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education

Department of Education
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GRADE 11

MATHEMATICS

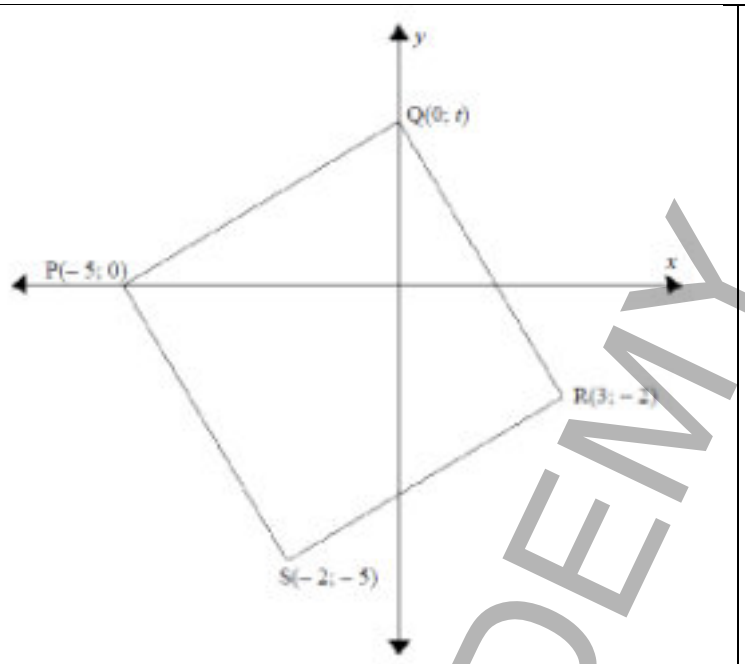
2024 JUNE P2

MARKING GUIDELINE

This marking guideline consists of 11 pages

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QUESTION 1

		
1.1	$PS=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $PS=\sqrt{(-2+5)^2+(-5+0)^2}$ $PS=\sqrt{34}$ $RS=\sqrt{(3+2)^2+(-2+5)^2}$ $RS=\sqrt{34}$	✓subt in corr form ✓answer ✓subt in corr form ✓answer (4)
1.2	$M\left(\frac{x_1+x_2}{2};\frac{y_1+y_2}{2}\right)$ $M\left(\frac{-5+3}{2};\frac{0-2}{2}\right)$ $M(-1;-1)$	✓x-value ✓y-value (2)
1.3	$\frac{t-5}{2}=-1$ $t-5=-2$ $t=3$	✓Method (1)
1.4	$m_{PQ}=\frac{y_2-y_1}{x_2-x_1}$ $m_{PQ}=\frac{3-0}{0+5}$ $m_{PQ}=\frac{3}{5}$	✓subt in corr form ✓answer (2)

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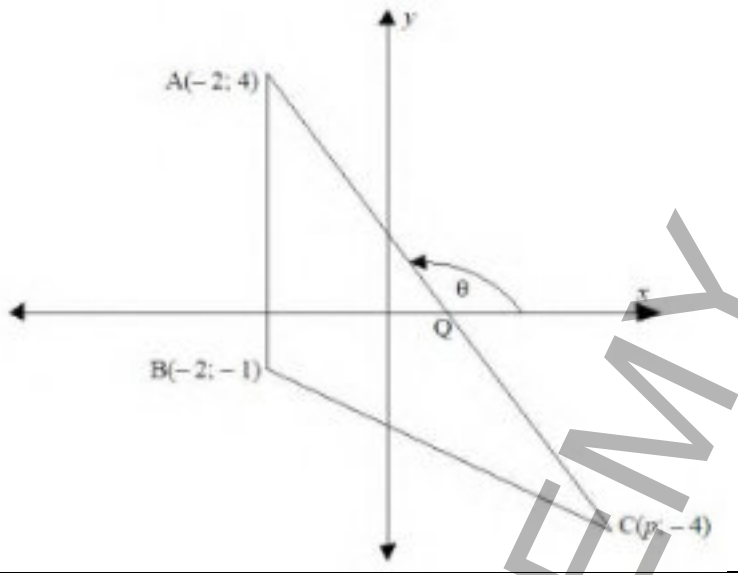
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1.5	$m_{QR} = \frac{-2-3}{3-0}$ $m_{QR} = -\frac{5}{3}$ $m_{PQ} \times m_{QR} = \frac{3}{5} \times -\frac{5}{3} = -1$ $\therefore P\hat{Q}R = 90^o$ OR Inclination of PQ = $\tan^{-1}\left(\frac{3}{5}\right) = 30,96^o$ $m_{QR} = \frac{-2-3}{3-0}$ $m_{QR} = -\frac{5}{3}$ Inclination of QR = $180 - \tan^{-1}\left(\frac{5}{3}\right) = 120,96^o$ $\therefore P\hat{Q}R = 120,96^o - 30,96^o = 90^o$	✓subt in corr form ✓answer ✓Method ✓answer OR ✓inc PQ ✓gradient QR ✓inc QR ✓answer (4)
1.6	Square Diagonals bisect each other/diagonals have the same midpoint. All sides are equal. Interior angles = 90^o	✓square ✓diagonals ✓any of the other two reasons. (3)
		[16]

