GR 11 MATHS + M.LIT P.2

Education
KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P2

MARKING GUIDELINE

COMMON TEST

JUNE 2017

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 100

N.B. This marking guideline consists of 8 pages.

QUESTION 1

1.1	$BO = \sqrt{(3-0)^2+(7-0)^2}$ $= \sqrt{58}$ $BC = \sqrt{(3-10)^2+(7-4)^2}$ $= \sqrt{58}$	1A for substitution 1CA for answer 1A for substitution 1CA for answer (4)
1.2	Gradient of BO $= \frac{7-0}{3-0}$ $= \frac{7}{3}$ Gradient of BC $= \frac{7-4}{3-10}$ $= \frac{-3}{7}$	1A for substitution 1CA for answer 1A for substitution 1CA for answer (4)
1.3	$M_{BO} \times M_{BC} = \frac{7}{3} \times \frac{-3}{7}$ $= -1$ $\therefore O\hat{B}C = 90°$	1 A for product 1A for -1 (2)
1.4	Area of $\Delta BCO = \frac{1}{2} \times b \times h$ $= \frac{1}{2} \times \sqrt{58} \times \sqrt{58}$ $= 29$ square units	1A for formula 1CA for substitution 1CA for answer (3)
1.5	$D = \left(\frac{3+10}{2}; \frac{7+4}{2}\right)$ $= \left(\frac{13}{2}; \frac{11}{2}\right)$	1A for $\frac{13}{2}$ 1A for $\frac{11}{2}$ (2)
1.6.1	Gradient of the line $= \frac{7}{3}$ $y = mx + c$ $2 = \frac{7}{3}(5) + c$ $c = \frac{-29}{3}$ $y = \frac{7}{3}x - \frac{29}{3}$ $7x - 3y - 29 = 0$ is the equation	1 CA for gradient 1CA for substitution of point 1CA for c - value 1CA for equation 1CA for $ax + by + c = 0$ form (5)
1.6.2	$7\left(\frac{13}{2}\right) - 3\left(\frac{11}{2}\right) - 29$ $= \frac{91}{2} - \frac{33}{2} - 29$ $= \frac{91-33-58}{2}$ $= 0$ $\therefore$ D lies on the line	1CA for substitution 1CA for simplification (2) [22]

QUESTION 2

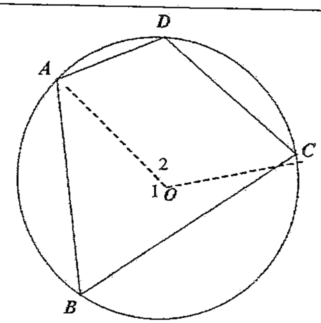
2.1.1	$PS=\sqrt{(3+1)^2+(a-4)^2}$ $\sqrt{16+a^2-8a+16}=2\sqrt{13}$ $32+a^2-8a=52$ $a^2-8a-20=0$ $(a-10)(a+2)=0$ $a=10$ or $a=-2$ $\therefore a=10$	1A for substitution in distance formula 1A for equating to $2\sqrt{13}$ 1CA for squaring both sides 1CA standard form 1CA factors (5)
2.1.2	$m_{PS}=m_{SW}$ $\frac{10-4}{4}=\frac{\frac{17}{2}-10}{t-3}$ $\frac{6}{4}=\frac{\frac{-3}{2}}{t-3}$ $6t-18=6$ $t=2$ OR $m_{PS}=m_{PW}$ $\frac{10-4}{4}=\frac{\frac{17}{2}-4}{t+1}$ $\frac{6}{4}=\frac{\frac{9}{2}}{t+1}$ $6t+6=18$ $t=2$	1A for equating gradients 1A for substitution 1CA for simplification 1CA for answer OR 1A for equating gradients 1A for substitution 1CA for simplification 1CA for answer (4)
2.2.1	$1=\frac{x+(-2)}{2}$ $x=4$ $1=\frac{y+5}{2}$ $y=-3$	1A for substitution 1A for substitution (2)
2.2.2	$\tan\theta=m_{SR}$ $\tan\theta=\frac{9-(-3)}{6-4}$ $=6$ $\theta=80{,}54°$	1A for $\tan\theta=m_{SR}$ 1A for 6 1CA for answer (3)

2.2.3	$P\hat{V}W$ = Angle of inclination of PQ $=80{,}54°$ [opp. sides of parm. PQRS are parallel.] $\tan P\hat{W}T=m_{PR}$ $=\frac{5-(-3)}{-2-4}$ $=-\frac{4}{3}$ $P\hat{W}T=180°-53{,}13°$ $=126{,}87°$ $Q\hat{P}R=P\hat{W}T-P\hat{V}W$ [ext. ∠ of ΔPVW] $=126{,}87°-80{,}54°$ $=46{,}33°$	1A for $P\hat{V}W=80{,}54°$ 1A for $m_{PR}=-\frac{4}{3}$ 1CA for size of $P\hat{W}T$ 1CA for subtracting 1CA for answer (5)
2.2.4	Q(−4;−7)	1A for −4 1A for −7 (2) [21]

