GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2024

GRADE 11

MARKING GUIDELINES

MATHEMATICS (PAPER 2)

11 pages

INSTRUCTIONS AND INFORMATION

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

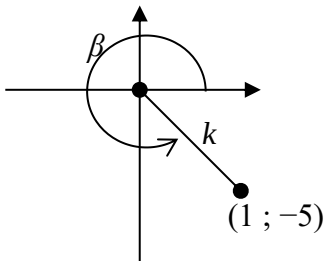
NOTES:

- 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.
- Assuming values/answers in order to solve a question is UNACCEPTABLE.

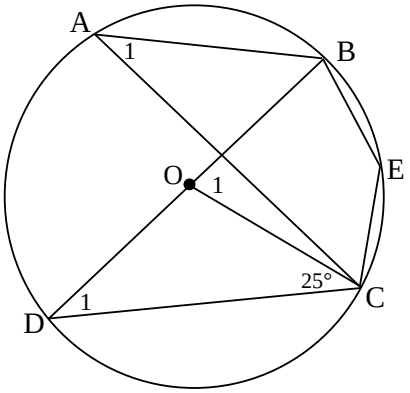
QUESTION 1			
1.1	$\text{BC} = \sqrt{\left(4-\left(-4\right)\right)^2+\left(-2-\left(-6\right)\right)^2}$ $\text{BC} = \sqrt{80}$ $\text{BC} = 4\sqrt{5}$	✓ Substitution into correct formula ✓ Answer	(2)
1.2	$\frac{6+4}{2} = x \qquad \frac{y+\left(-2\right)}{2} = 2$ $x = 5 \qquad y = 6$	✓ $x = 5$ ✓ $y = 5$	(2)
1.3	$m_{\text{BC}} = \frac{-2-\left(-6\right)}{4-\left(-4\right)}$ $m_{\text{BC}} = \frac{1}{2}$	✓ Substitution into correct formula ✓ Answer	(2)
1.4	$m_{\text{BC}} = \frac{1}{2}$ $\therefore m_{\text{AD}} = -2 \qquad \text{AD} \perp \text{BC}$ $y-\left(2\right) = -2\left(x-\left(-2\right)\right)$ $y = -2x-2$	✓ $m_{\text{AD}} = -2$ ✓ Substitute A$(-2\ ;\ 2)$ ✓ Equation	(3)
1.5	$\tan\theta = -2$ $\theta = 180° - 63,434...°$ $\theta = 116,57°$	✓ Substitution into correct formula ✓ Answer	(2)

1.6	$F(2\,;-10)$	✓ $x=2$ ✓ $y=-10$	(2)
1.7	Equation of BC: $y-(-2)=\frac{1}{2}(x-4)$ $y=\frac{1}{2}x-4$ D is a point of intersection between AD and BC $y=\frac{1}{2}x-4$ (1) and $y=-2x-2$ (2) (1) = (2) $\frac{1}{2}x-4=-2x-2$ $x-8=-4x-4$ $5x=4$ $x=\frac{4}{5}=0,8$ $y=-2(0,8)-2$ $y=-\frac{18}{5}=-3,6$ $\therefore D(0,8\,;\,-3,6)$	✓ $m_{BC}=-2$ ✓ Substitute B$(-4;-6)$ of C $(4;-2)$ ✓ Equation of BC ✓ Simultaneous equation substitution of y	(4)
1.8	$AD=\sqrt{(-2-(0,8))^2+(2-(-3,6))^2}$ $AD=\sqrt{39,2}=\frac{14\sqrt{5}}{5}$ Area ABCE $=BC\times AD$ Area ABCE $=4\sqrt{5}\times\frac{14\sqrt{5}}{5}$ Area ABCE $=56$ units^2	✓ Length of AD ✓ Substitution into area of a parallelogram formula ✓ Answer	(3)
			[20]

