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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2023

GRADE 11

MARKING GUIDELINES

MATHEMATICS (PAPER 2)

10 pages

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INSTRUCTIONS AND INFORMATION:

- A – ACCURACY
- CA – CONSISTENT ACCURACY
- S – STATEMENT
- R – REASON
- S & R – STATEMENT with REASON

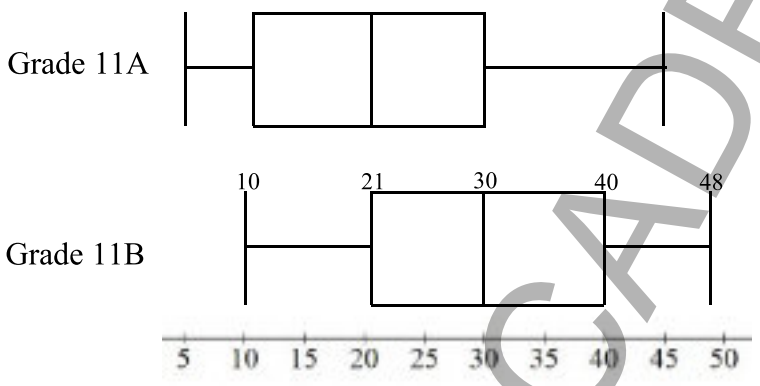
NOTES:

- 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.
- It is unacceptable to adopt values/answers in order to solve a problem.

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QUESTION 1

1.1	10; 13; 17; 21; 21; 23; 27; 29; 31; 34; 37; 38; 42; 43; 46; 48 Min. =10 ; $Q_1 = 21$; Max. = 48 $Q_2 = \frac{29+31}{2} = 30$; $Q_3 = \frac{38+42}{2} = 40$	✓ Correct Min. Q_1 and Max. ✓ Correct Q_2 ✓ Correct Q_3	(3)
1.2		✓ Correct Min. plot/lower whisker ✓ Correct Max. plot/upper whisker ✓ Correct box	(3)
1.3	$\bar{x} = \frac{480}{16}$ $\bar{x} = 30$	✓ Fraction ✓ Answer **NB**: Answer only full marks	(2)
1.4	σ = 11,46	✓✓ Answer	(2)
1.5	1σ interval: (30 – 11,46 ; 30 + 11,46) (18,54 ; 41,46) 4 learners achieved over 41,46 marks.	✓ Interval ✓ Answer	(2)
1.6	There is no difference in the IQR. IQR = 19 for both classes. However, the middle 50% for Grade 11B was between 21 and 40 compared to only 11 and 30 for Grade 11A. The box for 11B is shifted to the right. Thus, Grade 11B generally performed better.	✓ Comment ✓ IQR value	(2)
1.7	75%	✓ Answer	(1)
			[15]

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QUESTION 2

2.1	Equation of EG: $3x - y + 6 = 0$ $y = 3x + 6$ then $m_{EG} = 3$ $\tan \beta = 3$ $\beta = 71{,}57°$	✓ Gradient ✓ Answer	(2)
2.2	$x + 3(0) = 8$ $x = 8$ $\therefore (8;0)$	✓ $x = 0$ ✓ Coordinate form	(2)
2.3	$M_{DF} = M_{GE}$ diagonals bisect $K\left(\frac{-10+8}{2}; \frac{6+0}{2}\right)$ $K(-1;3)$ $-1 = \frac{x+1}{2}$ $3 = \frac{y+9}{2}$ $x = -3$ $y = -3$ $\therefore E(-3;-3)$	✓ $M_{DE} = M_{GE}$ ✓ Coordinates of K ✓ x-value ✓ y-value	(4)
2.4	$m_{DF} \times m_{GE}$ $= -\frac{1}{3} \times 3$ $= -1$ $\therefore DF \perp GE$ DGFE is a rhombus. (diagonals bisect perpendicularly)	✓ m_{DF} ✓ DF ⊥ GE ✓ Reason	(3)
			[11]

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QUESTION 3

3.1	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $AC = \sqrt{(1-(-2))^2 + (5-(-1))^2}$ $AC = 3\sqrt{5}$	✓ Substitution ✓ Answer	(2)
3.2	$m_{BC} = \frac{5-4}{1-(-3)}$ $m_{BC} = \frac{1}{4}$	✓ Substitution ✓ Answer	(2)
3.3	$m_{BC} = m_{BD} = m_{CD}$ $\frac{1}{4} = \frac{y-5}{5-1}$ **or** $\frac{1}{4} = \frac{y-4}{5-(-3)}$ $y = 6$	✓ Equal gradients ✓ Substitution ✓ $y = 6$	(3)
3.4	$m_{AH} = -4 \quad (\text{AH} \perp \text{BC})$ $y-(-1) = -4(x-(-2))$ $y = -4x - 9$	✓ m_{AH} ✓ Substitute A ✓ Equation	(3)
			[10]

