



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	<div> Decrease amount in thousands $= R32\ 187 \times 4,402\% \quad \checkmark M$ $\approx R1\ 416,87 \quad \checkmark CA$ Communication Cost in thousands $= R32\ 187 - R1\ 416,87 \checkmark M$ $= R30\ 770,13$ $= R30\ 770 \quad \checkmark R$ </div> <div> Decrease amount $= R32\ 187\ 000 \times 4,402\%$ $= R1\ 416\ 871,74$ $\approx R1\ 417\ 000$ Comm. Cost $= R32\ 187\ 000 - R1\ 417\ 000$ $= R30\ 770\ 000$ </div> <p style="text-align: center;">OR</p> <div> Communication Cost in thousands $= 32\ 187 - (4,402\% \times 32\ 187) \quad \checkmark M$ $= 32\ 187 - 1\ 416,87 = 30\ 770 \quad \checkmark CA \quad \checkmark R$ </div> <p style="text-align: center;">OR</p> <div> $100\% - 4,402\% = 95,598\% \quad \checkmark M$ Communication Cost in thousand $= R32\ 187 \times 95,598\% \quad \checkmark M$ $= R30\ 770,12826 \quad \checkmark CA$ $\approx R30\ 770 \quad \checkmark R$ </div> <p style="text-align: center;">OR</p> <div> Communication Cost in thousands $= R2\ 163\ 571 - R(67\ 257 + 640\ 601 + 69\ 866 + 953\ 592 + 135\ 768 + 34\ 087 + 55\ 267 + 176\ 363) \quad \checkmark M$ $= R2\ 163\ 571 - R2\ 132\ 801 \quad \checkmark CA$ $= R30\ 770 \quad \checkmark CA$ </div>	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. $\checkmark \checkmark O$ OR Imported stock will cost more. $\checkmark \checkmark O$	2O explanation (2)	F L4
1.1.3	For 2015: Percentage profit $= \frac{342\ 534}{2\ 250\ 041} \times 100\% \quad \checkmark RT$ $= 15,22345593\% \quad \checkmark SF$ $\quad \checkmark A$ For 2016: Percentage profit $= \frac{360\ 651}{2\ 403\ 509} \times 100\%$ $= 15,00518617\% \quad \checkmark A$ The profit decreased $\checkmark O$ 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
	<p>NOTE: Calculated profit for 2015 is R343 002 thousand</p> $\text{Percentage profit} = \frac{343\,002}{2\,250\,041} \times 100\% \quad \begin{matrix} \checkmark \text{RT} \\ \checkmark \text{SF} \end{matrix}$ $\approx 15,24\% \quad \checkmark \text{A}$ <p>For 2016:</p> $\text{Percentage profit} = \frac{360\,651}{2\,403\,509} \times 100\%$ $= 15,00518617\% \quad \checkmark \text{A}$ <p>The profit decreased $\checkmark \text{O}$</p>	<p>1RT correct values 1SF substitution</p> <p>1A percentage for 2015</p> <p>1A percentage for 2016</p> <p>1O comparison NPR</p> <p>(5)</p>	
1.2	$\begin{aligned} \text{Income tax} &= \text{R}147\,996 + 39\% \times \text{R}(663\,000 - 550\,100) \quad \begin{matrix} \checkmark \text{A} & \checkmark \text{MCA} \end{matrix} \\ &= \text{R}147\,996 + 39\% \times \text{R}112\,900 \\ &= \text{R}147\,996 + \text{R}44\,031 \quad \checkmark \text{S} \\ &= \text{R}192\,027 \quad \checkmark \text{CA} \end{aligned}$ $\begin{aligned} \text{Total Income Tax (after rebates)} &= \text{R}192\,027 - \text{R}13\,500 - \text{R}7\,407 \quad \checkmark \text{M} \\ &= \text{R}171\,120 \quad \checkmark \text{CA} \end{aligned}$ <p>OR $\text{R}192\,027 - \text{R}20907$</p>	<p>1A correct bracket 1MCA amount above 1S simplification 1CA tax before rebate</p> <p>1M subtracting both rebates 1CA tax after rebate</p> <p>(6)</p>	F L3
1.3	<p>Increase number of donors for 2017</p> $\begin{aligned} &= 110\,000 \times 9,6\% \\ &= 10\,560 \quad \checkmark \text{M} \end{aligned}$ <p>Number of donors 2017</p> $\begin{aligned} &= 110\,000 + 10\,560 \\ &= 120\,560 \quad \checkmark \text{CA} \end{aligned}$ <p>Increase number of donors for 2018</p> $\begin{aligned} &= 120\,560 \times 9,6\% \\ &= 11\,573,76 \quad \checkmark \text{M} \end{aligned}$ <p>Number of donors 2018</p> $\begin{aligned} &= 120\,560 + 11\,573,76 \\ &= 132\,133,76 \\ &\approx 132\,134 \quad \checkmark \text{CA} \end{aligned}$ <p style="text-align: center;">OR</p> <p>Number of donors for 2017</p> $\begin{aligned} &= 110\,000 + (110\,000 \times 9,6\%) \quad \checkmark \text{M} \\ &= 120\,560 \quad \checkmark \text{CA} \end{aligned}$ <p>Number of donors for 2018</p> $\begin{aligned} &= 120\,560 + (120\,560 \times 9,6\%) \quad \checkmark \text{M} \\ &= 132\,133,76 \\ &\approx 132\,134 \quad \checkmark \text{CA} \end{aligned}$ <p style="text-align: center;">OR</p>	<p>1M calculating 9,6% 1CA calculating total donors for 2017</p> <p>1M calculating 9,6 % of 2017 donors</p> <p>1CA calculating donors for 2018</p> <p style="text-align: center;">OR</p> <p>1M multiplying correct values 1CA calculating donors for 2017 1M multiplying correct % to 2017 number 1CA calculating number for 2018</p>	D L3

