Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2011

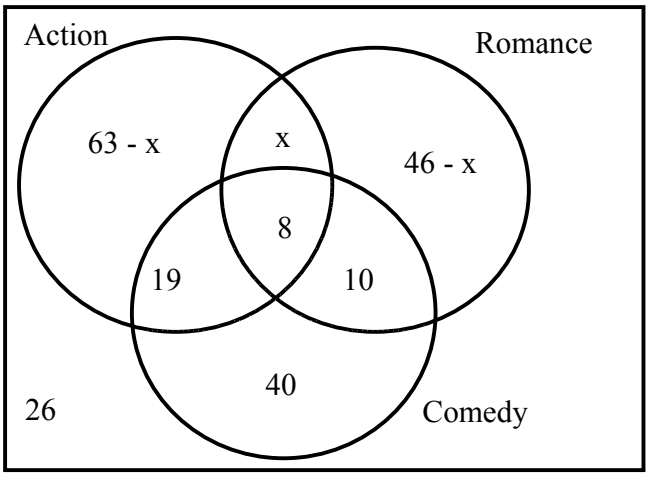
MATHEMATICS P3

MEMORANDUM

MARKS: 100

This memorandum consists of 10 pages.

QUESTION 1				
1.1	- 2 ; - 2 ; - 4 ; - 6 ; - 10		(3)	✓ - 4 ✓ - 6 ✓ -10
1.2	1.2.1	13 terms	(1)	✓ answer
	1.2.2	- 466	(1)	✓ answer
			[5]	
QUESTION 2				
2.1	$\frac{57,6}{100} \times 23\ 000\ 000$ = 13 248 000		(1)	✓ answer
2.2	$\frac{13\ 248\ 000}{48\ 000\ 000} \times 100$ = 27,60 % Yes, a representative sample constitutes 10% of a population.		(2)	✓ 27,60% ✓ answer
2.3	$\frac{62}{100} \times 13\ 248\ 000$ = 8 213 760 votes		(1)	✓ answer
2.4	234 – 198 = 36 $\frac{36}{234} \times 100$ = 15,38%		(2)	✓ $\frac{\mathbf{36}}{\mathbf{234}}$ ✓ answer
2.5	All races and cultures			✓✓ answer
	Both males and females			
	Both urban and rural voters			
	Both youth and adults			
	Both rich and poor voters			
	(Any logical explanation)		(2)	
			[8]	

QUESTION 3				
3.1	$\frac{68}{100} \times 150$ = 102 members		(2)	✓ $\frac{68}{100}$ ✓ answer
3.2	14% + 2% = 16%		(2)	✓14% or 2% ✓ answer
3.3	Lowest body mass: 78 – 3(5,9) = 60,30 kg Highest body mass: 78 + 3(5,9) = 95,70 kg		(2)	✓ 60,30 kg ✓95,70 kg
			[6]	
QUESTION 4				
4.1	4.1.1		(6)	✓ 63 - x ✓ 46 - x ✓ 40 ✓ 10 ✓ 19 ✓ x , 8 and 26
	4.1.2	63 – x + 46 – x + 40 + 8 + 10 + 19 + x + 26 = 200 212 – x = 200 x = 12 Only action movies = 63 -12 = 51	(3)	✓ equation ✓ 12 ✓ answer
	4.1.3	P(only 2 types) = $\frac{19+12+10}{200}$ = $\frac{41}{200}$ or 0,21	(2)	✓✓ answer

