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MATHEMATICS

MARKING GUIDELINE

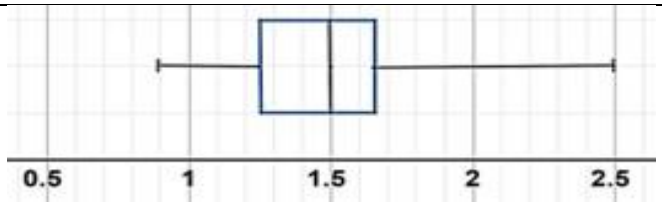
GRADE 11: EXAM PAPER 2 **NOV 2025** TERM 4

NOTE:

- If a candidate answers a question TWICE, mark the FIRST attempt ONLY.
- Consistent accuracy applies in ALL aspects of the marking guideline.
- If a candidate crossed out an attempt of a question and did NOT redo the question, mark the cross-out attempt.
- The mark for substitution is awarded for substitution into the CORRECT formula.

QUESTION 1 [19]

R0,9m	R1,0m	R1,1m	R1,2m	R1,3m	R1,4m	R1,5m	R1,5m	R1,5m	R1,5m	R1,6m	R1,6m	R1,7m
1	2	3	4	5	6	7	8	9	10	11	12	13
R1,7m	R1,9m	R2,5m										
14	15	16 ✓										

1.1.1	R1,5 million✓	✓ order ✓ median	(2)
1.1.2	R1,5 million✓	✓ mode	(1)
1.1.3	= R23,9 million ÷ 16✓ = R1,49 million✓	✓ total divided ✓ mean	(2)
1.1.4	$Q_1 = 1{,}25$ ✓ $Q_3 = 1{,}65$ ✓ Interquartile range = 0,4 million✓	✓ Q1 ✓ Q3 ✓ answer	(3)
1.2		✓ maximum & minimum ✓ Q2 ✓ Q1 & Q3 ✓ accuracy	(4)

1.3	Q1 - 1,5×IQR = 0,65✓ Q3 + 1,5×IQR = 2,25✓ Yes; R2,5 million is an outlier. ✓	✓ lower boundary ✓ upper boundary ✓ outlier	(3)
1.4	Standard deviation measures the spread of the data✓ around the mean. ✓	✓ spread ✓ mean	(2)
1.5	The outlier increases✓ the standard deviation. This is because it lets the data appear more spread ✓than it actually is.	✓ increases ✓ more spread	(2)
			[19]

QUESTION 2 [24]

2.1	$DB = \sqrt{(-8+10)^2 + (-11-3)^2}$ ✓ $= 10\sqrt{2}$✓	✓ substitution ✓ length	(2)
2.2	$J\left(\frac{-10-8}{2}; \frac{3-11}{2}\right)$✓ $J(-9;-4)$ ✓	✓ substitution ✓ coordinates	(2)
2.3	A(3;0) ✓ H(0;-3) ✓	✓ coordinates A ✓ coordinates B	(2)
2.4.1	$\tan\theta = \frac{0-3}{3+10}$✓ $= -\frac{3}{13}$✓ $\therefore \theta = 167°$✓✓	✓ substitution ✓ gradient ✓✓ angle	(4)
2.4.2	$\tan\beta = 1$ ✓ $\therefore \beta = 45°$ ✓	✓ gradient ✓ angle	(2)
2.4.3	$G\hat{A}D = 13°$ ✓ $D\hat{E}A = 180° - 32° - (45° + 13°)$ ✓ $= 90°$✓	✓ angle ✓ calculation ✓ angle	(3)

2.5	$x_C = 2x_Q - x_D$ $= 2(-12) - (-10)$ ✓ $= -14$✓ $y_C = 2y_Q - y_D$ $= 2(-3) - (3)$ $= -9$✓	✓ method ✓ x-value ✓ y-value	(3)
2.6	$m_{DC} = \frac{-9-3}{-14+10}$✓ $= 3$✓ $m_{BC} = \frac{-9+11}{-14+8}$✓ $= -\frac{1}{3}$✓ $m_{DC} \times m_{BC} = -1$ ✓ $\therefore \hat{C} = 90°$ ✓ And $D\hat{E}A = 90°$ Hence, DCBE is a cyclic quadrilateral …(ext. ∠ quad; $\hat{C} = D\hat{E}A$)	✓ substitution ✓ gradient ✓ substitution ✓ gradient ✓ $m_{DC} \times m_{BC} = -1$ ✓ $\hat{C} = 90$	(6)
			[24]