QUESTION 4

4.1	4.1.1	$x^2 + (-24)^2 = 25^2$ $x = -7$		✓ Substitute into Pythagoras ✓ Answer	(2)
	4.1.2	(a)	$\sin\beta$ $= -\frac{24}{25}$	✓ Answer	(1)
		(b)	$\cos(180° - \beta)$ $= -\cos\beta$ $= -\left(\frac{-7}{25}\right)$ $= \frac{7}{25}$	✓ Reduction ✓ Simplified answer	(2)

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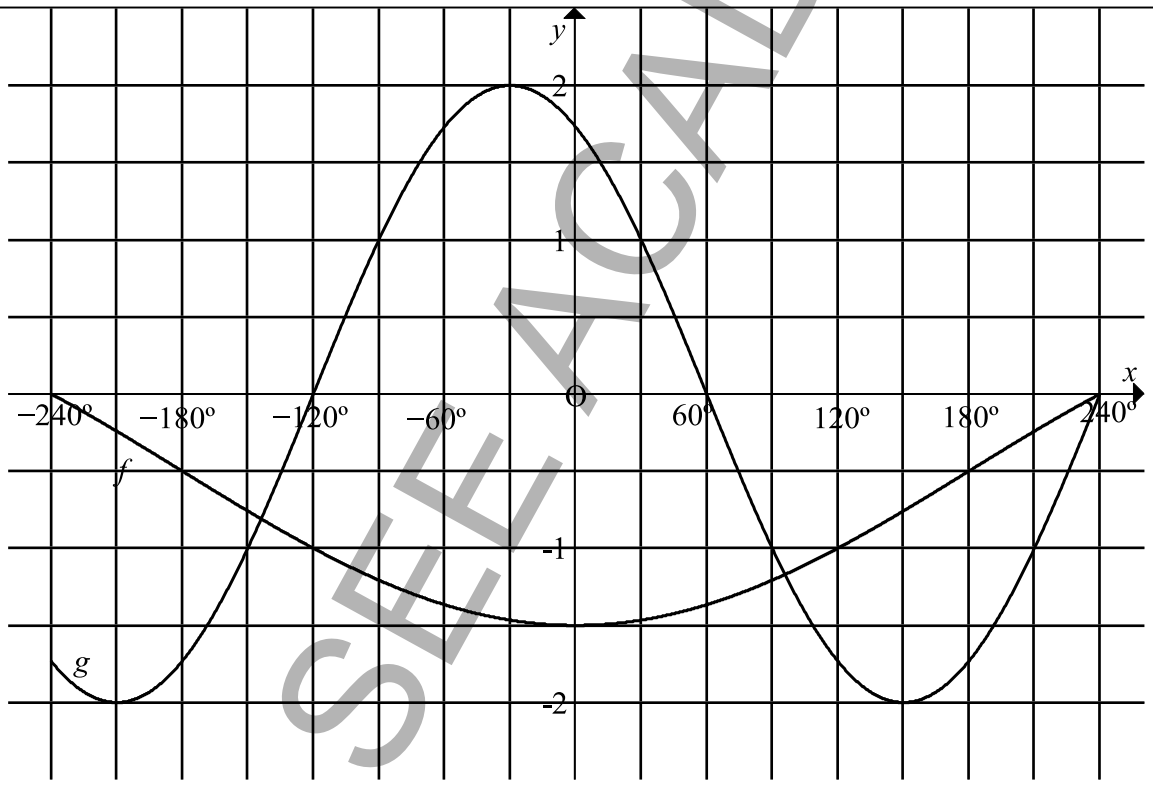
		(c)	$\tan^2(-\beta)$ $= \tan^2 \beta$ $= \left(\frac{-24}{-7}\right)^2$ $= \frac{576}{49}$	✓ Reduction ✓ Simplified answer	(2)
	4.1.3	(a)	$\sin\beta = \frac{-24}{25}$ $\frac{y}{15} = \frac{-24}{25}$ $y = \frac{-72}{5}$ $\cos\beta = \frac{-7}{25}$ $\frac{x}{15} = \frac{-7}{25}$ $x = \frac{-21}{5}$	✓ $\sin\beta = \frac{y}{15}$ ✓ Equate sine ratios ✓ $\cos\beta = \frac{x}{15}$ ✓ Equate cosine ratios	(4)
		(b)	$\text{Area}\Delta\text{ROT} = \frac{1}{2}(12)\left(\frac{72}{5}\right)$ $\text{Area}\Delta\text{ROT} = 86{,}4 \text{ units}^2$ **ALTERNATIVE** $OT = 15 \quad OR = 12$ $\beta = 253{,}7397...°$ $\text{Area}\Delta\text{ROT} = \frac{1}{2}(15)(12)\sin(106{,}26°)$ $\text{Area}\Delta\text{ROT} = 86{,}4 \text{ units}^2$	✓ Formula for area Δ ✓ Base = 12 ✓ Height = $\frac{72}{5}$ ✓ Area ✓ OT length ✓ 106,26° ✓ Substitute sine area formula ✓ Area	(4)