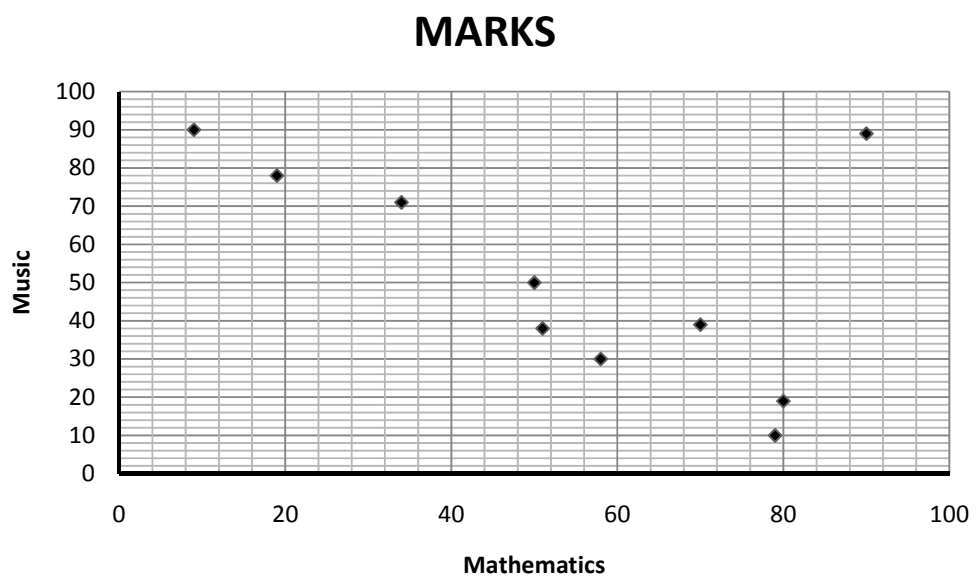
4.2

	Good Concentration (C)	Not Good Concentration (D)	Total
Sleeps for 6 hours or more (A)	180	**120**	300
Sleeps for less than 6 hours (B)	40	660	**700**
Total	220	780	1000

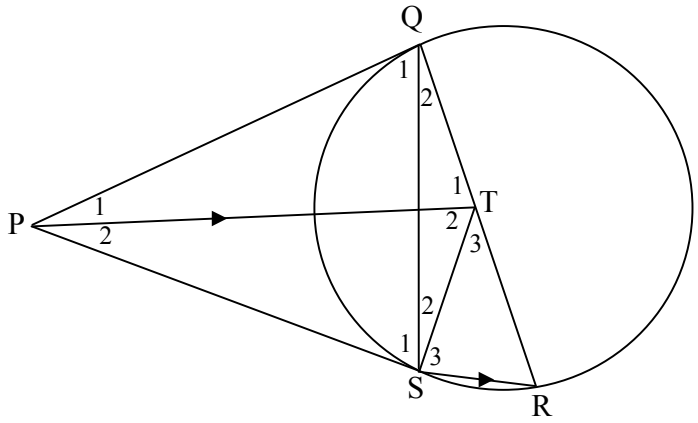
	4.2.1	a = 120 and b = 700	(1)	✓ both answers
	4.2.2	P (A and D) $= \frac{120}{1000}$ $= \frac{3}{25}$ or 0,12	(2)	✓ $\frac{120}{1000}$ ✓ answer
	4.2.3	P(A ∩ C) $= \frac{180}{1000} = \frac{9}{50}$ or **0,18** P(A) $= \frac{300}{1000} = \frac{3}{10}$ or 0,3 P(C) $= \frac{220}{1000} = \frac{11}{50}$ or 0,22 P(A) × P(C) $= \frac{3}{10} \times \frac{11}{50}$ or 0,3 × 0,22 $= \frac{33}{500}$ or **0,066** P(A ∩ C) ≠ P(A) × P(C) ∴ events are not independent	(4)	✓ 0,18 ✓ 0,3 and 0,22 ✓ product 0,066 ✓ conclusion
			[18]	

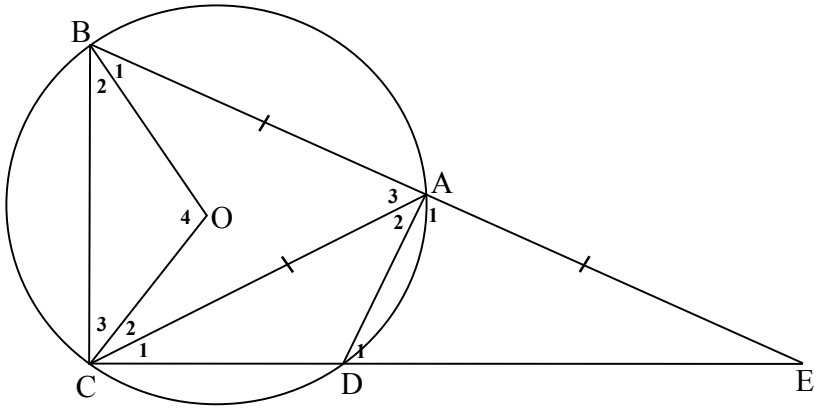
QUESTION 5				
5.1	5.1.1	Possible passwords = $41 \times 41 \times 41 \times 41 \times 41 \times 41$ $= 4\,750\,104\,241$	(2)	✓ 41^6 ✓ answer
	5.1.2	Possible passwords $= 26 \times 41 \times 41 \times 41 \times 41 \times 5$ $= 367\,348\,930$	(2)	✓ 26 and 5 ✓ answer
	5.1.3	P(Password) $= \frac{41\times40\times39\times38\times37\times36\times35}{41^4 + 41^5 + 41^6 + 41^7 + 41^8}$ $= 0{,}0138$	(3)	✓ numerator ✓ denominator ✓ answer
5.2	$^5C_3 = \frac{5!}{3!(5-3)!} = \frac{5\times4\times3\times2\times1}{(3\times2\times1)2!}$ $= 10$		(3)	✓ counting principle ✓ method ✓ answer
			[10]	

