GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2022

GRADE 11

MARKING GUIDELINES

MATHEMATICS PAPER 2

10 pages

INSTRUCTIONS AND INFORMATION:

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 deleted attempt.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- It is UNACCEPTABLE for candidates to assume values in order to answer questions.

Marks are awarded as per the guidelines, and the following symbols are used:

- **A** – Accuracy
- **CA** – Continued Accuracy
- **S** – Statement
- **R** – Reason
- **S/R** – Statement with Reason

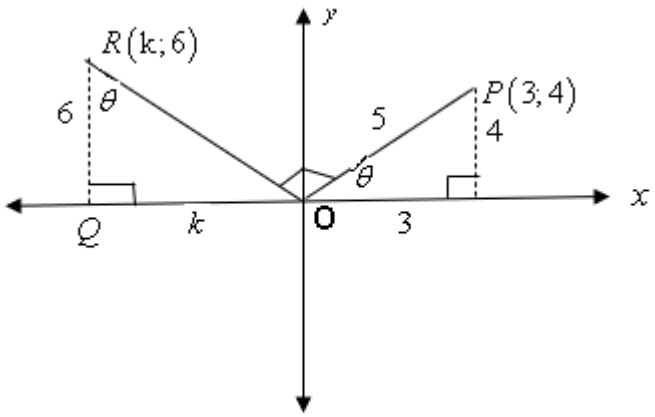
QUESTION 1

1.1	1.1.1	$m_{DF} = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{DF} = \frac{-3-2}{-5+1}$ $m_{DF} = \frac{5}{4}$	✓ substitution ✓ answer	(2)
	1.1.2	$m_{DE} = -\frac{4}{5}$	✓ answer	(1)
	1.1.3	$y = mx + c$ $2 = -\frac{4}{5}(-1) + c \ \ pt \ \ D(-1\ ;\ 2)$ $c = \frac{6}{5}$ $\therefore y = -\frac{4}{5}x + \frac{6}{5}$ **NOTE:** Any other valid method.	✓ substitution ✓ value of c ✓ answer	(3)
	1.1.4	$m = -\frac{4}{5}$ $y = mx + c$ $-3 = -\frac{4}{5}(-5) + c \ \ F(-5\ ;\ -3)$ $c = -7$ $\therefore y = -\frac{4}{5}x - 7$	✓ value of m ✓ value of c ✓ equation	(3)
	1.1.5	$y = -\frac{4}{5}x + \frac{6}{5}$ $y = -\frac{4}{5}(6) + \frac{6}{5}$ $y = -\frac{18}{5}$	✓ substitution ✓ answer	(2)

	1.1.6	$d_{DF} = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$ $d_{DF} = \sqrt{(-3-2)^2 + (-5+1)^2}$ $d_{DF} = \sqrt{41}$ $d_{DE} = \sqrt{(-2-2)^2 + (4+1)^2}$ $d_{DE} = \sqrt{41}$ $\therefore$ Δ DEF is an isosceles Δ	✓ substitution ✓ answer ✓ substitution ✓ answer ✓ conclusion	(5)
	1.1.7	$area_{DEF} = \frac{1}{2}.\sqrt{41}.\sqrt{41}$ $area_{DEF} = \frac{41}{2}$ square units	✓ substitution ✓ answer	(2)
1.2	1.2.1	Trapezuim	✓ answer	(1)
	1.2.2	$\sqrt{(x-10)^2 + (-9-3)^2} = 15$ $x^2 - 20x + 100 + 144 = 225$ $x^2 - 20x + 19 = 0$ $(x-19)(x-1) = 0$ $x = 1,\ x \neq 19$	✓ substitution ✓ simplification ✓ standard form ✓ factors ✓ selection	(5)
	1.2.3	$T = \left(\frac{10+1}{2}; \frac{3-9}{2}\right)$ $= \left(\frac{11}{2}; -3\right)$	✓ substitution ✓ answer	(2)
	1.2.4	$m_{SP} = m_{RS} = \frac{3+9}{10-1}$ $m_{SP} = m_{RS} = \frac{4}{3}$ $\therefore \frac{4}{3} = \frac{1-y}{-4+7}$ $\therefore 12 = 3 - 3y$ $\therefore y = -3$	✓ value of m_{RS} ✓ substitution ✓ answer	(3)