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4.2	$\dfrac{\tan 225° + \sin(180° - \theta)\cos(90° + \theta)}{\cos(90° - \theta)\sin(-\theta - 540°)}$ $= \dfrac{1 + \sin\theta . - \sin\theta}{\sin\theta . \sin\theta}$ $= \dfrac{1 - \sin^2\theta}{\sin^2\theta}$ $= \dfrac{\cos^2\theta}{\sin^2\theta}$ $= \tan^2\theta$	✓ $\tan 225° = 1$ ✓ $\sin(180° - \theta) = \sin\theta$ ✓ $\cos(90° + \theta) = -\sin\theta$ ✓ $\sin(-\theta - 540°) = \sin\theta$ ✓ $1 - \sin^2\theta = \cos^2\theta$ ✓ $\dfrac{\cos^2\theta}{\sin^2\theta} = \tan^2\theta$	(6)
			[21]

QUESTION 5



5.1	$A = 2$	✓ Answer	(1)
5.2	Period = 720°	✓ Answer	(1)
5.3	$a = -1$ $p = -60°$	✓ Value of a ✓ Value of p	(2)
5.4	$-120° \le x \le 60°$ **or** $x = -240°$ **or** $x = 240°$	✓ Interval ✓ $-240°$; $240°$	(2)
5.5	$p = 30°$	✓✓ Value of p	(2)
			[8]

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QUESTION 6

6.1	$\tan\left(\frac{\theta}{2}\right)=\frac{r}{R}$ $R.\tan\left(\frac{\theta}{2}\right)=r$	✓ Substitution ✓ Manipulation	(2)
6.2	$V_{hemisphere}=\frac{1}{2}.\frac{4}{3}\pi R^3$ $V_{hemisphere}=\frac{2}{3}\pi R^3$ $V_{cone}=\frac{1}{3}\pi r^2 R$ $V_{cone}=\frac{1}{3}\pi\left(R.\tan\left(\frac{\theta}{2}\right)\right)^2 R$ $V_{cone}=\frac{2}{3}\pi.R^3\tan^2\left(\frac{\theta}{2}\right)$ $V_{remaining}=\frac{2}{3}\pi R^3-\frac{1}{3}\pi.R^3\tan^2\left(\frac{\theta}{2}\right)$ $V_{remaining}=\frac{\pi R^3}{3}\left(2-\tan^2\left(\frac{\theta}{2}\right)\right)$	✓ $\frac{1}{2}$ Volume Sphere ✓ Substitute r from 6.1 ✓ Subtract volumes (Method) ✓ Factors	(4)
6.3	$V_{cone}=\frac{1}{3}\pi.R^3\tan^2\left(\frac{\theta}{2}\right)$ $V_{cone}=\frac{1}{3}\pi(11)^3\tan^2\left(\frac{36°}{2}\right)$ $V_{cone}=147{,}15\ cm^3$	✓ $V_{cone}=\frac{1}{3}\pi.R^3\tan^2\left(\frac{\theta}{2}\right)$ ✓ Substitute $R=11$ and $\theta=36°$ ✓ Volume of wax	(3)
			[9]