QUESTION 2				
2.1	2.1.1	$\sin(-20°)$ $= -\sin 20°$ $= -p$	✓ $-\sin 20°$ ✓ $-p$	(2)
	2.1.2	$\sin 160°$ $= \sin 20°$ $= p$	✓ $\sin 20°$ ✓ p	(2)
	2.1.3	$\sin^2\theta + \cos^2\theta = 1$ $1 - \sin^2 70°$ $= \cos^2 70°$ $= \sin^2 20°$ $= p^2$ **OR** $1 - \sin^2 70°$ $= 1 - \cos^2 20°$ $= \sin^2 20°$ $= p^2$ **OR** $1 - \sin^2 70°$ $= 1 - \cos^2 20°$ $= 1 - \left(\sqrt{1-p^2}\right)^2$ $= p^2$	✓ $\cos^2 70°$ ✓ $\sin^2 20°$ ✓ p^2 ✓ $1 - \cos^2 20°$ ✓ $\sin^2 20°$ ✓ p^2 ✓ $1 - \cos^2 20°$ ✓ $\left(\sqrt{1-p^2}\right)^2$ ✓ p^2	(3)
2.2	$\dfrac{\tan 225° - \sin(180° + \theta)\cos(\theta + 90°)}{\sin\theta.\sin(360° + \theta) + \cos\theta\cos(-\theta)}$ $= \dfrac{1 - (-\sin\theta)(-\sin\theta)}{\sin\theta.\sin\theta + \cos\theta.\cos\theta}$ $= \dfrac{1 - \sin^2\theta}{\sin^2\theta + \cos^2\theta}$ $= \cos^2\theta$		✓ $\tan 225° = 1$ ✓ $-\sin\theta$ ✓ $-\sin\theta$ ✓ $\sin\theta.\sin\theta$ ✓ $\cos\theta.\cos\theta$ ✓ $\cos^2\theta$	(6)

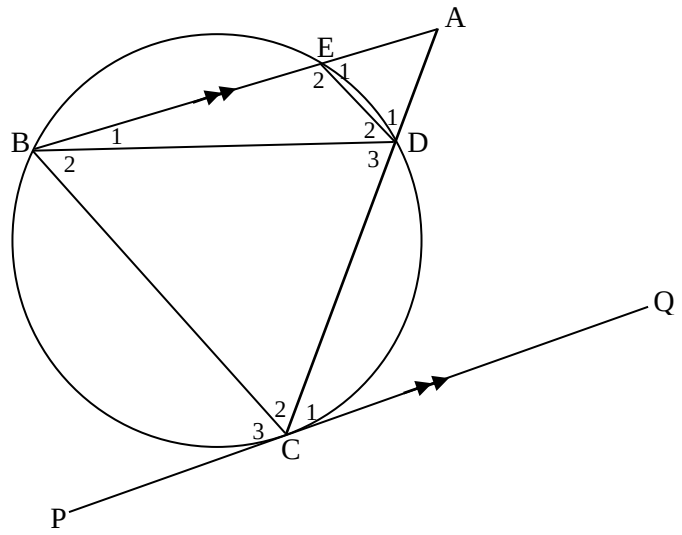
2.3	2.3.1	 $\sin\beta=\frac{-5}{k}$ and $\cos\beta=\frac{1}{k}$ $\sin\beta$ is negative and $\cos\beta$ is postive in quadrant IV **OR** In quadrant IV, y is negative and x is positive.	✓ Isolate $\sin\beta$ ✓ Isolate $\cos\beta$ ✓ Explanation ✓ Diagram	(4)
	2.3.2	$\tan\beta=-\frac{5}{1}$ $\tan\beta=-5$	✓ $\tan\beta=-5$	(1)
	2.3.3	$x^2+y^2=r^2$ $(1)^2+(-5)^2=k^2$ $k=\sqrt{26}$ $\quad k>0$	✓ Substitute into Pythagoras ✓ $k=\sqrt{26}$	(2)
2.4	2.4.1	$\text{LHS}=\sin^2\alpha\left(\frac{\sin\alpha}{\cos\alpha}+\frac{\cos\alpha}{\sin\alpha}\right)$ $=\sin^2\alpha\left(\frac{\sin^2\alpha+\cos^2\alpha}{\sin\alpha.\cos\alpha}\right)$ $=\frac{\sin\alpha(1)}{\cos\alpha}$ $=\tan\alpha$ $=\text{RHS}$	✓ $\frac{\sin\alpha}{\cos\alpha}$ ✓ $\frac{\cos\alpha}{\sin\alpha}$ ✓ Add fractions ✓ $\sin^2\alpha+\cos^2\alpha=1$ ✓ conclusion	(5)
	2.4.2	$\sin^2\alpha\left(\tan^2\alpha+1\right)=\sqrt{3}\tan\alpha$ $\sin^2\alpha\left(\tan\alpha+\frac{1}{\tan\alpha}\right)=\sqrt{3}$ $\therefore\tan\alpha=\sqrt{3}$ $\alpha=60°+k.180°$; $k\in Z$	✓ $\div\tan\alpha$ ✓ Substitute $\tan\alpha$ ✓ $\alpha=60°+k.180°$ ✓ $k\in Z$	(4)
				[29]

