basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P2

NOVEMBER 2017

MARKING GUIDELINES

MARKS: 150

Symbol	Explanation
M	Method
MA	Method with accuracy
CA	Consistent accuracy
A	Accuracy
C	Conversion
S	Simplification
RT	Reading from a table/ a graph / document/diagram
SF	Correct substitution in a formula
O	Opinion/Explanation
P	Penalty, e.g. for no units, incorrect rounding off, etc.
R	Rounding off
NPR	No penalty for rounding
AO	Answer only
MCA	Method with constant accuracy

This marking guideline consist of 17 pages.

QUESTION 1 [40 MARKS]

Ques	Solution	Explanation	T&L

1.1.1	Decrease amount in thousands
	= R32 187 × 4,402% ✓M
	≈ R1 416,87 ✓CA
	Communication Cost in thousands
	= R32 187 – R1 416,87 ✓M
	= R30 770,13
	= R30 770 ✓R
	
	     Decrease amount
	     = R32 187 000 × 4,402%
	     = R1 416 871,74
	     ≈ R1 417 000
	     Comm. Cost
	     = R32 187 000 – R1 417 000
	     = R30 770 000
	
	OR
	
	Communication Cost in thousands
	        ✓M
	= 32 187 – (4,402% × 32 187) ✓M
	= 32 187 – 1 416,87 = 30 770 ✓CA ✓R
	
	OR
	     ✓M
	100% – 4,402% = 95,598 % ✓M
	Communication Cost in thousand = R32 187 × 95,598%
	                        = R30 770,12826 ✓CA
	                        ≈ R30 770 ✓R
	
	OR
	
	Communication Cost in thousands
	        ✓M
	= R2 163 571 – R(67 257 + 640 601 + 69 866 + ✓M
	    953 592 + 135 768 + 34 087 + 55 267 + 176 363)
	= R2 163 571 – R2 132 801 ✓CA
	= R30 770 ✓CA
		1M % calculation
		1CA decreased amount
		
		1M subtracting
		
		1R rounding
		
		OR
		
		1M subtracting
		1M % calculation
		1CA decreased amount
		1R rounding
		
		OR
		
		1M subtracting
		1M % calculation
		1CA cost
		1R rounding
		
		OR
		
		1M subtracting
		1M adding all other values
		
		1CA total for other values
		1CA cost
		
		AO
		
		(4)
			F
			L2

1.1.2	Profits could decrease. ✓✓O **OR** Imported stock will cost more. ✓✓O	2O explanation (2)	F L4

1.1.3	For 2015: Percentage profit = $\dfrac{342\,534}{2\,250\,041} \times 100\%$ ✓RT
	                          ✓SF
	          = 15,22345593%
	               ✓A
	
	For 2016: Percentage profit = $\dfrac{360\,651}{2\,403\,509} \times 100\%$
	          = 15,00518617 % ✓A
	
	The profit **decreased** ✓O
	OR
	The profit nearly stayed the same.
	OR
		1RT correct values
		1SF substitution
		1A percentage for 2015
		
		1A percentage for 2016
		
		1O comparison
			F
			L4

Ques	Solution	Explanation	T&L

	NOTE: Calculated profit for 2015 is R343 002 thousand
	
	Percentage profit = $\dfrac{343\,002}{2\,250\,041} \times 100\%$ ✓RT
	    ✓SF
	    $\approx 15{,}24\%$ ✓A
	
	For 2016:
	
	Percentage profit = $\dfrac{360\,651}{2\,403\,509} \times 100\%$
	    $= 15{,}00518617\,\%$ ✓A
	
	The profit **decreased** ✓O
		1RT correct values
		1SF substitution
		
		1A percentage for 2015
		
		1A percentage for 2016
		
		1O comparison
		NPR
		
		(5)	

1.2	✓A ✓MCA
	Income tax = R147 996 + 39% × R(663 000 – 550 100)
	        = R147 996 + 39% × R112 900
	        = R147 996 + R44 031 ✓S
	        = R192 027 ✓CA
	Total Income Tax (after rebates) ✓M
	 = R192 027 – R13 500 – R7 407 **OR** = R192 027 – R20907
	