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QUESTION 2

		
2.1	$\theta = 90^\circ + 37^\circ$ (ext $\angle$ of a triangle) $\theta = 127^\circ$	✓Method ✓answer (2)
2.2	$m = \tan 127^\circ$ $m = -1,33$ $y - y_1 = m(x - x_1)$ $y - 4 = -1.33(x + 2)$ $y = -1,33x - 2,66 + 4$ $y = -1,33x + 1,34$	✓gradient ✓Subt of A ✓answer (3)
2.3	$-1,33x + 1,34 = 0$ $-1,33x = -1.34$ $x = 1$ Q(1; 0)	✓y = 0 ✓$x = 1$ (2)
2.4	$\frac{y_2 - y_1}{x_2 - x_1} = m$ $\frac{4 + 4}{-2 - p} = -1.33$ $2,66 + 1.33p = 8$ $1.33p = 5.34$ $p = 4$ OR	✓Method ✓simplification ✓answer

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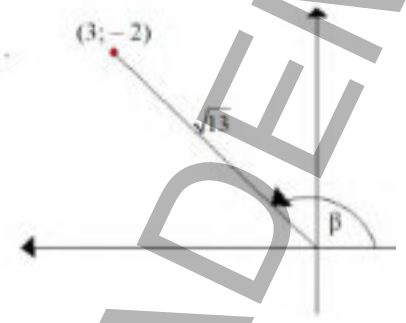
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	$\frac{y_2-y_1}{x_2-x_1}=m$ $\frac{-4-0}{p-1}=-1.33$ $-1.33p+1.33=-4$ $-1.33p=-5,33$ $p=4$	✓Method ✓simplification ✓answer (3)
2.5	$m_{BC}=\frac{y_2-y_1}{x_2-x_1}$ $=\frac{-4+1}{4+2}$ $=-\frac{1}{2}$ $m_{new}=m_{BC}=-\frac{1}{2}$ $y-y_1=m(x-x_1)$ $y-4=-\frac{1}{2}(x+1)$ $y=-\frac{1}{2}x-\frac{1}{2}+4$ $y=-\frac{1}{2}x+\frac{7}{2}$	✓subt ✓m_{BC} ✓m_{new} ✓subt of point A ✓eq. (5)
		[15]

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QUESTION 3

3.1.1	$\sin 122^o = 0,848$	✓answer
3.1.2	$\dfrac{\tan\alpha}{\cos^2(\theta+\alpha)}$ $= \dfrac{\tan 122^o}{\cos^2\left(89.4^o + 122^o\right)}$ $= \dfrac{\tan 122^o}{\left(\cos 211,4^o\right)^2}$ $= -2,197$	✓subt ✓answer (2)
3.2.1	$\tan\beta = -\dfrac{2}{3}$ $r^2 = x^2 + y^2$ $r^2 = (-3)^2 + (2)^2$ $r = \sqrt{13}$ $\therefore \cos\beta = -\dfrac{3}{\sqrt{13}}$ 	✓diagram ✓value of r ✓cos β (3)
3.2.2	$\sqrt{13}\cos\beta - 13\sin^2\beta$ $= \sqrt{13}\left(-\dfrac{3}{\sqrt{13}}\right) - 13\left(\dfrac{2}{\sqrt{13}}\right)^2$ $= -3 - 4$ $= -7$	✓subt ✓answer (2)
3.3	 $r^2 = x^2 + y^2$ $1 = x^2 + m^2$ $x^2 = 1 - m^2$ $x = \sqrt{1-m^2}$ $\tan 94^o = \tan\left(180^o - 86^o\right)$ $= -\tan 86^o$ $= -\dfrac{\sqrt{1-m^2}}{m}$	✓ $x = \sqrt{1-m^2}$ ✓reduction ✓answer (3)