QUESTION 3				
3.1	$a=-2$ $p=-30°$		✓ $a=-2$ ✓ $p=-30°$	(2)
3.2	$-2\le y\le 2$ **OR** $y\in[-2\ ;\ 2]$		✓ Interval ✓ Notation	(2)
3.3	$b=6$		✓ $b=6$	(1)
3.4	3.4.1	$-60°<x<120°$	✓ Interval ✓ Notation	(2)
	3.4.2	$-90°<x<0°$ of $90°<x\le 180°$	✓ $-90°<x<0°$ ✓ $90°<x\le 180°$	(2)
3.5	$g(2x)=\sin(2x-30°)$ $=\cos(90°-(2x-30°))$ $=\cos(120°-2x)$ $=\cos(2x-120°)$ $\therefore t=-120°$ **OR** $g(2x)=\sin(2x-30°)$ $=\sin(2(x-15°))$ $\cos(2x+t)$ must be translated 120° to the right $\therefore t=-120°$		✓ $\cos(120°-2x)$ ✓ $t=-120°$ **OR** ✓ $\sin(2(x-15°))$ ✓ $t=-120°$	(2)
				[11]

QUESTION 4				
4.1	supplementary or (add up to 180°)		✓ Answer	(1)
4.2				
4.2	4.2.1	$\hat{D}_1 = 25°$ ∠'s opp equal radii	✓ S & R	(1)
	4.2.2	$\hat{O}_1 = 50°$ ext ∠ of Δ	✓ S ✓ R	(2)
	4.2.3	$\hat{A}_1 = 25°$ ∠'s in same segments **OR** ∠ at centre = 2 × at circumference	✓ S ✓ R	(2)
	4.2.4	$\hat{E} = 155°$ opp ∠'s cyclic quad	✓ S ✓ R	(2)
				[8]

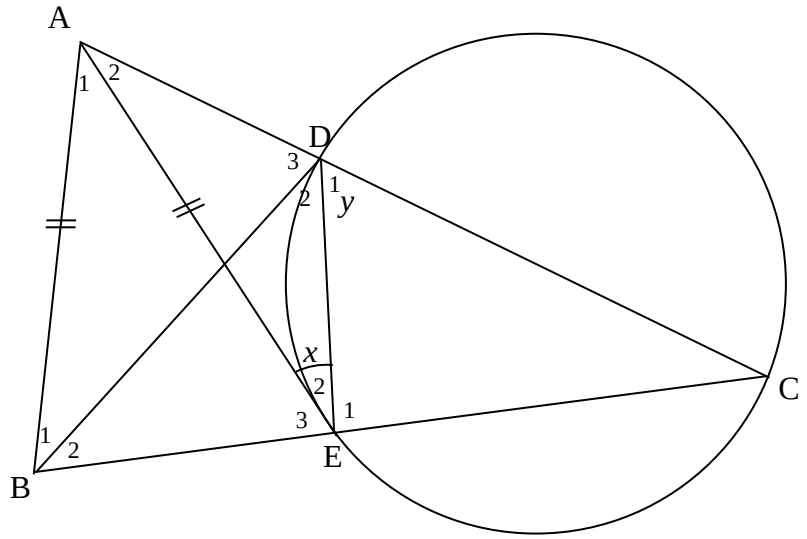
QUESTION 5			
5.1	$AE = 6$ line from centre ⊥ to chord $r^2 = 5^2 + 6^2$ Pythagoras' theorem $r = \sqrt{61}$	✓ S ✓ R ✓ S ✓ Answer in surd form	(4)
5.2	$OC = r = \sqrt{61}$ radii $F_1 = 90°$ line from centre to midpt of chord $x^2 = 61 - 7^2$ Pythagoras' Theorem $x = 2\sqrt{3} = 3,46$	✓ S ✓ R ✓ S	(3)
			[7]