QUESTION 3

3.1	bisects the chord	1A for answer (1)
3.2.1	AB = 34cm OP = 17cm	1A for length of diameter 1A for length of OP (2)
3.2.2	$PM^2 = OP^2 - OM^2$ [Theorem of Pythagoras] $= 17^2 - 15^2$ $= 64$ PM = 8cm $PQ = 2 \times PM$ [line from centre ⊥ to chord] = 16cm	1S for $PM^2 = OP^2 - OM^2$ or $PM^2 = 17^2 - 15^2$ 1R (for Theorem of Pythagoras) 1CA for length of PM 1CA for length of PQ 1R (for line from centre ⊥ to chord) (5)
3.2.3	$\hat{Q} = 90°$ [∠ in semicircle] $QR^2 = PR^2 - PQ^2$ [Theorem of Pythagoras] $= 34^2 - 16^2$ $= 900$ QR = 30cm OR $QR = 2 \times OM$ [midpoint theorem] = 30cm	1S/R 1CA for applying Theorem of Pythagoras 1CA for answer OR 1S 1R 1CA for answer (3) **[11]**

QUESTION 4

4.1	 Construct AO and OC $\hat{O}_1 = 2\hat{D}$ [∠ at centre = 2 x ∠ at circumference] $\hat{O}_2 = 2\hat{B}$ [∠ at centre = 2 x ∠ at circumference] but $\hat{O}_1 + \hat{O}_2 = 360°$ [∠s around a pt] $2\hat{D} + 2\hat{B} = 360°$ $\hat{B} + \hat{D} = 180°$	1A construction 1S 1R 1S/R 1S/R 1A for substitution (6)
4.2	$\hat{T}_2 = 32°$ [∠s opp equal sides] $\hat{O}_1 = 118° - 2(32°)$ [sum of ∠'s of a triangle] $= 116°$ $\hat{P} = \frac{1}{2}(116°)$ [∠ at centre = 2×∠ at circumference] $= 58°$ $= x$ $\hat{R} = 180° - 58°$ [opp ∠s of cyclic quad] $= 122°$ $\hat{Q}_3 = \hat{T}_2$ [alt ∠'s; OT ∥ QR] $= 32°$ $y = 180° - (122° + 32°)$ [sum of ∠'s of a triangle] $= 26°$	1S/R 1S 1 S 1R 1S 1R 1S/R 1A answer (8)
4.3	$A\hat{D}C = 90°$ [∠ in a semicircle] $\hat{C} = 180° - (90° + 22°)$ [sum of ∠s of Δ] $= 68°$ $\hat{B} = \hat{C}$ [∠s in same segment] $= 68°$	1S 1R 1S/R 1S 1R (5) **[19]**

QUESTION 5

5.1	$\hat{P}_2 = 90°$ [line from centre to midpoint of chord] $\hat{R}_2 = 90°$ [radius ⊥ tangent] $\therefore$ OPQR is a cyclic quadrilateral [converse: opp ∠s of cyclic quad are supplementary] OR $\hat{P}_1 = 90°$ [line from centre to midpoint of chord] $\hat{R}_2 = 90°$ [radius ⊥ tangent] $\therefore$ QPQR is a cyclic quadliteral [converse: ext. ∠ of a cyclic quad = opp. interior angle]	1S 1R 1S 1R 1R OR 1S 1R 1S 1R 1R	(5)
5.2.1	$\hat{K} = \hat{M}$ [opp. ∠'s of parm.] $= x$ $\hat{E}_1 = \hat{M}$ [ext. ∠ of cyclic quad] $\hat{K} = \hat{E}_1$ [both = $\hat{M}$] KN = NE [sides opp. = angles]	1S/R 1S 1R 1S/R	(4)
5.2.2	$\hat{N}_3 = \hat{E}_1$ [alt. ∠'s; KL ∥ MN] MFN is a tangent to circle KEN [converse: tan - chord - theorem]	1S 1R 1R	(3)
5.2.3	$\hat{G} = \hat{M}$ [∠'s in the same segment] $= x$ $= \hat{K}$ [proved] KL = LG [sides opp. to = angles]	1 S 1R 1 S 1 S/R	(4) [16]

QUESTION 6

6.1	$\hat{Q}_1 = \hat{R}$ [tan - chord - theorem] $= x$ $= \hat{T}_1$ [given] PT ∥ SR [correcsponding ∠'s are equal]	1S 1R 1S 1 S/R	(4)
6.2	PQ = PS [2 tangents from same point] $\hat{S}_1 = \hat{Q}_1$ [∠'s opp to = sides] $= x$ $\hat{S}_1 = \hat{T}_1$ [both = x] TQPS is a cyclic quadlateral [converse: ∠'s in same segment]	1S/R 1 S/R 1S 1S/R	(4)
6.3	$\hat{T}_2 = \hat{Q}_1$ [∠'s in same segment] $= x$ $\hat{T}_1 = \hat{Q}_1$ [given] $\hat{T}_1 = \hat{T}_2$ $\therefore$ PT bisects $S\hat{T}Q$	1S 1R 1 S	(3) [11]

TOTAL: 100