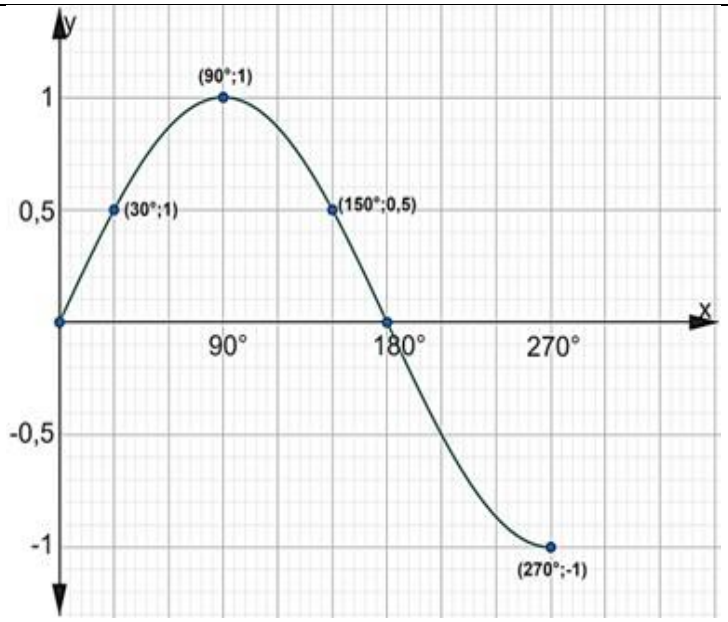
QUESTION 3 [20]

3.1.1	$x = t$✓; $r = 1$✓; $y = \sqrt{1-t^2}$✓ $\tan 28° = \frac{\sqrt{1-t^2}}{t}$✓	✓ x ✓r ✓ y-value ✓ answer	(4)
3.1.2	$\sin 62°$ $\cos 28°$ ✓ $= t$✓	✓ conversion ✓ answer	(2)
3.1.3	$\cos 208°$ $= \cos(180° + 28°)$ ✓ $= -\cos 28°$ ✓ $= -t$ ✓	✓ formula ✓ reduction ✓ answer	(3)

3.2	Left hand side: $\frac{\sin 270° . \cos(-\theta) . \cos^2(\theta - 180°)}{\sin(90° - \theta) \tan(315°) . \cos(180° + \theta)}$ $= \frac{(1)✓(\cos\theta)✓ \cos^2\theta ✓}{\cos\theta ✓(-\tan 45°)✓(-\cos\theta)✓}$ $= \frac{\cos\theta}{(-1)(-1)}$ $= \cos\theta$	✓ 1 ✓ $\cos\theta$ ✓ $\cos^2\theta$ ✓ $\cos\theta$ ✓ $-\tan 45°$ ✓ $-(\cos\theta)$	(6)
3.3	$\frac{1 - \cos^2 x}{\cos x - \cos^2 x} - \frac{\cos^2 x + \sin^2 x}{\cos(-x)}$ $= \frac{1 - \cos^2 x}{\cos x\,(1 - \cos x)} - \frac{1✓}{\cos x}$ $= \frac{1 - \cos^2 x}{\cos x\,(1 - \cos x)} - \frac{1}{\cos x} \times \frac{(1 - \cos x)}{(1 - \cos x)}✓$ $= \frac{1 - \cos^2 x - 1 + \cos x}{\cos x\,(1 - \cos x)}$ $= \frac{\cos x - \cos^2 x}{\cos x\,(1 - \cos x)✓}$ $= \frac{\cos x\,(1 - \cos x)✓}{\cos x\,(1 - \cos x)}$ $= 1✓$	✓ 1 ✓ $\frac{(1-\cos x)}{(1-\cos x)}$ ✓ $\cos x\,(1 - \cos x)$ ✓ numerator ✓ 1	(5)
			[20]

QUESTION 4 [13]

4.1	$3 - 3\sin^2 x$ $3(1 - \sin^2 x)✓ = 3\cos^2 x ✓$	✓ factorise ✓ identity	(2)
4.2	$3\cos^2 x = 5\sin x - \sin^2 x$ $3 - 3\sin^2 x ✓ = 5\sin x - \sin^2 x$ $2\sin^2 x + 5\sin x - 3 = 0$ ✓ $(2\sin x - 1)(\sin x + 3) = 0$ ✓ $\sin x = \frac{1}{2}$	✓ substitution ✓ standard form ✓ factors ✓ solutions	