QUESTION 6



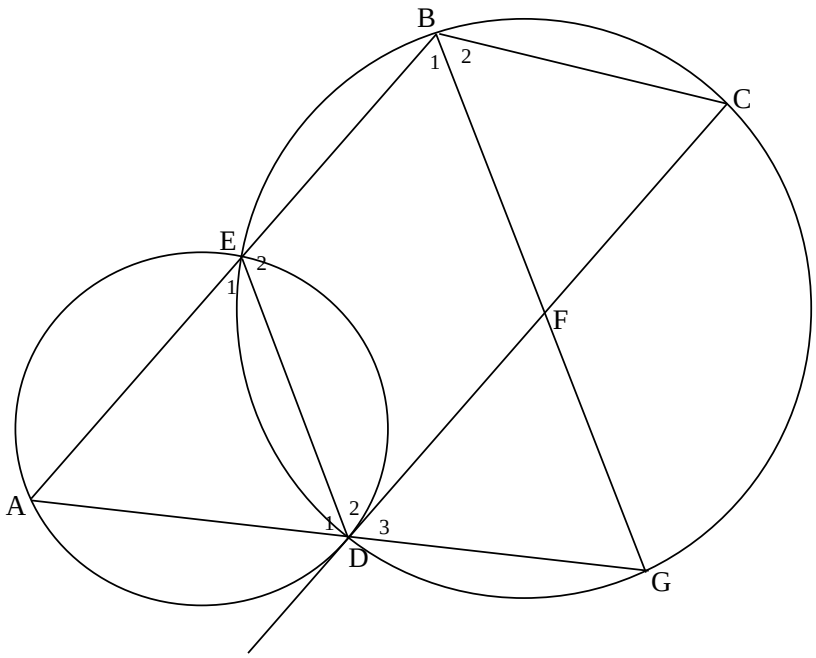
6.1	$\hat{A} = \hat{C}_1$	alt $\angle$'s, PQ $\parallel$ AB	✓ S ✓ R	
	$\hat{B}_2 = \hat{C}_1$	tan chord theorem	✓ S ✓ R	
	$\therefore \hat{A} = \hat{B}_2$	both equal $\hat{C}_1$		(4)
6.2	$\hat{D}_3 = \hat{B}_1 + \hat{A}$	ext $\angle$ of Δ	✓ S ✓ R	
	$\hat{D}_3 = \hat{B}_1 + \hat{B}_2$	$\hat{B}_2 = \hat{A}$	✓ S	
	$\hat{D}_1 = \hat{B}_1 + \hat{B}_2$	ext $\angle$ cyclic quad	✓ S ✓ R	
	$\therefore \hat{D}_3 = \hat{D}_1$	both equal $\hat{B}_1 + \hat{B}_2$		
		OR		
	$\hat{D}_1 = \hat{B}_1 + \hat{B}_2$	ext $\angle$ cyclic quad	✓ S ✓ R	
	$\hat{C}_3 = \hat{B}_1 + \hat{B}_2$	alt $\angle$'s, AB $\parallel$ PQ	✓ S & R	
	$\therefore \hat{D}_1 = \hat{C}_3$	both equal $\hat{B}_1 + \hat{B}_2$		
	en $\hat{D}_3 = \hat{C}_3$	tan chord theorem	✓ S ✓ R	
	$\therefore \hat{D}_3 = \hat{D}_1$	both equal $\hat{C}_3$		(5)
				[9]

