac{EF}{\tan\alpha}$ $DF = \frac{x\tan\alpha - y}{\tan\alpha}$ $= \frac{1000\tan 45° - 250}{\tan 45°}$ $\therefore DF = 750m$	✓ $\tan\alpha = \frac{EF}{DF}$ ✓ *substitution* ✓ *answer* (3)
		[8]

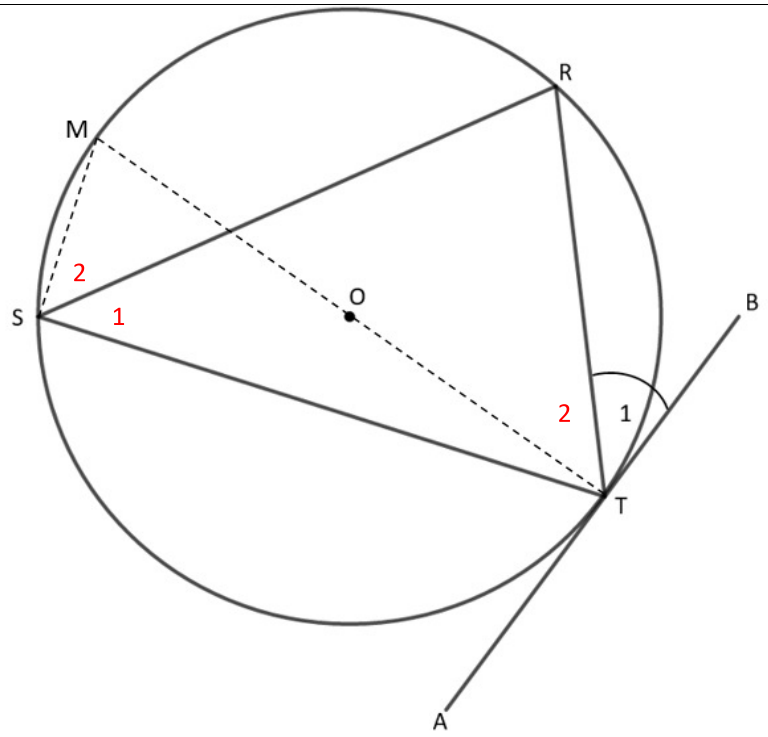
QUESTION 8



8.1	$\frac{CD}{CA}=\frac{DF}{FE}$ ∣ *prop theorem, GF ∥AE* $\frac{CD}{3}=\frac{3}{1}$ $CD=9$	✓ S ✓ R ✓ $CD=9$ (3)
8.2	$GD=9-x$ $\frac{9-x}{12}=\frac{3}{9}$ ∣ *prop theorem, GF ∥AE* $x=5$	✓ $GD=9-x$ ✓ *S* ✓ *R* ✓ *answer* (4)
8.3	In ΔABC and ΔAED: $\hat{A}=\hat{A}$ ∣ *common* $\hat{B}=\hat{E}$ ∣ *corresp < s, BC ∥ED* $\hat{C}=\hat{D}$ *corresp < s, BC ∥ED* $\therefore \Delta ABC \Vert\Vert \Delta AED$ ∣ *AAA* $\frac{BC}{ED}=\frac{AC}{AD}=\frac{AB}{AE}$ ∣ *∥∥∆s* $\frac{BC}{9}=\frac{3}{12}$ $BC=\frac{9}{4}$ **OR** $\frac{AB}{AE}=\frac{1}{4}$	✓ *S* ✓ S/R ✓ S/R ✓ S ✓ *answer* (5) **OR** ✓ $\frac{AB}{AE}=\frac{1}{4}$