	$\therefore x = 30° + 360°.k; k \in Z$✓ Or $x = 150° + 360°.k; k \in Z$		
4.3		✓ intercepts ✓ interval ✓ shape & turning point	(3)
4.4	$y \in R;\ -1 \leq y \leq 1$ ✓✓	✓ values ✓ notation	(2)
4.5	$k \geq 2$ ✓✓	✓✓ $k \geq 2$	(2)
			[13]

QUESTION 5 [19]

5.1	$\hat{C}_2 = 76°$ ✓ $BE^2 = x^2 + (4x)^2 - 2(x)(4x)\cos 76°$✓ $\therefore BE = \sqrt{17x^2 - 8x^2\cos 76°}$ ✓ $= x\sqrt{17 - 8\cos 76°}$✓	✓ angle ✓ substitution ✓ simplification ✓ answer	(4)
5.2	$\frac{\sin\theta}{y} = \frac{\sin 104°}{x\sqrt{17-8\cos 76°}}$✓ $\sin\theta = \frac{y\sin 104°}{x\sqrt{17-8\cos 76°}}$✓	✓ substitution ✓ answer	(2)
5.3	$\frac{1}{2}(y)(7)\sin 58°$✓ $= 37$✓ $\therefore y = 12{,}47m$✓	✓ substitution ✓ area ✓ answer	(3)

5.4	$E\hat{B}C = 58° - \theta$ ✓✓	✓✓ answer	(2)
5.5	$\frac{BE}{\sin 76°} = \frac{x}{\sin(58°-\theta)}$ ✓ $BE = \frac{x \sin 76°}{\sin(58°-\theta)}$ ✓ $\frac{x \sin 76°}{\sin(58° - \theta)} = x\sqrt{17 - 8\cos 76°}$ $\sin(58° - \theta) = \frac{\sin 76°}{\sqrt{17-8\cos 76°}}$ ✓ $58° - \theta = 14{,}48°$ ✓ $\therefore \theta = 43{,}52°$ ✓	✓ substitution ✓ BE expression ✓ equation ✓ simplification ✓ angle	(5)
5.6	$\sin 43{,}52° = \frac{12{,}47 \sin 104°}{x\sqrt{17-8\cos 76°}}$ ✓ $x = \frac{12{,}47 \sin 104°}{(\sqrt{17-8\cos 76°})(\sin 43{,}52°)}$ ✓ $\therefore x = 4{,}53m$ ✓	✓ substitution ✓ x as subject ✓ x-value	(3)
			[19]

QUESTION 6 [7]

6.1	$V = \frac{1}{3}\pi\left(\frac{x}{2}\checkmark\right)^2 y\checkmark + \frac{1}{2} \times \frac{4}{3}\pi\left(\frac{x}{2}\right)^3$ ✓ $= \frac{\pi x^2 y}{12} + \frac{4\pi x^3}{48}$ $= \frac{\pi x^2 y + \pi x^3}{12}$ ✓ OR $= \frac{\pi x^2 (y+x)}{12}$	✓ radius $\frac{x}{2}$ ✓ V cone substitution ✓ V sphere substitution ✓ simplification	(4)
6.2	$V = \frac{\pi(5)^2[8+5]}{12}$ ✓ $= 85{,}08cm^3$ ✓	✓ substitution ✓ volume	(2)
6.3	The volume decreases. ✓	✓ answer	(1)
			[7]

QUESTION 7 [15]

7.1	Angle in a semi-circle. ✓	✓ reason	(1)
7.2.1	$\hat{Q}_2 = 2\hat{P}_1$ ✓…(∠ at circumference = 2× ∠ at centre) ✓ $= 42°$✓	✓ statement ✓ reason ✓ angle	(3)
7.2.2	$\hat{R}_1 = \hat{P}_1$ ✓…(∠'s in same Θ segment) ✓ $= 21°$✓	✓ statement ✓ reason ✓ angle	(3)
7.2.3	$\hat{R}_2 = \frac{1}{2}\hat{O}_3$ ✓…(∠ at circumference = 2× ∠ at centre) ✓ $= 50°$✓	✓ statement ✓ reason ✓ angle	(3)
7.2.4	$\hat{S}_4 = 180° - \hat{O}_3$ ✓…(co-interior ∠'s; TP||ON) ✓ $= 80°$✓	✓ statement ✓ reason ✓ angle	(3)
7.3	Trapezium✓; at least one pair opposite sides parallel. ✓	✓ answer ✓ reason	(2)
			[15]