QUESTION 7



	$\hat{C} = x$	tan chord theorem	✓ S & R	
	$\hat{E}_2 + \hat{E}_3 = x + y$	ext $\angle$ of Δ	✓ R	
	$\hat{E}_2 = x$	given	✓ S	
	$\therefore \hat{E}_3 = y$		✓ S & R	
	$\hat{B}_1 + \hat{B}_2 = y$	$\angle$'s opp equal sides	✓ S	
	$\therefore \hat{B}_1 + \hat{B}_2 = \hat{D}1$	both equal y	✓ S & R	
	$\therefore$ ABED is a cyclic quad	converse ext $\angle$ cyclic quad		
	OR	ext $\angle$ = to opp int $\angle$		(6)
				[6]

QUESTION 8



8.1	$\hat{A} = \hat{C}$	opp $\angle$'s of parm	✓ S & R	
	$\hat{E}_1 = \hat{C}$	ext $\angle$ cyclic quad	✓ S ✓ R	
	$\therefore \hat{A} = \hat{E}_1$	both equal $\hat{C}$	✓ R	
	$\therefore AD = DE$	sides opp equal $\angle$'s		
		OR		
	$\hat{E}_1 = \hat{C}$	ext $\angle$ cyclic quad	✓ S ✓ R	
	$\hat{D}_3 = \hat{C}$	alt $\angle$'s, BC $\parallel$ DG		
	$\therefore \hat{E}_1 = \hat{D}_3$	both equal $\hat{C}$		
	$\hat{A} = \hat{D}_3$	corr $\angle$'s, AB $\parallel$ DC	✓ S & R	
	$\therefore \hat{A} = \hat{E}_1$	both equal $\hat{D}_3$	✓ R	
	$ED = AD$	sides opp equal $\angle$'s		(4)

8.2	$\hat{G} = \hat{E}_1$	ext $\angle$ cyclic quad	✓ S ✓ R	
	$\hat{A} = \hat{E}_1$	proven in 8.1	✓ S	
	$\therefore \hat{A} = \hat{G}$	both equal $\hat{E}_1$	✓ S ✓ R	
	$\therefore AB = BG$	sides opp equal $\angle$'s	✓ S & R	
	but AB = CD	opp sides of parm		
	$\therefore BG = CD$	both equal AB		
	OR			
	$\hat{G} = \hat{C}$	$\angle$'s in same seg	✓ S ✓ R	
	$\hat{A} = \hat{C}$	opp $\angle$'s parm	✓ S & R	
	$\therefore \hat{A} = \hat{G}$	both equal $\hat{C}$		
	$\therefore AB = BG$	sides opp equal $\angle$'s	✓ S ✓ R	
	but AB = CD	opp sides of parm	✓ S & R	
	$\therefore BG = CD$	both equal AB		
	OR			
	$\hat{B}_2 = \hat{G}$	alt $\angle$'s, BC $\parallel$ DG	✓ S & R	
	$\hat{B}_2 = \hat{D}_3$	$\angle$'s in the same seg	✓ S ✓ R	
	$\therefore \hat{G} = \hat{D}_3$	both equal $\hat{B}_2$		
	and $\hat{D}_3 = \hat{A}$	corr $\angle$'s, AB $\parallel$ CD	✓ S	
	$\therefore \hat{G} = \hat{A}$	both equal $\hat{D}_3$	✓ S & R	
	$\therefore BA = BG$	sides opp equal $\angle$'s	✓ S & R	
	but BA = DC	opp sides of parm		
	$\therefore BG = CD$			(6)
				[10]
			TOTAL:	**100**