Ques	Solution	Explanation	T&L
	<p style="text-align: center;">OR</p> <p>Number of donors for 2017 $= 110\,000 \times 109,6\%$ ✓M $= 120\,560$ ✓CA</p> <p>Number of donors for 2018 $= 120\,560 \times 109,6\%$ ✓M $= 132\,133,76$ $\approx 132\,134$ ✓CA</p> <p style="text-align: center;">OR</p> <p>Number of donors for 2018 $\checkmark M \quad \checkmark M \quad \checkmark M$ $= 110\,000 \times 109,6\% \times 109,6\%$ $= 132\,133,76$ $\approx 132\,134$ ✓CA</p>	<p style="text-align: center;">OR</p> <p>1M multiplying and adding percentages 1CA calculating total number for 2017</p> <p>1M multiplying and adding correct % to 2017 number 1CA calculating number for 2018</p> <p style="text-align: center;">OR</p> <p>1M adding percentages 1M multiplying correct numbers 1M multiplying 109,6% twice 1CA calculating number for 2018 NPR</p> <p>AO</p> <p style="text-align: right;">(4)</p>	
1.4.1	<p>Makes provision for other people who are not Asian, Black, Coloured or White. ✓✓O</p> <p>OR</p> <p>Some donors don't indicate race. ✓✓O</p> <p>OR</p> <p>The percentage of the races do not add up to 100%. ✓✓O</p> <p>OR</p> <p>The other is 'mixed' race. ✓✓O</p> <p>OR</p> <p>They are from other countries. ✓✓O</p>	<p>2O explanation</p> <p style="text-align: right;">(2)</p>	D L4
1.4.2	<p style="text-align: center;">✓O</p> <p>As the years increase the percentage black donors increase. ✓O</p>	<p>2O increasing trend</p> <p style="text-align: right;">(2)</p>	D L4
1.4.3	<p>The number of donors are different every year. ✓✓O</p> <p>OR</p> <p>The graph represents percentages. ✓✓O</p> <p>OR</p> <p>The percentages are rounded values. ✓✓O</p> <p>OR</p> <p>The graph shows that the bars' heights are not the same. ✓✓O</p>	<p>2O explanation</p> <p style="text-align: right;">(2)</p>	D L4