QUESTION 6	NOTE: According to the NCS the solutions to data-handling problems should be done with the use of a calculator. The alternative is to use the pen and paper method.



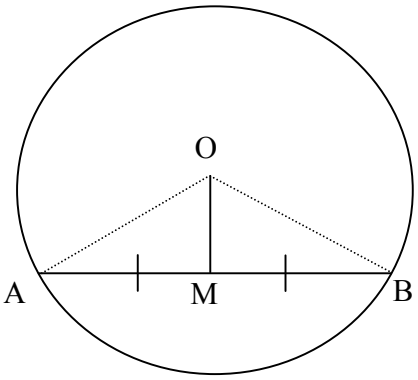
6.1	See diagram	(3)	(✓) 3 - 5 points (✓✓) 6 - 9 points ✓✓✓ all points correct.
6.2	y = a + bx = 82,94 – 0,58x	(4)	a ✓✓ b✓✓
6.3	r = -0,54	(2)	✓✓ answer
6.4	Weak negative correlation.	(1)	✓ answer
6.5	Maths = 90; Music = 89 ∴ (90;89)	(1)	✓ answer
6.6	r = - 0,964	(2)	✓ ✓answer
6.7	With the outlier excluded. Outliers distort statistical measures.	(2)	✓ answer ✓ reason
		[15]	

*** FOR QUESTIONS 7 TO 10 FOLLOW CANDIDATES REASONING ***				
QUESTION 7				
				
7.1	7.1.1	$\hat{Q}_1 = 67^o$ (two tangents drawn from the same point)		✓ answer & reason
		$\hat{R} = \hat{Q}_1 = 67^o$ (tangent-chord theorem)		✓ answer & reason
		$\hat{T}_1 = \hat{R} = 67^o$ (corresponding angles, PT∥ SR)	(3)	✓ answer & reason
	7.1.2	$\hat{S}_3 = 67^o$ (TS = TR: radii) $\hat{T}_2 = 67^o$ (alt. angles: PT // SR) **OR** $Q\hat{P}S = 180^o - 2(67^o)$ (sum of the angles of $\Delta = 180^o$ $= 46^o$ $\hat{Q}_2 = 90^o - 67^o$ (PQ ⊥ PQ, tangent/radius) $= 23^o$ $\hat{T}_2 = 67^o$ ($S\hat{T}Q = 134^o$, sum of the angles of $\Delta QTS = 180^o$)	(2)	✓ statement & reason ✓ statement & reason
	7.1.3	$P\hat{Q}T = 90^o$ $P\hat{S}T = 90^o$ (tangent ⊥ radius) $P\hat{Q}T + P\hat{S}T = 180^o$ => opposite angles are supplementary ∴ PQTS is a cyclic quadrilateral	(2)	✓ statement ✓conclusion
		OR $\hat{Q}_1 = \hat{T}_2$ (both = 67^o : proven above) => Angles subtended by same chord are equal ∴ PQTS is a cyclic quadrilateral		



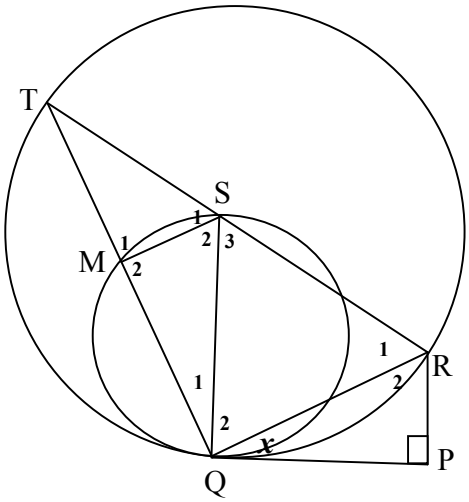
7.2	7.2.1	$\hat{A}_3$ = 2x (angle centre = 2 × angle circumference) C$\hat{A}$E = 180° − 2x (angles on a straight line) $\hat{E}$ = $\hat{C}_1$ = x (angles of Δ = 180°, AC = AE given)	(3)	✓ statement/reason ✓ statement/reason ✓ statement/reason
	7.2.2	A$\hat{B}$C = B$\hat{C}$A = 90° – x (BA = CA, given)		✓ statement/reason
		$\widehat{D}_1$ = A$\hat{B}$C = 90° – x (ext. angle of a cyclic quad,)		✓ statement/reason
		$\hat{A}_1$ = 90° (angles of a triangle)		✓ statement
		∴ DE is the diameter, because $\hat{A}_1$ is subtended on DE.		✓ conclusion
			(4)	
			[14]	