	= R171 120 ✓CA
		1A correct bracket
		1MCA amount above
		1S simplification
		1CA tax before rebate
		
		1M subtracting **both** rebates
		1CA tax after rebate
		
		(6)
			F
			L3

1.3	Increase number of donors for 2017
	= 110 000 × 9,6%
	= 10 560 ✓M
	Number of donors 2017
	= 110 000 + 10 560
	= 120 560 ✓CA
	
	Increase number of donors for 2018
	= 120 560 × 9,6%
	= 11 573,76 ✓M
	Number of donors 2018
	= 120 560 + 11 573,76
	= 132 133,76
	$\approx$ 132 134 ✓CA
	
	          OR
	
	Number of donors for 2017
	=110 000 + (110 000 × 9,6%) ✓M
	= 120 560 ✓CA
	
	Number of donors for 2018
	=120 560 + (120 560 × 9,6%) ✓M
	= 132 133,76
	$\approx$ 132 134 ✓CA
	          OR
		1M calculating 9,6%
		1CA calculating total donors for 2017
		
		1M calculating 9,6 % of 2017 donors
		
		1CA calculating donors for 2018
		
		OR
		
		1M multiplying correct values
		1CA calculating donors for 2017
		
		1M multiplying correct % to 2017 number
		1CA calculating number for 2018
			D
			L3

Ques	Solution	Explanation	T&L

	OR
	
	Number of donors for 2017
	$= 110\,000 \times 109{,}6\%$ ✓M
	$= 120\,560$ ✓CA
	
	Number of donors for 2018
	$= 120\,560 \times 109{,}6\%$ ✓M
	$= 132\,133{,}76$
	$\approx 132\,134$ ✓CA
	
	        OR
	
	Number of donors for 2018
	    ✓M ✓M ✓M
	$= 110\,000 \times 109{,}6\% \times 109{,}6\%$
	$= 132\,133{,}76$
	$\approx 132\,134$ ✓CA
		OR
		
		1M multiplying and adding percentages
		1CA calculating total number for 2017
		
		1M multiplying and adding correct % to 2017 number
		1CA calculating number for 2018
		
		        OR
		
		1M adding percentages
		1M multiplying correct numbers
		1M multiplying 109,6% twice
		1CA calculating number for 2018
		NPR
		
		AO	

		(4)	
1.4.1	Makes provision for other people who are not Asian, Black, Coloured or White. ✓✓O **OR** Some donors don't indicate race. ✓✓O **OR** The percentage of the races do not add up to 100%. ✓✓O **OR** The other is 'mixed' race. ✓✓O **OR** They are from other countries. ✓✓O	2O explanation (2)	D L4
1.4.2	✓O ✓O As the years increase the percentage black donors increase.	2O increasing trend (2)	D L4
1.4.3	The number of donors are different every year. ✓✓O **OR** The graph represents percentages. ✓✓O **OR** The percentages are rounded values. ✓✓O **OR** The graph shows that the bars' heights are not the same. ✓✓O	2O explanation (2)	D L4

Ques	Solution	Explanation	T&L
1.4.4 (a)	The 2015 donors × 101,02% = 490914 Number of donors = $\dfrac{490\,914}{101,02\%}$ ✓A $\qquad$ OR $\dfrac{490\,914}{1,0102}$ $= 485\,957,236\ldots$ $\approx 485\,957$ ✓A	1MA dividing by 101,02% 1A number of donors **NPR** (2)	D L2
1.4.4 (b)	% white = 100% − (8% + 38% + 5% + 2%) ✓MA $\quad = 47\%$ ✓CA Number of white donors = 485 957 × 47% ✓MCA $\qquad\qquad\qquad = 228\,399,79\ldots$ $\qquad\qquad\qquad \approx 228\,400$ ✓CA	**CA from Q1.4.4 (a)** 1MA subtracting from 100% 1CA percentage 1MCA % calculation 1CA **rounded** number **AO** (4)	D L3
1.5.1	P $_{(Blood\ Type\ O)}$ $\quad$ ✓RT $= (39 + 6)\%$ $= 45\%$ **OR** $\dfrac{9}{20}$ **OR** 0,45 ✓A	1RT correct two values 1A calculating probability (2)	P L2
1.5.2	AB$^+$ $\quad$ ✓✓A	2A correct blood type (2)	P L2
1.5.3	$\quad$ ✓O No, it is NOT most likely. Can **only** receive blood from own blood group. ✓✓O **OR** P $_{(O^-\ receiving\ blood\ from\ any\ donor)}$ $= \dfrac{1}{8}$ ✓A ✓A ∴ It is NOT most likely. ✓O	1O verification 2O explanation **OR** 1A numerator 1A denominator 1O verification (3)	P L4
		[40]	