QUESTION 8 [26]

8.1	$\hat{C}_3 = 90°$✓ …(∠'s on straight line) ✓ $C\hat{F}G = \hat{C}_3 = 90°$✓ …(tangent-chord) ✓ Hence, O is the centre of the circle✓ …(converse ∠ in semi-Θ) ✓	✓ statement ✓ reason ✓ statement ✓ reason ✓ reason	(5)
8.2	$\hat{G} = \hat{F}_4 = x$✓ …(∠'s opposite = sides; radii) ✓ $\hat{C}_1 = \hat{G} = x$✓ …(tangent-chord) ✓ $\hat{F}_2 = \hat{C}_1 = x$✓ …(given) ✓	✓ statement ✓ reason ✓ statement ✓ reason ✓ statement ✓ reason	(6)

8.3.1	$\hat{F}_3 = 90° - \hat{F}_4$ ✓…(complementary ∠'s) ✓ $= 90° - x$✓	✓ statement ✓ reason ✓ angle	(3)
8.3.2	$\hat{O}_1 = 180° - 2\hat{F}_4$✓ …(∠'s of ∆)✓ $= 180° - 2x$✓	✓ statement ✓ reason ✓ angle	(3)
8.3.3	$\hat{O}_2 = 180° - \hat{O}_1$✓…(∠'s on straight line) ✓ $= 2x$✓	✓ statement ✓ reason ✓ angle	(3)
8.3.4	$\hat{D} = 90° - \hat{O}_2$ ✓…(complementary ∠'s) ✓ $= 90° - 2x$✓	✓ statement ✓ reason ✓ angle	(3)
8.4	$\hat{F}_2 = x$✓ …(proven) $\hat{G} = x$ ✓…(proven) Hence, AF is a tangent to the circle at F …(converse tangent-chord) ✓	✓ statement ✓ statement ✓ reason	(3)
			[26]

QUESTION 9 [7]

9.1	$\hat{R} = 90°$ ✓	✓ angle	(1)
9.2	$\hat{T}_1 = 90°$ ... $(\theta\ in\ ½\odot)$ ✓ PRST is a kite …(pair adjacent sides =; one pair opposite angles =)✓ ST = SR …(adjacent sides of kite) ✓ LT = RS …(LS = 2RS) $\hat{T}_2 = 90°$ ... $(suppl.\angle' s =)$ ✓ Hence, LS ⊥ MT $SM^2 = LM^2$ …(Pythagoras) ✓ SM = LM Hence, M is centre of other circle and LM is the radius…(line from midpoint of chord to centre of circle) ✓	✓ reason ✓ one fact ✓ reason ✓ angle & reason ✓ ANY method (Pythagoras OR Congruency etc.) ✓ reason	(6)
			[7]

TOTAL: 150

TAXONOMY LEVELS					
GRADE 11					
MATHEMATICS					
PAPER 2 - TERM 4 - 2025					
MARKS: 150					
QUESTION	KNOWLEDGE	ROUTINE PROCEDURES	COMPLEX PROCEDURES	PROBLEM SOLVING	TOTAL
DESIRED %	20%	35%	30%	15%	100%
1.1.1	2				2
1.1.2	1				1
1.1.3	2				2
1.1.4	3				3
1.2		4			4
1.3		3			3
1.4	2				2
1.5		2			2
2.1		2			2
2.2		2			2
2.3	2				2
2.4.1		4			4
2.4.2		2			2
2.4.3		3			3
2.5			3		3
2.6			6		6
3.1.1		4			4
3.1.2	2				2
3.1.3			3		3
3.2			6		6
3.3			5		5
4.1		2			2
4.2				4	4
4.3		3			3
4.4		2			2
4.5			2		2
5.1		4			4
5.2		2			2
5.3	3				3
5.4	2				2
5.5				5	5
5.6			3		3
6.1			4		4
6.2	2				2
6.3	1				1

7.1	1				1
7.2.1	3				3
7.2.2	3				3
7.2.3	3				3
7.3.4	3				3
7.4	2				2
8.1				5	5
8.2			6		6
8.3.1		3			3
8.3.2		3			3
8.3.3		3			3
8.3.4		3			3
8.4			3		3
9.1		1			1
9.2				6	6
Total	37	52	41	20	150
Actual %	24,7	34,7	27,3	13,3	100,0
Desired %	20%	35%	30%	15%	100