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

QUESTION 2 [37 MARKS]			
Ques	Solution	Explanation	T&L
2.1.1	<p>Inland prices have higher costs for transport / storage. ✓✓O</p> <p>OR</p> <p>Coastal storages are close by and transport fees are lower. ✓✓O</p> <p>OR</p> <p>Fuel is imported via harbours. ✓✓O</p> <p>OR</p> <p>Most refineries are along the coast. ✓✓O</p>	<p>2O reason</p> <p>(2)</p>	F L4
2.1.2	<p> $S = \frac{R2,67}{R12,32} \times R616,00$ ✓A ✓M $= R133,50$ ✓CA </p> <p>OR</p> <p> $\text{Number of litres} = \frac{R616,00}{R12,32}$ ✓M $= 50$ ✓A </p> <p> $S = 50\ell \times R2,67/\ell$ $= R133,50$ ✓CA </p> <p>OR</p> <p> $\text{Basic fuel price} = \frac{R77 \times R5,26}{R1,54} = R263$ ✓A $S = R616 - R142,50 - R77,00 - R263,00 = R133,50$ ✓M ✓CA </p>	<p> $\text{OR } \frac{R2,67}{R2,34} \times R117$ </p> <p> $\text{OR } \frac{R142,50}{R2,85} \text{ OR } \frac{R77,00}{R1,54}$ $\text{OR } \frac{R117}{R2,34}$ </p> <p> 1M multiplying 1A correct ratio 1CA storage cost </p> <p> 1M dividing 1A litres 1CA storage cost </p> <p>OR</p> <p> 1A basic fuel price 1M subtracting all from total 1CA storage cost </p> <p>AO</p> <p>(3)</p>	F L2
2.1.3	<p> $\text{Number of litres consumed} = 1\,250\text{ km} \times 7,3\ell \div 100\text{ km}$ ✓M $= 91,25\ell$ ✓A </p> <p> $\text{Inland cost} = 91,25\ell \times R12,32/\ell$ $= R1\,124,20$ ✓CA </p> <p> $\text{Coastal cost} = 91,25\ell \times R11,94/\ell$ $= R1\,089,525$ $\approx R1\,089,53$ ✓CA </p> <p>Statement is NOT valid. ✓O</p> <p>OR</p> <p> $\text{Litres consumed} = 1\,250\text{ km} \div 100\text{ km} \times 7,3 = 91,25$ ✓M ✓A </p> <p> $\text{Difference in fuel price} = R12,32 - R11,94 = R0,38$ ✓M </p> <p> $\text{Difference in cost} = R0,38/\ell \times 91,25\ell$ $\approx R34,68$ ✓A </p> <p>Statement is NOT valid. ✓O</p> <p>OR</p>	<p> 1M working with consumption rate 1A number of litres 1CA inland cost </p> <p>1CA coastal cost</p> <p>1O verification</p> <p>OR</p> <p> 1M working with consumption rate 1A number of litres 1M difference 1A cost 1O verification </p>	F L4