QUESTION 2 [37 MARKS]

Ques	Solution	Explanation	T&L
2.1.1	Inland prices have higher costs for transport / storage. ✓✓O **OR** Coastal storages are close by and transport fees are lower. ✓✓O **OR** Fuel is imported via harbours. ✓✓O **OR** Most refineries are along the coast. ✓✓O (2)	2O reason	F L4
2.1.2	$S = \dfrac{R2{,}67\ ✓A}{R12{,}32} \times R616{,}00$ ✓M $\boxed{OR\ \dfrac{R2{,}67}{R2{,}34} \times R117}$ $= R133{,}50$ ✓CA **OR** Number of litres $= \dfrac{R616{,}00\,✓M}{R12{,}32}$ $\boxed{OR\ \dfrac{R142{,}50}{R2{,}85}\ OR\ \dfrac{R77{,}00}{R1{,}54}\ \\ OR\ \dfrac{R117}{R2{,}34}}$ $= 50$ ✓A $S = 50\ell \times R2{,}67/\ell$ $= R133{,}50$ ✓CA **OR** Basic fuel price $= \dfrac{R77 \times R5{,}26}{R1{,}54} = R263$ ✓A $S = R616 - R142{,}50 - R77{,}00 - R263{,}00 = R133{,}50$ ✓M ✓CA (3)	1M multiplying 1A correct ratio 1CA storage cost 1M dividing 1A litres 1CA storage cost **OR** 1A basic fuel price 1M subtracting all from total 1CA storage cost **AO**	F L2
2.1.3	Number of litres consumed $= 1\,250\text{ km} \times 7{,}3\ \ell \div 100\text{ km}$ ✓M $= 91{,}25\ \ell$ ✓A Inland cost $= 91{,}25\ \ell \times R12{,}32/\ell$ $= R1\,124{,}20$ ✓CA Coastal cost $= 91{,}25\ \ell \times R11{,}94/\ell$ $= R1\,089{,}525$ $\approx R1\,089{,}53$ ✓CA Statement is NOT valid. ✓O **OR** Litres consumed $= 1\,250\text{ km} \div 100\text{ km} \times 7{,}3 = 91{,}25$ ✓M ✓A Difference in fuel price $= R12{,}32 - R11{,}94 = R0{,}38$ ✓M Difference in cost $= R0{,}38/\ell \times 91{,}25\ \ell$ $\approx R34{,}68$ ✓A Statement is NOT valid. ✓O **OR**	1M working with consumption rate 1A number of litres 1CA inland cost 1CA coastal cost 1O verification **OR** 1M working with consumption rate 1A number of litres 1M difference 1A cost 1O verification	F L4

Ques	Solution	Explanation	T&L
	OR Inland Cost / 100 km = 7,3 ℓ × R12,32/ ℓ = R89,94 ✓M Number of 100km distances =1250 km ÷ 100 km = 12,5 Cost = 12,5 × R89,94 = R1 124,20 ✓A Coastal Cost / 100 km = 7,3 l × R11,94 = R87,16 Number of 100 km distances = 1250 km ÷ 100 km = 12,5 Cost =12,5 × R89,94 = R1 089,53 ✓A Difference = R1 124,50 – R1 089,53 = R34,67 ✓M Statement is NOT valid. ✓O **OR** Difference = R12,32 – R11,94 = R0,38 ✓M Number of 100 km distances = 1 250 km ÷ 100 km = 12,5 Cost = R0,38 ^{✓M}× 7,3 ^{✓M}× 12,5 = R34,68 ✓A Statement is NOT valid. ✓O	OR 1M working with consumption rate 1A cost 1A cost 1M difference 1O verification **OR** 1M difference 1M multiplying with consumption rate 1M multiply with 12,5 1A cost 1O verification **NPR** (5)	