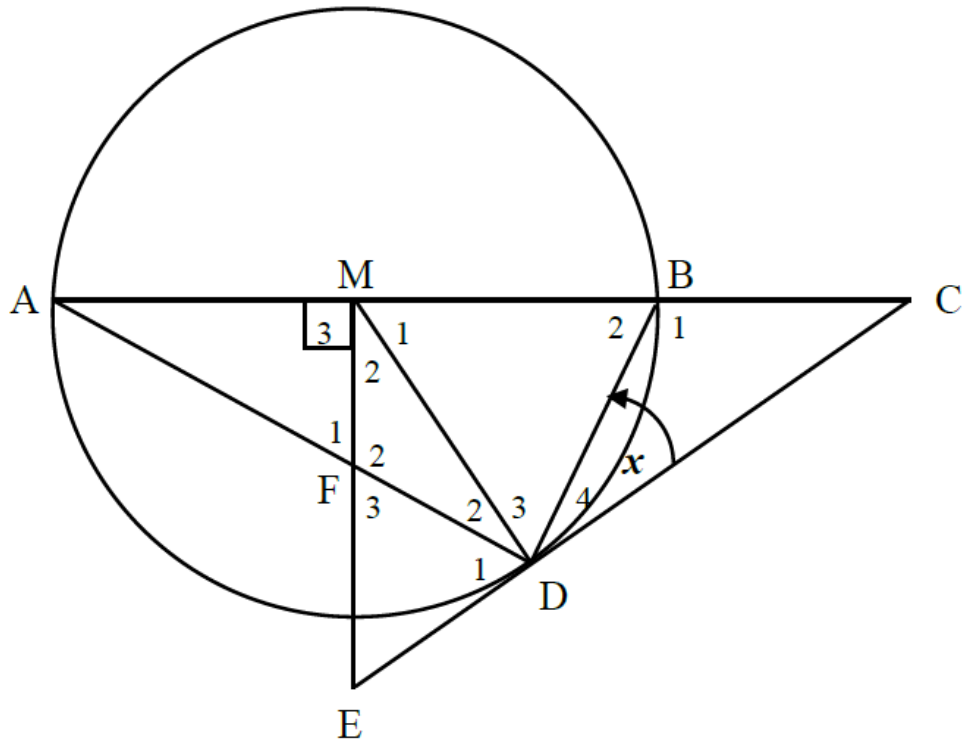
	$\frac{AC}{AD}=\frac{3}{12}=\frac{1}{4}$ $\therefore \frac{AB}{AE}=\frac{AC}{AD} \quad \mid =\frac{1}{4}$ $\therefore \Delta ABC \ \|\|\| \ \Delta AED \quad \mid \ sides\ of\ \Delta s\ in\ prop$ $\frac{BC}{ED}=\frac{AC}{AD}=\frac{AB}{AE} \quad \mid \ \|\|\|\Delta s$ $\frac{BC}{9}=\frac{3}{12}$ $BC=\frac{9}{4}$	✓ $\frac{AC}{AD}=\frac{1}{4}$ ✓ S/R ✓ *ratios* ✓ *answer* (5)
8.4	$\hat{C}=\hat{D} \ \ corresp<s, \ \ BC \ \|\|ED$ $\frac{area\Delta ABC}{area\Delta GFD}=\frac{\frac{1}{2}BC.AC\sin C}{\frac{1}{2}FD.GD\sin D}$ $=\frac{BC.AC}{FD.GD}$ $=\frac{\frac{9}{4}\times 3}{3\times 4}$ $=\frac{9}{16}$	✓ $\hat{C}=\hat{D}$ ✓ $\frac{1}{2}BC.AC\sin C$ ✓ $\frac{1}{2}FD.GD\sin D$ ✓ $\frac{\frac{9}{4}\times 3}{3\times 4}$ ✓ *answer* (5)
		[17]

QUESTION 9



construction: Draw diameter TOM and join SM. $\hat{T}_1 + \hat{T}_2 = 90°$ ∣ $< s$ *in semi circle* $\hat{S}_1 + \hat{S}_2 = 90°$ ∣ $tan \perp radius$ $\hat{S}_2 = \hat{T}_2$ ∣ $< s$ *in the same seg*	✓ *construction* ✓ S /R ✓ S ✓ R ✓ S /R
	[19]

QUESTION 10



10.1	$\hat{A} = \hat{D}_4 = x$ ǀ tan-chord theorem $\hat{D}_2 = \hat{A} = x$ ǀ $< s\ opp = sides$	✓ S ✓ R ✓ S/R (3)
10.2	$\hat{M}_1 = 2x$ ǀ $ext < of\ \Delta MAD$ $\hat{M}_2 = \hat{D}_1 + \hat{D}_2 = 90°$ ǀ $tan \perp radius$ $\hat{M}_2 = 90° - 2x$ $\hat{E} = 2x$ ǀ $sum\ of < s\ in\ \Delta MED$ $\hat{E} = \hat{M}_1 = 2x$ $MC\ is\ a\ tangent\ at\ M$ ǀ $converse$ tan $chord\ theorem$	✓ S ✓ S/R ✓ $\hat{E} = 2x$ ✓ R (4)
10.3	$\hat{D}_2 + \hat{D}_3 = 90°$ ǀ $< s\ in\ semi\ circle$ $\hat{M}_3 = 90°$ ǀ $given$ $\hat{M}_3 = \hat{D}_2 + \hat{D}_3 = 90°$ $FMBD$ is a cyclic quad ǀ converse ext < of cyclic quad **OR** $\hat{F}_1 = 90° - x$ ǀ $sum\ of < s\ in\ \Delta AMF$ $\hat{B}_2 = \hat{D}_3 = 90° - x$ ǀ $< s\ opp = sides$ $\hat{F}_1 = \hat{B}_2 = 90° - x$	✓ S/R ✓ $\hat{M}_3 = \hat{D}_2 + \hat{D}_3$ ✓ R (3) **OR** ✓ S ✓ S/R

	$FMBD$ is a cyclic quad ǀ converse ext < of cyclic quad	✓ R (3)
10.4	In ΔMDC: $MC^2 = MD^2 + DC^2$ ǀ *Pythagoras* $(3BC)^2 = (2BC)^2 + DC^2$ $9BC^2 = 4BC^2 + DC^2$ $DC^2 = 5BC^2$	✓ $MC^2 = MD^2 + DC^2$ ✓ $MC = 3BC$ *and* $MD = 2BC$ ✓ $9BC^2 = 4BC^2 + DC^2$ (3)
10.5	*In* ΔDBC *and* ΔDFM: $\hat{B}_1 = \hat{F}_2$ ǀ $ext < of\ cyclic\ quad$ $\hat{D}_4 = \hat{D}_2$ ǀ $= x$ $\hat{C} = \hat{M}_2$ ǀ $3^{rd}\ of < s\ of\ \Delta s$ $\Delta DBC \text{ ||| } \triangle DFM$ ǀ AAA	✓ S ✓ R ✓ S ✓ R (4)
10.6	$\frac{DM}{FM} = \frac{DC}{BC}$ ǀ ||| $\triangle s$ $= \frac{\sqrt{5}BC}{BC}$ $= \sqrt{5}$	✓ S ✓ *answer* (2)
		[12]
		TOTAL: 150