	1.2.5	$m_{SP} = \frac{4}{3}$ $\therefore$ *equation SP* $3 = \frac{4}{3}(10) + c \;\; S(10\ ;\ 3)$ $\therefore c = -\frac{31}{3}$ $\therefore y = \frac{4}{3} \times -\frac{31}{3}$ $\therefore x = 4 \;\; at$ W $\therefore y = \frac{4}{3}(4) - \frac{31}{3}$ $\therefore y = -5$ $W(4\ ;\ -5)$ **NOTE:** Point W does not have to be in coordinate form.	✓ value of c ✓ x-value ✓ y-value	(3)
				[32]

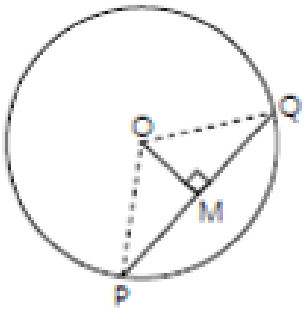
QUESTION 2

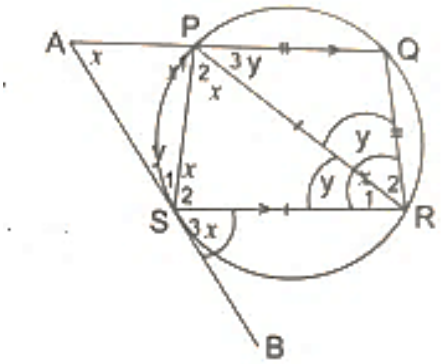
2.1				
	2.1.1	$\sin(90-\theta)=\cos\theta$ $\therefore 5\cos\theta=0$ $\therefore \cos\theta=\frac{3}{5}$ $\therefore \sin\theta=\frac{4}{5}$	✓ identity ✓ value of $\cos\theta$ ✓ answer	(3)
	2.1.2	$\tan\theta=\frac{4}{3}=-\frac{k}{6}$ $\therefore 3k=-24$ $\therefore k=-8$	✓ $\tan\theta=\frac{4}{3}$ ✓ $\tan\theta=-\frac{k}{6}$ ✓ answer	(3)

2.2	2.2.1	$\frac{\tan 315° + \cos 300°}{\sin 150° + \tan 135°}$ $= \frac{(-tan\,45^\circ) + (cos\,60^\circ)}{(sin\,30^\circ) + (-tan\,45)}$ $= \frac{(-1) + (\frac{1}{2})}{\frac{1}{2} + (-1)}$ $= 1$	✓ $-\tan 45°$ ✓ $\cos 60°$ ✓ $\sin 30°$ ✓ $-\tan 45°$ ✓ all special angles ✓ answer	(6)
	2.2.2	$= \frac{\sin(180° + x)\cos(180° - x).\sin 50°}{\tan(315°).\cos^2(360° - x).\cos 140°}$ $= \frac{(-sin\,x)(-cos\,x)(cos\,40^\circ)}{(-tan\,45^\circ)(cos^2\,x)(-cos\,40^\circ)}$ $= \frac{sin\,x}{(-1)(-cos\,x)}$ $= tan\,x$	✓ reduce numerator ✓ reduce denominator ✓ $\sin x$ ✓ -1 ✓ $-\cos x$ ✓ answer	(6)
2.3	$\sin(x + 10°) = \cos(x - 30°)$ $\sin(x + 10°) = \sin(90° - (x - 30°))$ $= \sin(120° - x)$ *Quadrant* 1: $= (120° - x) + 360°\,k;\ k \in Z$ $2x = 110° + 360°\,k;\ k \in Z$ $x = 55° + 180°\,k;\ k \in Z$ *Quadrant* 2: $= (x + 10°) = (120° - x) + 360°\,k;\ k \in Z$ $x + 10° = 60° + x$ *(no solution)* *Final solution*: $x = -125°,\ x = 55°$		✓ identity ✓ $\sin(120° - x)$ ✓ $(x + 10°) = (120° - x)$ ✓ $360°\,k;\ k \in Z$ ✓ $x = 55° + 180°k$ ✓ $x = -125°$ ✓ $x = 55°$	(7)