2.2.1	% increase = $\dfrac{\text{R70,9 billion} - \text{R54 billion}}{\text{R54 billion}}$ ^{✓M}×100% ✓A
	        ≈ 31,296 % ✓CA
	
	OR
	
	$\dfrac{\text{R70,9 billion}}{\text{R54 billion}}$ ^{✓M}× 100% = 131,2962% ✓A
	% increase = 131,2962% – 100%
	         ≈ 31,296 % ✓CA
	
	OR
	Using Trial & Error:
	      ✓M ✓A
	R54 billion × 31,3% = R16,9 billion
	
	R16,9 billion + R54 billion = R70,9 billion
	
	∴ % increase = 31,3% ✓CA
		1M % increase
		1A correct values
		1CA percentage
		
		OR
		
		1M % increase
		1A correct values
		
		1CA percentage
		
		OR
		
		1M % calculation
		1A increase amount
		
		1CA percentage
		NPR
		               (3)
			F
			L2

Ques	Solution	Explanation	T&L
2.2.2	$7 + 118 = 125$ ✓A $\dfrac{7}{125} \times$ Total budgeted income $= $ R70,9 billion ✓A Total budgeted income $= $ R70,9 billion $\div \dfrac{7}{125}$ ✓M $\qquad\qquad\qquad = $ R1 266,07 billion $\qquad\qquad\qquad \approx $ R1 266 billion ✓CA **OR** $7 : 118 = $ R70,9 billion $: x$ ✓A $\quad 7x = $ R70,9 billion $\times 118$ $\quad\quad x = \dfrac{\text{R70,9 billion} \times 118}{7}$ ✓S $\quad\quad\quad \approx $ R1 195,17 billion ✓CA Total budgeted income $= $ R1 195,17 billion $+$ R70,9 billion $\qquad\qquad\qquad\qquad = $ R1 266,07 billion $\qquad\qquad\qquad\qquad \approx $ R1 266 billion ✓CA	1A adding ratio values 1A using ratio values 1M dividing by ratio 1CA budget value **OR** 1A using proportion 1S changing subject 1CA other revenues 1CA rounded value in **billion** (4)	F L3
2.3.1	India ✓✓RT	2RT country (2)	D L2
2.3.2	0,02 0,52 **0,63** 0,91 1,12 **1,23** 2,03 2,17 **2,97** 3,62 4,11 $\text{IQR} = Q_3 - Q_1$ ✓M $\qquad$ ✓A $\qquad$ ✓A $\quad = 2,97 - 0,63$ $\quad = 2,34$ ✓CA	1M use formula of IQR 1A lower quartile 1A upper quartile 1CA IQR **AO** [Accept $58 - 7 = 51$] (4)	D L3
2.3.3	Countries with high rankings are developed (rich, 1st world) as well ✓✓O as underdeveloped/developing (poor, 3rd world). **OR** ✓✓O Countries with low rankings are developed (rich) as well as underdeveloped/ developing (poor). **OR** Counties listed are from all over the world (different continents). ✓✓O **OR** ✓✓O Rankings show the sample was chosen randomly.	2O valid reason (2)	D L4

