Basic Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P2

JUNE COMMON TEST 2015

MEMORANDUM

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 100

This memorandum consists of 9 pages.

QUESTION 1

1.1.1 $AB = \sqrt{(0-8)^2+(8-2)^2}$ ✓ $= 10$✓ $BC = \sqrt{(8-2)^2+(2+6)^2}$ ✓ $= 10$✓	A: Correct substitution CA: Correct answer (4)
1.1.2 $M = \left(\frac{0+2}{2} \quad \frac{8-6}{2}\right)$ ✓ $= (1;1)$ ✓✓	A: Correct substitution CA: Correct answer (3)
1.1.3 $mBM = \frac{2-1}{8-1}$ $= \frac{1}{7}$ ✓ $mAC = \frac{8+6}{0-2}$ $= -7$✓ $\frac{1}{7}x-7 = -1$✓ ∴ BM is perpendicular to AC✓	CA Correct substitution into gradient formula. CA: Gradient BM CA: Gradient AC CA: Multiplying gradients (4)

1.1.4 $mAB = \frac{8-2}{0-8}$ $= -\frac{6}{8}$ ✓ $mBC = \frac{8}{6}$ ✓ $-\frac{3}{4} \times \frac{4}{3} = -1$✓ $\therefore \quad A\hat{B}C = 90°$✓	CA: Gradient CA CA: Gradient CA CA: Multiplying gradients CA: Conclusion (4)
1.1.5 Right✓ – angled - Isosceles✓triangle	A: Right–angled A: Isosceles. (2)
1.1.6 Area $= \frac{10 \times 10}{2}$ ✓ $=$ 10 sq units✓	A: Correct substitution CA: Correct answer. (2)
1.1.7 $y = mx + c$ $mBM = \frac{1}{7}$ and M (1:1) $1 = \frac{1}{7}(1) + c$✓ $c = \frac{6}{7}$✓ $\therefore \quad y = \frac{1x}{7} + \frac{6}{7}$✓ **OR** $y - 1 = \frac{1}{7}(x - 1)$✓ $y = \frac{1}{7}x + \frac{6}{7}$✓ **OR** $y - 2 = \frac{1}{7}x\,(x-8)$ ✓ $y = \frac{1}{7}x + \frac{6}{7}$✓	CA: Correct substitution CA: Correct simplification CA: Correct Answer (3) CA: Correct substitution CA: Simplification CA: Correct answer (3) CA: Correct substitution CA: Simplification CA: Correct answer. (3)

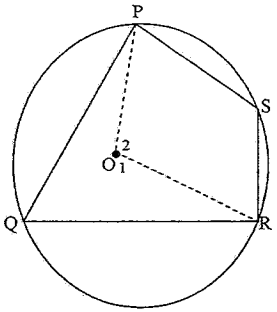
1.1.8 $mAC = -7$ $mBC = \frac{4}{3}$ $\tan\theta = -7$ RA $= 81{,}9°$ ✓ $\tan\theta = \frac{3}{4}$ RA $= 53{,}1°$ ✓ $\therefore \quad \theta = 180° - (81{,}9° + 53{,}1°)$ $= 45°$✓✓	CA: 81,9° CA: 53,1° CA: Correct answer (4)
1.1.9 D is (–6✓; 0✓)	CA: Correct answer. (2)
1.2 $3(-4) + 4(11) = 32$✓ $32 = 32$✓ $\therefore$ (–4; 11) lies on the line✓	A: Correct substitution CA: Simplification CA: conclusion. (3)
1.3 $mPQ = mRT$ $1 \overset{✓}{=} \frac{m+4-\frac{1}{2}}{2m-\frac{5}{2}}$ ✓ $2m - \frac{5}{2} = m + \frac{7}{2}$ ✓ $m = 6$ ✓	AA: Equating two gradients CA: Simplification CA: Correct answer. (4)
1.4 1.4.1 $\tan 108{,}4° = -3$✓ $\therefore \quad m = -3$✓	A: Correct substitution CA: Correct answer (2)

1.4.2 $0 = -3(-3) + c$ $c = -9$✓ $\therefore \quad y = -3x - 9$✓ **OR** $y - 0 = -3(x + 3)$✓ $y = -3x - 9$✓	CA: Correct substitution CA: Correct answer (2) CA: Correct substitution CA: Correct answer (2)
1.4.3 R is (0; –9)✓✓	CA: Correct answer (2)
1.4.4 $\frac{b-0}{a-2a}$✓ $= \frac{b+9}{a-0}$✓ $ab = ab + 9a - 2ab - 18a$✓ $2ab = -9a$ ✓ $b = -\frac{9}{2}$	AA: Equating two gradients CA: Simplification CA: Correct answer. (4) **[45]**
QUESTION 2 2.1 bisects the chord✓✓	AA: Correct answer (2)
2.2 2.2.1 DY = 12cm ✓ $OD^2 = (12,5)^2 - (12)^2$✓ $\therefore$ OD = $\sqrt{12,25}$ $\therefore$ OD = 3,5✓ $\therefore$ MD = 12,5 – 3,5 = 9cm✓	A: length of DY CA: Correct substitution CA: Length of OD CA: Length of MD (4)