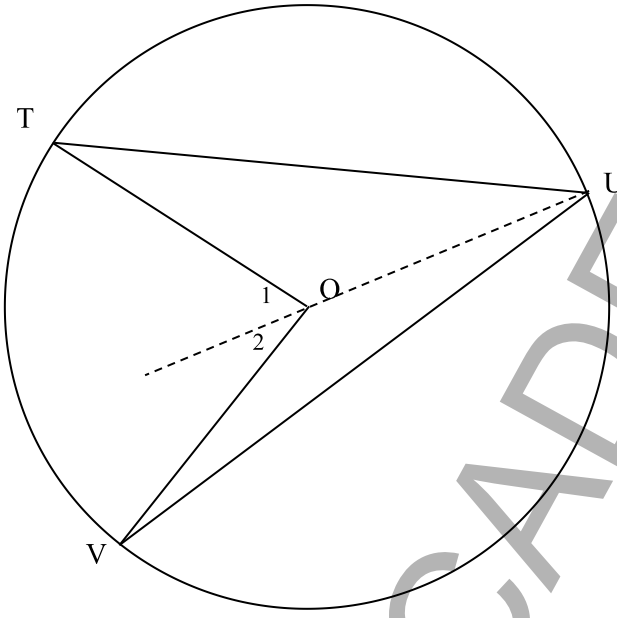
QUESTION 7

7.1	7.1.1	$\hat{C}_2=40°$	tan chord theorem	✓ S ✓ R	(2)
	7.1.2	$\hat{K}_1=90°$	∠'s in a semi circle	✓ S ✓ R	(2)
	7.1.3	$\hat{P}_1=25°$	ext ∠ of a Δ	✓ S ✓ R	(2)
7.2	$\hat{T}_1=65°$ $TC=QC$		ext ∠ of Δ sides opp equal ∠'s	✓ R ✓ R	(2)
					[8]

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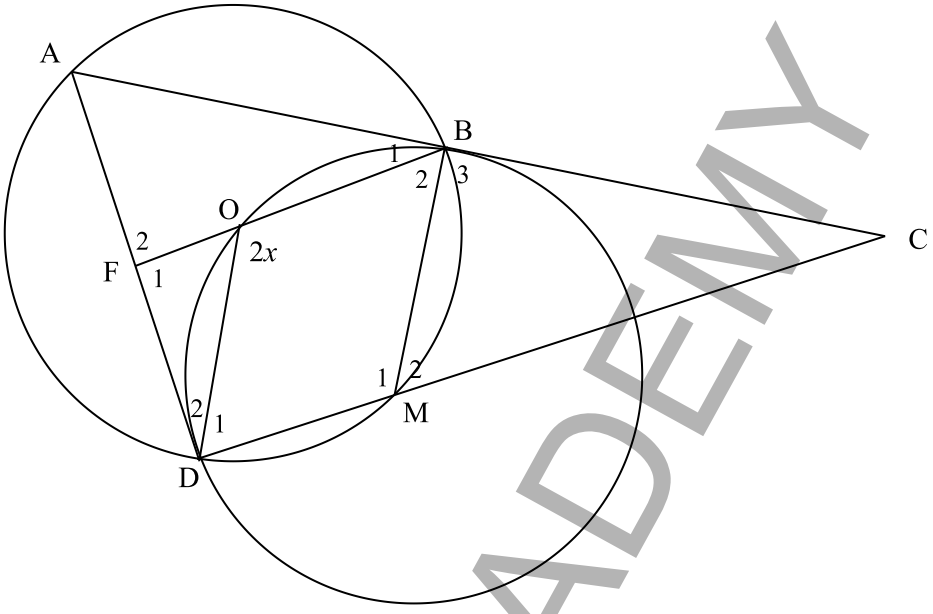
QUESTION 8



8.1	*Construct UO and extend.* In ΔTOU $\hat{O}_1 = \hat{T} + \hat{U}_1$ exterior $\angle$ of Δ $\hat{T} = \hat{U}_1$ $\angle$'s opp equal radii $\therefore \hat{O}_1 = 2\hat{U}_1$ Similarly in ΔTOU $\therefore \hat{O}_2 = 2\hat{U}_2$ $\therefore \hat{O}_1 + \hat{O}_2 = 2\hat{U}_1 + 2\hat{U}_2$ $\therefore \hat{O}_1 + \hat{O}_2 = 2(\hat{U}_1 + \hat{U}_2)$ $T\hat{O}V = 2T\hat{U}V$	✓ Construction ✓ SR ✓ SR ✓ S ✓ Conclusion	(5)

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8.2	8.2.1		Two pairs of adjacent sides equal.	✓ R	(1)
	8.2.2	(a)	∠ at centre = 2 × ∠ at circumference	✓ R	(1)
		(b)	ext ∠ of cyclic quad	✓ R	(1)
		(c)	corr ∠'s, OD ∥ MB	✓ R	(1)
		(d)	opp ∠'s, rhombus **ALTERNATIVE** alt ∠'s, OB ∥ DM	✓ R	(1)
	8.2.3		$\hat{D}_2 + x = 90°$ tan ⊥ rad $\hat{D}_2 = 90° - x$ $\hat{B}_3 = 90°$ tan ⊥ rad $\hat{C} = 90° - x$ int ∠s of Δ $\therefore \hat{D}_2 = \hat{C}$ both $90° - x$	✓ R ✓ S ✓ SR ✓ Conclusion	(4)
	8.2.4		$\hat{F}_2 = 90°$ corr ∠s, FB ∥ DM AF = FD line from centre ⊥ chord AB = BC line through midpt ∥ to 2nd side	✓ SR ✓ S ✓ R ✓ R	(4)
					[18]
				TOTAL:	**100**

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