Ques	Solution	Explanation	T&L
2.3.4	India: Mean Daily wage $= \dfrac{236,51}{93,76\%}$ ✓RT ✓MA $\approx 252,25$ Rouble ✓A SA: Mean Daily wage $= \dfrac{237,35}{26,20\%}$ $\approx 905,92$ Rouble ✓A Difference $= (905,92 - 252,25)$ Russian Rouble ✓M $= 653,67$ Russian Rouble ✓CA	1RT reading both values 1MA dividing by % 1A Indian day wage 1A SA day wage 1M subtracting 1CA difference in **Rouble** (6)	F L3
2.3.5	Range $= 425,52 - 21,44$ ✓A $= 404,08$ Russian Rouble 1 Russian Rouble $= 0,016$ Euro ✓M $\therefore 404,08$ Russian Rouble $= 404,08 \times 0,016$ Euro $= 6,46528$ Euro ✓C 1 South African Rand $= 0,070$ Euro $\therefore \dfrac{6,46528}{0,07}$ ✓C $= R92,36$ ✓A Learner solution is **incorrec**t ✓O **OR** 1 Russian Rouble $= \dfrac{0,016}{0,070}$ Rand ✓C $= R\,0,2285714286$ ✓A Range $= 425,52 - 21,44$ ✓A $= 404,08$ Russian Rouble $= 404,08 \times 0,2285714286$ rand/rouble ✓C $= R92,36$ ✓A Learner solution is **incorrect** ✓O **OR** Max. value to rand: $425,52 \times 0,016 \div 0,07 = R97,26$ ✓C ✓CA Min. value to rand: $21,44 \times 0,016 \div 0,07 = R4,90$ ✓CA Range $= R97,26 - R4,90 = R92,36$ ✓M ✓CA Learner solution is **incorrect.** ✓O	1A range 1M multiplication 1C convert to Euro 1C convert to rand 1A rand value 1O verification **OR** 1C dividing by 0,07 1A conversion factor 1A range 1C conversion 1A rand value 1O verification **OR** 1C conversion 1CA max value 1CA min value 1M subtracting 1CA rand value 1O verification **NPR** (6)	D L4
		[37]	

QUESTION 3 [40 MARKS]

Ques	Solution	Explanation	T&L
3.1.1	$\overset{\checkmark\checkmark A}{33}$ Kwela Street $\checkmark A$	2A correct number 1A correct street (3)	MP L2

3.1.2	Length 22 mm $\checkmark A$ (21 mm to 23 mm)
	Width 9 mm $\checkmark A$ (8 mm to 10 mm)
	
	Scale 25 $\overset{\checkmark A}{mm}$ = 30 m (24 mm to 26 mm)
	
	$\therefore$ Length = $\dfrac{30}{25} \times 22$ m $\checkmark M$
	     = 26,4 m $\checkmark CA$
	
	Width = $9 \times \dfrac{30}{25}$ m = 10,8 m $\checkmark CA$
	
	OR
	
	$\overset{\checkmark A}{}$
	Scale: 25 mm : 30 m (24 mm to 26 mm)
	    25mm : 30 000 mm
	       1 : 1 200 $\checkmark M$
	Length = 22 mm $\checkmark A$ (21 mm to 23 mm)
	Width = 9 mm $\checkmark A$ (8 mm to 10 mm)
	Actual length = 22 × 1 200 mm
	        = 26 400 mm = 26,4 m $\checkmark CA$
	Actual width = 9 × 1 200 mm
	        = 10 800 mm = 10,8 m$\checkmark CA$
		1A length
		1A width
		
		1A measured scale
		
		1M using the scale
		
		1CA length in m
		
		1CA width in m
		
		OR
		
		1A measured scale
		
		1M unit scale
		1A length
		
		1A width
		
		1CA length in m
		
		1CA width in m
		(6)
			M
			L3

3.1.3	On the enlarged map: Measured length = 62 mm$\overset{\checkmark MCA}{}$(61mm to 64 mm) $\overset{\checkmark M}{}$ $\overset{\checkmark CA}{}$ Scaled length = 62 mm ÷ 5 = 12,4 mm ≠ 22 mm $\therefore$ NOT valid $\checkmark O$ **OR** On the enlarged map: The measured width = 24 $\overset{\checkmark A}{mm}$ (23 mm to 26 mm) $\overset{\checkmark M}{}$ $\overset{\checkmark CA}{}$ widths: 9 mm × 5 = 45 mm ≠ 24 mm $\therefore$ NOT valid $\checkmark O$ **OR**	**CA from Q3.1.2** 1MCA measured length 1M dividing by 5 1CA simplification 1O verification **OR** 1A measured length 1M multiplying with 5 1CA simplification 1O verification	MP L4