2.4	2.4.1	$B\hat{C}D = 40°$ [Sum of the int. angles of a triangle] **NOTE**: Candidate does not have to state the reason.	✓ answer	(1)
	2.4.2	$\frac{CD}{\sin 80^\circ} = \frac{52}{\sin 60^\circ}$ $CD = \frac{52.\sin 80^\circ}{\sin 60^\circ}$ $= 59{,}13\,m$	✓ sine ratio ✓ answer	(2)
	2.4.3	$\frac{BC}{\sin 40^\circ} = \frac{52}{\sin 60^\circ}$ $BC = \frac{52.\sin 40^\circ}{\sin 60^\circ}$ $BC = 38{,}59\,m$ *let* $AD = b$ (triangle ABD) $\therefore b^2 = a^2 + d^2 - 2adCos116^\circ$ $\therefore b^2 = (38{,}59)^2 + (74)^2 - 2(38{,}59)(74)\cos 116^\circ$ $b^2 = 9468{,}87$ $b = 97{,}31\,m$	✓ sine rule ✓ value of BC ✓ correct sub into Cos rule ✓ answer	(4)
	2.4.4	$B\hat{D}C = 40°$ (Sum of angles of ΔBDC) Area of ABCD = $\left(\frac{1}{2}\right)74 \times 52 \times \sin 36° \left(\frac{1}{2}\right)59{,}13 \times 52 \times \sin 40°$ $= 2119{,}11\,m^2$	✓ $B\hat{D}C = 40°$ ✓ area ΔABC ✓ area ΔCBD ✓ answer	(4)
				[36]

QUESTION 3

3.1			
	Given: Circle with centre O. OM is perpendicular to PQ. RTP: PM = MQ Construction: Draw radii OP and OQ Proof: In ΔOPM and ΔOQM OP = OQ (radii) OM = OM (common) $O\hat{M}P = 90° = O\hat{M}Q$ (given OM ⊥ PQ) $\therefore \Delta OPM \equiv \Delta OQM$ (90° ; H ; S) $\therefore$ PM = MQ	✓ construction ✓ S/R ✓ S/R ✓ S/R ✓ condition-congruency	(5)
3.2	AB = 10 *cm* (given) AD = DB = 5 *cm* [Line from centre of circle perpendicular to chord bisects chord] $OD^2 = 13^2 - 5^2$ [*PT*] $OD^2 = 144$ OD = 12 $\therefore$ DC = 1 *cm*	✓ S ✓ R ✓ S/R ✓ value of OD ✓ answer	(5)

3.3	$A = \pi r^2$ $A = 3{,}14.(13)^2$ $A = 530{,}66\ cm^2$ $\therefore$ area of ΔOAB $\text{Area} = \frac{1}{2}bh$ $\text{Area} = \frac{1}{2}.10.12$ $\text{Area} = 60\ cm^2$ $\therefore$ remaining space $= 530{,}66\ cm^2 - 60\ cm^2$ $\therefore$ remaining space $= 470{,}66\ cm^2$		✓ area of circle ✓ area of ΔOAB ✓ answer	(3)
3.4				
	3.4.1	$\hat{P}_2 = x$ (tan-chord theorem) $\hat{S}_2 = x$ (angles opposite equal sides) $\hat{P}_1 = x$ (alt angles; $APQ \parallel SR$) $Q\hat{R}S = x$ (ext. angle of cyclic quad) $\hat{A} = x$ (corresp. angles; $APQ \parallel SR$)	✓ S ✓ R ✓ S ✓ R ✓ S ✓ R ✓ S ✓ R ✓ S ✓ R	(10)
	3.4.2	$\hat{A} = x$ *and* $\hat{P}_1 = x$ [*from* 3.4.1] $\hat{S}_1 = 180^0 - 2x$ [sup $p\ \angle s$] $\therefore \hat{R}_1 = \hat{S}_1$ [*tan/chord*] $\therefore \hat{P}_3 = \hat{S}_1$ [*alt Ls* ; AQ$\parallel SR$]	✓ S ✓ R ✓ S ✓ R ✓ S ✓ R	(6)
	3.4.3	$\hat{R}_1 = \hat{P}_3$ (from 3.4.2) PS = QR (equal angles subtend equal chords)	✓ S ✓ ✓ R	(3)
				[32]
			TOTAL:	**100**