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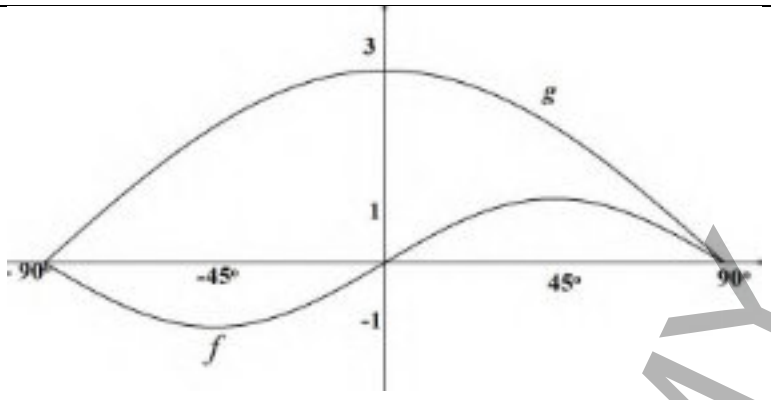
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3.4	$\frac{\cos(360^\circ - x)\tan(x - 180^\circ)}{\sin(-x)\cos(90^\circ - x)}$ $= \frac{\cos x.(\tan x)}{(-\sin x).\sin x}$ $= -\frac{\cos x}{\sin^2 x}.\frac{\sin x}{\cos x}$ $= -\frac{1}{\sin x}$	✓cos x ✓tan x ✓– sin x ✓sin x ✓ $\frac{\sin x}{\cos x}$ (5)
3.5	$\frac{\tan 120^\circ.\sin 115^\circ}{\cos 240^\circ \cos 205^\circ}$ $= \frac{-\tan 60^o.\sin 65^o}{-\cos 60.(-\cos 25^o)}$ $= -\frac{\sqrt{3}.\sin 65^o}{\frac{1}{2}\sin 65^o}$ $= -2\sqrt{3}$	✓ $-\tan 60^o$ ✓sin 65° ✓ – cos 60° ✓– cos 25° ✓sin 65° ✓answer (5)
3.6	$\frac{1}{1-\cos x} + \frac{1}{1+\cos x} = \frac{2}{\sin^2 x}$ $\text{LHS} = \frac{(1+\cos x)+(1-\cos x)}{(1-\cos x)(1+\cos x)}$ $= \frac{2}{1-\cos^2 x}$ $= \frac{2}{\sin^2 x}$ = RHS	✓numerator ✓denominator ✓simplification (3)
3.7	$5\tan(\theta + 10^\circ) = 4$ $\tan(\theta + 10^o) = \frac{4}{5}$ $\text{ref}\angle = \tan^{-1}\frac{4}{5} = 38,66^o$ First Quad: $(\theta + 10^o) = 38,66^o + k.180^o$; $\theta = 28,66 + k.180^o$ Third quad: $(\theta + 10^o) = 218^o + k.180^o$; $\theta = 208,66 + k.180$ $k \in$	✓std form ✓ref angle ✓answer ✓answer (4)
		[29]

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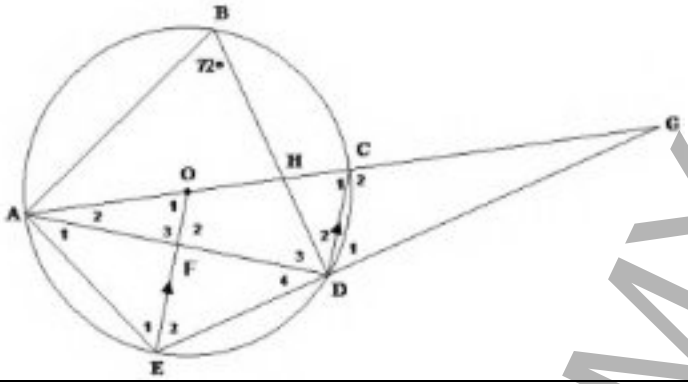
QUESTION 4

4.1		*f*: ✓shape ✓turning points ✓(0; 0) g: ✓shape ✓turning point ✓end points of *f* and *g*. (6)
4.2	Period = 180°	✓answer (1)
4.3	$y \in [0;3]$	✓✓answer (2)
4.4	$[-90^\circ;0^\circ]$ or $-90^\circ \leq x \leq 0^\circ$	✓notation ✓critical values (2)
		[11]

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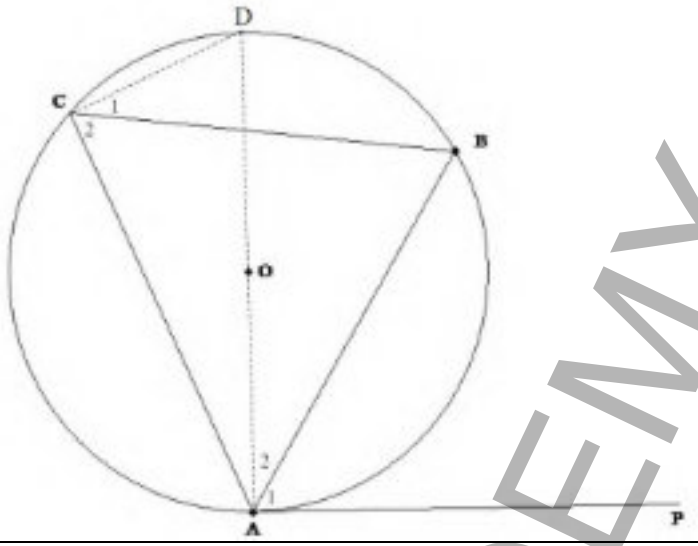
QUESTION 5