Ques	Solution	Explanation	T&L
	OR On the enlarged map: Measured length = 62 mm ✓A (61mm to 64 mm) Measured width = 24 mm (23 mm to 26 mm) $$\text{Scale factor} = \frac{62}{22} ✓M \quad \textbf{OR} \quad \text{width} = \frac{24}{9}$$ $$\approx 2{,}82 \quad ✓CA \qquad \approx 2{,}67$$ ∴ Not valid ✓O	**OR** 1A measured 1M dividing 1CA scale factor 1O verification (4)	
3.2.1	✓MA Length = 5 240 mm – 2 × 220 mm = 4 800 mm ✓CA Width = 4 040 mm – 2 × 220 mm = 3 600 mm ✓CA ✓MCA Floor area = 4 800 mm × 3 600 mm = 17 280 000 mm^2 = 17 280 000 ÷ 1 000 000 ✓C = 17,28 m^2 ✓CA **OR** Length = 5 240mm = 5,24m Width = 4 040mm = 4,04m ✓C Wall thickness = 220mm = 0,22m ✓MA Interior Length = 5,24m – 2(0,22m) = 4,8m ✓CA Interior Width = 4,04m – 2(0,22m) = 3,6m ✓CA Floor Area = 4,8 m × 3,6 m ✓MCA = 17,28m^2 ✓CA	1MA subtracting of thickness 1CA internal length 1CA internal width 1MCA substitution 1C conversion 1CA internal area in m^2 **OR** 1C conversion of all values 1MA subtracting thickness 1CA length 1CA width 1MCA substitution 1CA internal area in m^2 (6)	M L3
3.2.2	Area of Ceiling board = 2 400 mm × 900 mm ✓SF = 2 160 000 mm^2 ✓A Number of boards needed = $\dfrac{17\,280\,000}{2\,160\,000}$ ✓M = 8 ✓CA ∴ Need **more** than 7 ✓O **OR** Number needed = 4 800 mm ÷ 2 400 mm ✓M = 2 for length ✓CA Number needed = 3 600 mm ÷ 900 mm = 4 for width ✓CA Total needed = 2 × 4 = 8 ✓CA ∴ Need **more** than 7 ✓O **OR**	**CA from Q3.2.1** 1SF substitution 1A area of board 1M dividing 1CA number of boards 1O deduction **OR** 1M dividing 1CA number length wise 1CA number width wise 1CA number of boards 1O deduction	M L4

Ques	Solution	Explanation	T&L
	OR Area of one ceiling board = 2,4 m $\checkmark$SF × 0,9 m = 2,16 $\checkmark$A m^2 Total area coved by 7 boards = 2,16 m^2 $\checkmark$M × 7 = 15,12 $\checkmark$CA m^2 ∴ Need **more** than 7 $\checkmark$O	1SF substitution 1A area of board 1M multiplying 1CA total area 1O deduction (5)	M L4
3.2.3	Length of cornice $= 2 × (4\ 800$ $\checkmark$CA mm $+\ 3\ 600$ $\checkmark$SF mm) $= 16\ 800$ mm $\checkmark$CA	1CA values **from Q 3.2.1** or RT if reworked 1SF substitution 1CA length (3)	M L2
3.2.4	$16\ 800 ÷ 2\ 000 = 8,4$ $\checkmark$CA Hence 9 lengths cornice needed. $\checkmark$A $\checkmark$M Total cost = 8 × R91,44 + 9 × R53,64 = R731,52 + R482,76 = R1 214,28 $\checkmark$CA The statement is **correct**. $\checkmark$O	**CA from Q3.2.3 and Q3.2.2** 1CA number of lengths 1A using 2 correct prices 1M multiplying 1CA cost 1O conclusion (5)	F L4
3.3.1	Above ground is a higher security risk $\checkmark\checkmark$O **OR** Safety reasons $\checkmark\checkmark$O **OR** Below the ground the cost will be less. $\checkmark\checkmark$O **OR** Above the ground it takes up space. $\checkmark\checkmark$O **OR** Underground, the water stays cooler/fresher than in direct sun/ lessen evaporation. $\checkmark\checkmark$O **OR** Aesthetic reasons. $\checkmark\checkmark$O **OR** Below the ground for water to easily run into it. $\checkmark\checkmark$O **OR** Less maintenance $\checkmark\checkmark$O	2O reason (2)	MP L4