QUESTION 8



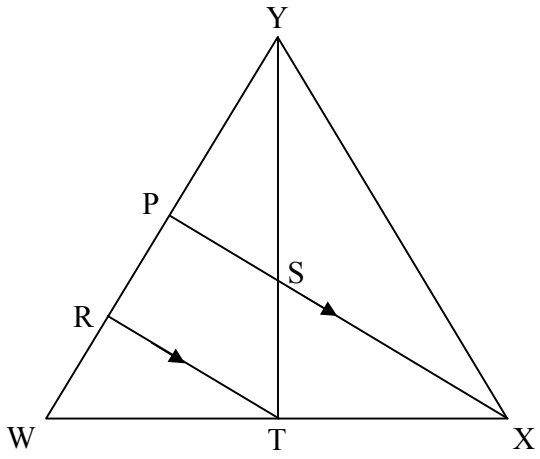
	Construction : Draw radii OA and OB		✓ construction
	Proof: In Δ AMO and Δ BMO is:		
	AM = BM (given)		✓statement & reason
	OA = OB (radius)		✓statement & reason
	OM is common		✓statement & reason
	ΔAMO ≡ Δ BMO (SSS)		
	A$\widehat{M}$O = B$\widehat{M}$O = 90°		✓ conclusion
	∴ AM ⊥ AB	**[5]**	

QUESTION 9



9.1	SM ⊥ TQ ($\widehat{M}_2 = 90^o$ in a semi-circle) ∴ TM = MQ	(2)	✓ statement & reason ✓ conclusion
9.2	$\hat{T}$ = P$\hat{Q}$R = x (tangent/chord theorem)		✓ statement & reason
	T$\hat{Q}$R = 90° (angle in a semi-circle)		✓ statement & reason
	$\hat{R}_1$ = 90° - x (angles of Δ TQR)		✓ statement & reason
	$\hat{R}_2$ = 90° - x (angles of Δ PQR)		
	∴ $\hat{R}_1 = \hat{R}_2$	(3)	
9.3	In Δ PQR and Δ QTR		
	P$\hat{Q}$R = $\hat{T}$ (tangent/chord theorem)		✓ statement & reason
	$\hat{R}_2 = \hat{R}_1$ (proven above)		✓ statement & reason
	ΔPQR /// Δ QTR (AAA)	(3)	✓ conclusion & reason
9.4	$\frac{RQ}{RT} = \frac{RP}{RQ}$ (Δ PQR /// Δ QTR)		✓ statement & reason
	RQ^2 = RT × RP ∴RQ^2 = 2 SQ.RP (TR = 2 SQ : radii)		✓ statement ✓ TR = 2 SQ
		(3)	
		[11]	

QUESTION 10



10.1	WT:WX = 3:5 WR:WP = 3:5 (RQ∥PX) WP:RP = 5:2 WP = YP ∴ YP:RP = 5:2 $\therefore \frac{YP}{YR} = \frac{5}{7}$	(3)	✓ WR:WP ✓ WP:RP ✓ YP:RP
10.2	Δ YPS /// Δ VRT (AAA) $\frac{YR}{YP} = \frac{TR}{SP}$ $\frac{TR}{SP} = \frac{7}{5}$	(2)	✓ statement ✓ answer
10.3	XP⊥WY given		
	RT ⊥ WY (RT ∥ PX)		
	$\frac{Area\ \Delta SPY}{Area\ \Delta TRY} = \frac{\frac{1}{2}PY.PS}{\frac{1}{2}YR.RT} = \frac{YP}{YR} \cdot \frac{PS}{TR} = \frac{5}{7} \times \frac{5}{7} = \frac{35}{49}$	(3)	✓ formula ✓ substitution ✓ answer
		[8]	
	TOTAL:	**100**	