2.2.2 BD = 12,5 + 3,5 = 16✓ $BX^2 = XD^2 + BD^2$ $= 12^2 + 16^2$✓ BX = $\sqrt{400}$ ✓ = 20cm✓	CA: Length of BD. CA: Correct substitution CA: Simplification CA: Correct answer. (4) **[10]**
QUESTION 3 3.1 twice the size of the angle subtended by the same arc at the circle.✓✓	AA: Correct answer. (2)
3.2 3.2.1 $O\hat{C}B = 40°$ (OB = OC)✓ $B\hat{O}C = 100°$ (int. ∠'s of a triangle)✓ $B\hat{A}C = 50°$✓ (∠'at centre)✓	A: S/R CA: Statement CA: S/R (4)
3.2.2 $B\hat{D}C = 130°$✓ (cyclic quad)✓	CA: S CA: R (2)
3.2.3 $D\hat{C}B = 25°$✓ (BD = CD)✓	CA: S CA: R (2) **[10]**

QUESTION 4

4.1



Proof	
Construct OP and OR.✓	A: Construction
$\hat{O}_1 = 2P\hat{S}R$ (∠' at centre)✓	A: Statement & reason
$\hat{O}_2 = 2P\hat{Q}R$ (∠' at centre)✓	A: Statement & reason
$\hat{O}_1 + \hat{O}_2 = 360°$ (Revolution)✓	A: Statement & reason
$2P\hat{S}R + 2P\hat{Q}R = 180°$✓	A: Correct substitution
$\therefore\ P\hat{S}R + P\hat{Q}R = 180°$✓	A: Conclusion
OR	
Let $P\hat{Q}R$ *be* x✓	A: $P\hat{Q}R = x$
$\hat{O}_2 = 2x$ (∠' at centre)✓	AA: statement and reason
$\hat{O}_1 = 360° - 2x$ (Revolution)✓	A: S/R
$P\hat{S}R = 180° - x$ (∠' at centre)✓	A: S/R
$\therefore\ P\hat{Q}R + P\hat{S}R = 180°$✓	A: conclusion (6)

4.2 Equal to an angle in the alternate circle segment✓✓	AA: Correct answer (2)
4.3	
4.3.1 $A\hat{B}D = 90°$ (diameter)✓	A: S/R
$B\hat{A}D = 28°$ (alt angles of D)✓	CA: S/R
$B\hat{C}D = 152°$✓ (cyclic quad)✓	CA: S/R (4)

4.3.2 $B\hat{D}C = 14°$ ✓ (BC = CD)✓ $\therefore \quad C\hat{D}F = 14°$ ✓ $(A\hat{D}F = 90°)$✓	CA: Statement CA: Reason CA: Statement CA: Reason (4)
4.4 $\hat{C}_1 = \hat{A}$ ✓ (alt. ∠'s AB‖ PT)✓ $\hat{C}_1 = \hat{B}$ ✓ (Tan – chord)✓ $\therefore \quad \hat{A} = \hat{B}$ ✓ $\therefore \quad AC = BC$ **OR** $\hat{C}_3 \overset{\checkmark}{=} \hat{B}$ $(alt\angle s\, \overset{\checkmark}{AB} \parallel PT)$ $\hat{C}_3 \overset{\checkmark}{=} \hat{A}$ (tan $\overset{\checkmark}{\text{chord}}$) $\therefore \quad \hat{A} = \hat{B}$ ✓ $\therefore \quad AC = BC$	A: Statement A: Reason A: Statement A: Reason A: Conclusion (5) A: Statement A: Reason A: Statement A: Reason A: Conclusion [21]

QUESTION 5	
5.1 $\hat{R} = (180° - x)$✓ (cyclic quad)✓	A: Statement A: Reason
5.2 $\hat{P}_2 \overset{\checkmark}{=} \hat{Q}_2 = x$ $(QT \overset{\checkmark}{=} PT)$ $\hat{P}_2 = \hat{Q}_3 \overset{\checkmark}{=} x$ (alt ∠'s $\overset{\checkmark}{\text{RB}} \parallel$ TP) $\hat{Q}_3 = R\hat{T}P \overset{\checkmark}{=} x$ (ext. ∠' $\overset{\checkmark}{\text{of}}$ cyclic quad) $\hat{Q}_2 = \hat{P}_1 \overset{\checkmark}{=} x$ (tan $\overset{\checkmark}{\text{chord}}$) $\hat{P}_1 = \overset{\checkmark}{\hat{B}_1} = x$ (corresp. ∠'s RB ‖TP)	A: Statement A: Reason A: Statement A: Reason A: Statement A: Reason A: Statement A: Reason A: Statement A: Reason (10)
5.3 $\hat{Q}_3 = \hat{B}_1$ (proven)✓ $\therefore \quad QP = BP$ ✓	A: Statement A: Conclusion (2) **[14]**

GRADE 11 MATHEMATICS P2 JUNE 2015

COGNITIVE LEVEL ANALYSIS GRID SUMMARY

LEVEL	1	2	3	4
	KNOWLEDGE	ROUTINE	COMPLEX	PROBLEM SOLVING
1.1.1	4			
1.1.2		3		
1.1.3		4		
1.1.4		4		
1.1.5	2			
1.1.6	2			
1.1.7		3		
1.1.8			2	
1.1.9		2		
1.2		3		
1.3			4	
1.4.1	2			
1.4.2		2		
1.4.3	2			
1.4.4			4	
2.1	2			
2.2.1			4	
2.2.2			4	
3.1	2			
3.2.1		4		
3.2.2		2		
3.2.3		2		
4.				6
5.1	2			
5.2.1			4	
5.2.2		4		
5.3			5	
6.1	2			10
6.2				
6.3			2	
%	20%	33%	31%	16%