Ques	Solution	Explanation	Level
3.3.2	$8\ 000\ \ell = 8\ 000\ 000\ \text{cm}^3$ $= 8\ \text{m}^3$ ✓C Volume of a cylindrical tank $= \pi \times \text{radius}^2 \times \text{length}$ $8\ \text{m}^3 = 3{,}142 \times \text{radius}^2 \times 2{,}9\ \text{m}$ ✓SF $(\text{radius})^2 = \dfrac{8\ \text{m}^3}{3{,}142 \times 2{,}9\ \text{m}}$ ✓A $= 0{,}87798239\dots$✓S Radius $= \sqrt{0{,}87798239}$ $\approx 0{,}937\ \text{m}$ ✓CA Diameter $= 1{,}874\ \text{m}$ ✓CA **OR** Volume of a cylindrical tank $= \pi \times \text{radius}^2 \times \text{length}$ $8\ 000\ 000\ \text{cm}^3 = 3{,}142 \times \text{radius}^2 \times 290\ \text{cm}$ ✓SF $(\text{radius})^2 = \dfrac{8\ 000\ 000\ \text{cm}^3}{3{,}142 \times 290\ \text{cm}}$ ✓A $= 8\ 779{,}8239\dots$ ✓S Radius $= \sqrt{8779{,}8239}$ $\approx 93{,}7\ \text{cm}$ ✓CA Diameter $= 187{,}4\ \text{cm}$ ✓CA $= 1{,}874\ \text{m}$ ✓C	1C Conversion 1SF substitution 1A change subject of formula 1S simplification 1CA radius 1CA diameter **OR** 1SF substitution 1A change subject of formula 1S simplification 1CA radius 1CA doubling the radius 1C conversion to m **NPR** (6)	M L3
		[40]	

QUESTION 4 [33 MARKS]

Ques	Solution	Explanation	T&L

4.1.1	Dineo's maximum wind speed is 95 (MPH)
	
	95 MPH = $\dfrac{80,4672}{50} \times 95$ km/h ✓C
	
	    = 152,887… km/h ✓CA
	    = 152,89 km/h ✓R
	
	OR
	
	50 mile = 80,4672 km
	  1 mile = 1,609344 km
	
	95 MPH = 95 miles / hour $\times$ 1,609344 ✓C
	
	    = 152,88768 km/h ✓CA
	
	    ≈ 152,89 km/h ✓R
	
	OR
	
	95 miles – 50 miles = 45 miles
	    50 miles = 80,4672 km
	    45 miles = x km
	x km = 80,4672 km × 45 miles ÷ 50 miles
	    = 72,4205 km ✓C
	
	Total distance = 80,4672 km + 72,4205 km
	        = 152,887 km ✓CA
	
	∴ 95 MPH = 152,89 km/h ✓R
		
		1C conversion
		
		1CA simplification
		
		1R rounding
		
		OR
		
		1C conversion
		
		1CA simplification
		
		1R rounding
		
		OR
		
		1C conversion
		
		1CA simplification
		
		1R rounding
		AO
		 (3)
			M
			L2

4.1.2	Measured distance between gridlines is 17 mm ✓A
	Measured distance between P and Q is 39 ✓A
	
	        ✓M
	Actual distance = $\dfrac{205,043 \text{ km}}{17 \text{mm}} \times 39$ mm ✓MCA
	
	    ≈ 470,39 km ✓CA
	Distance = Ave. speed × time
	
	Ave. speed = $\dfrac{470,39 \text{ km}}{24 \text{ hours}}$ ✓S
	              ✓SF
	    ≈ 19,56 km/h ✓CA
	