5.1	bisect	✓answer (1)
		
5.2.1(a)	$\hat{C}_1 = 72^o$ (angles in the same segment)	✓S ✓R (2)
5.2.1(b)	$\hat{O}_1 = \hat{C}_1 = 72^o$ (corr angles, OE//CD)	✓S ✓R (2)
5.2.1(c)	$\hat{O}_1 = 2 \times \hat{D}_4$ (angle at centre = 2 × angle at the cirm.) $\hat{D}_4 = 36^o$	✓S ✓R (2)
5.2.1(d)	$\hat{N}_1 + \hat{N}_2 = 108^o$ (Opp angles of a cyclic quad)	✓S ✓R (2)
5.2.1(e)	$\hat{D}_1 + (\hat{D}_2 + \hat{D}_3) + \hat{D}_4 = 180^o$ (sum of angles of a triangle) $\hat{D}_1 + 90^o + 36^o = 180^o$ (angle in the semi-circle) $\therefore \hat{D}_1 = 54^o$	✓S/R ✓S/R ✓S (3)
5.2.2	$\hat{E}_2 = \hat{D}_1 = 54^o$ (corr angles OE//CD) $\hat{F}_2 = \hat{E}_2 + \hat{D}_4$ (ext. angle of a triangle) $\hat{F}_2 = 90^o$ $\therefore$ AF = FD (perpendicular from centre to chord)	✓S/R ✓S/R ✓R (3)
5.2.3	No $\hat{E}_2 + \hat{C}_1^{\,o} \neq 180^o$ (opp angles are not suppl)	✓No ✓S/R (2)
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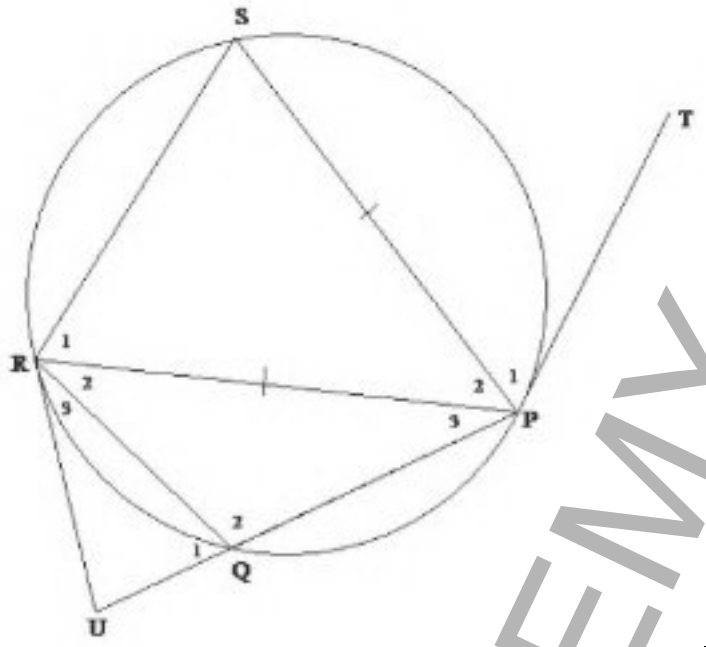
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QUESTION 6

6.1	bisect	✓answer (1)
6.2		
	$\hat{C}_1 + \hat{C}_2 = 90^o$ (angle in the semi-circle) $\therefore \hat{C}_2 = 90^o$ And $\hat{A}_1 + \hat{A}_2 = 90^o$ (tan $\perp$radius) $\hat{A}_1 = 90^o - \hat{A}_2$ But $\hat{C}_2 = \hat{A}_2$ (angles in the same segment) $\hat{A}_1 = \hat{C}_2$	✓construction ✓S/R ✓S ✓R ✓S/R ✓S/R (6)

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6.3	$\hat{P}_1 = \hat{S}$ (tan chord thrm) and $\hat{S} = \hat{Q}_1$ (ext angle of cyclic quad) but $\hat{P}_1 = \hat{U}$ (given) $\therefore \hat{U} = \hat{Q}_1$ $\therefore$ RU = RQ (angles opp sides are equal)	✓S ✓R ✓S ✓R ✓S ✓R (6)
		[13]

TOTAL: 100

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