	(Accept 16 mm to 18 mm for gridlines and 38 mm to 42mm for PQ distance)
	OR
		1A distance between gridlines
		1A distance P to Q
		1M using scale
		1MCA using correct values
		
		1CA actual distance
		
		1S changing the subject of the formula
		1SF substitution
		1CA Ave speed
		NPR
		 (8)
			M&P
			L3 (5)
			Meas
			L3 (3)

Ques	Solution	Explanation	T&L
	OR App. distance from P to Q is $2\frac{1}{3}$ gridlines ✓✓A Distance = $2\frac{1}{3} \times 205{,}043$ km ✓M ✓A $= 478{,}4336667$ km ✓CA Distance = Ave. speed × time $478{,}4336667$ km = Ave. speed × 24 hours ✓SF Ave. speed ≈ $19{,}93$ km/h ✓CA ✓S (Accept $2\frac{1}{6}$ up to $2\frac{1}{3}$) **OR** 18 mm ✓A $= 205{,}043$ 1 mm = $11{,}39$ ✓M ✓A Measured distance from the gridline to Q is 3 mm (2 to 4)mm Distance from P to Q ✓M $= 205{,}043 + 205{,}043 + 3 \times 11{,}39$ $= 444{,}256$ km ✓CA Ave. speed $= \dfrac{444{,}256 \text{ km}}{24 \text{ hours}}$ ✓SF ✓S $\approx 18{,}51$ km/h ✓CA	2A distance P to Q 1M multiplying 1A using correct values 1CA actual distance 1SF substitution 1S changing the subject of the formula 1CA ave. speed **OR** 1A distance between gridlines 1M unit scale 1A distance to Q 1M using scale 1CA actual distance 1SF substitution 1S changing the subject of the formula 1CA Ave speed **NPR** (8)	
4.2.1	10 ✓✓RT	2RT correct value (2)	D L2

Ques	Solution	Explanation	T&L
4.2.2	**Total number of storms per year according to affected world oceanic regions** 1A for 1st point 2A for the next 4 points correctly plotted 1A for the last point 1CA joining the points to form a broken line graph (5)		D L2
4.2.3	North Atlantic ✓✓RT	2RT correct region (2)	D L2

Ques	Solution	Explanation	T&L
4.2.4	Western Pacific: Total storms = 39 + 30 + 52 + 34 + 40 = 195 ✓A Damages in million USD ✓RT = 10 200 + 8 410 + 22 800 + 6 080 + 10 600 = 58 090 ✓MCA North Atlantic: Total storms = 12 + 9 + 13 + 19 + 19 = 72 ✓CA Damages in million USD ✓RT = 590 + 232 + 1510 + 75 000 + 21 000 = 98 332 ✓CA NOT valid statement, ✓O ✓✓O Western Pacific had the most storms but North Atlantic had the greatest amount of damages. (9)	1A number of storms WP 1RT using amounts from table 1MCA adding amounts 1CA number of storms in NA 1RT only using values to 2011 1CA amount of damage 1O not valid 2O reason	D (4) F(4) L4
4.3	Growth rate per 1 000 = 38,3 – 11,9 – 1,9 ✓MA $\qquad\qquad$ = 24,5 ✓CA ∴ percentage growth rate = $\dfrac{24,5}{1000} \times 100\%$ ✓MCA $\qquad\qquad\qquad$ = 2,45% ✓CA **OR** Percentage growth rate $\qquad$ ✓MA $= \left(\dfrac{38,3}{1000} - \dfrac{11,9}{1000} - \dfrac{1,9}{1000}\right) \times 100\%$ ✓M $= \dfrac{24,5}{1000} \times 100\%$ ✓CA $= 2,45\%$ ✓CA	1MA subtracting rates 1CA growth rate 1MCA calculating percentage (÷1 000 ×100) 1CA simplification **OR** 1MA subtracting rates 1M calculating percentage 1CA growth rate 1CA simplification **AO**	D L2
		(4)	
		[33]	
		TOTAL :150	