Ques	Solution	Explanation	T&L
	<p style="text-align: center;">OR</p> <p><u>Inland</u></p> <p>Cost / 100 km = 7,3 ℓ × R12,32/ ℓ = R89,94 ✓M</p> <p>Number of 100km distances = 1250 km ÷ 100 km = 12,5</p> <p>Cost = 12,5 × R89,94 = R1 124,20 ✓A</p> <p><u>Coastal</u></p> <p>Cost / 100 km = 7,3 l × R11,94 = R87,16</p> <p>Number of 100 km distances = 1250 km ÷ 100 km = 12,5</p> <p>Cost = 12,5 × R89,94 = R1 089,53 ✓A</p> <p>Difference = R1 124,50 – R1 089,53 = R34,67 ✓M</p> <p>Statement is NOT valid. ✓O</p> <p style="text-align: center;">OR</p> <p>Difference = R12,32 – R11,94 = R0,38 ✓M</p> <p>Number of 100 km distances = 1 250 km ÷ 100 km = 12,5</p> <p>Cost = R0,38^{✓M} × 7,3 × 12,5^{✓M} = R34,68 ✓A</p> <p>Statement is NOT valid. ✓O</p>	<p style="text-align: center;">OR</p> <p>1M working with consumption rate</p> <p>1A cost</p> <p>1A cost</p> <p>1M difference</p> <p>1O verification</p> <p style="text-align: center;">OR</p> <p>1M difference</p> <p>1M multiplying with consumption rate</p> <p>1M multiply with 12,5</p> <p>1A cost</p> <p>1O verification</p> <p>NPR</p> <p style="text-align: right;">(5)</p>	
2.2.1	<p style="text-align: center;">✓M</p> $\% \text{ increase} = \frac{\text{R70,9 billion} - \text{R54 billion}}{\text{R54 billion}} \times 100\% \quad \checkmark A$ <p style="text-align: center;">≈ 31,296 % ✓CA</p> <p style="text-align: center;">OR</p> $\frac{\text{R70,9 billion}}{\text{R54 billion}} \times 100\% = 131,2962\% \quad \checkmark A$ <p style="text-align: center;">% increase = 131,2962% – 100%</p> <p style="text-align: center;">≈ 31,296 % ✓CA</p> <p style="text-align: center;">OR</p> <p>Using Trial & Error:</p> $\text{R54 billion} \times 31,3\% = \text{R16,9 billion} \quad \checkmark A$ <p style="text-align: center;">R16,9 billion + R54 billion = R70,9 billion</p> <p style="text-align: center;">∴ % increase = 31,3% ✓CA</p>	<p>1M % increase</p> <p>1A correct values</p> <p>1CA percentage</p> <p style="text-align: center;">OR</p> <p>1M % increase</p> <p>1A correct values</p> <p>1CA percentage</p> <p style="text-align: center;">OR</p> <p>1M % calculation</p> <p>1A increase amount</p> <p>1CA percentage</p> <p>NPR</p> <p style="text-align: right;">(3)</p>	F L2

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

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

QUESTION 3 [40 MARKS]			
Ques	Solution	Explanation	T&L
3.1.1	33 ^{✓✓A} Kwela Street ^{✓A}	2A correct number 1A correct street (3)	MP L2
3.1.2	<p>Length 22 mm^{✓A} (21 mm to 23 mm) Width 9 mm^{✓A} (8 mm to 10 mm)</p> <p>Scale 25^{✓A} mm = 30 m (24 mm to 26 mm)</p> <p>$\therefore \text{Length} = \frac{30}{25} \times 22 \text{ m}$^{✓M} = 26,4 m^{✓CA}</p> <p>Width = $9 \times \frac{30}{25} \text{ m} = 10,8 \text{ m}$^{✓CA}</p> <p style="text-align: center;">OR</p> <p>Scale: 25^{✓A} mm : 30 m (24 mm to 26 mm) 25mm : 30 000 mm 1 : 1 200^{✓M}</p> <p>Length = 22 mm^{✓A} (21 mm to 23 mm) Width = 9 mm^{✓A} (8 mm to 10 mm) Actual length = $22 \times 1\,200 \text{ mm}$ = 26 400 mm = 26,4 m^{✓CA} Actual width = $9 \times 1\,200 \text{ mm}$ = 10 800 mm = 10,8 m^{✓CA}</p>	<p>1A length 1A width</p> <p>1A measured scale</p> <p>1M using the scale</p> <p>1CA length in m</p> <p>1CA width in m</p> <p style="text-align: center;">OR</p> <p>1A measured scale</p> <p>1M unit scale 1A length</p> <p>1A width</p> <p>1CA length in m</p> <p>1CA width in m (6)</p>	M L3
3.1.3	<p>On the enlarged map: Measured length = 62 mm^{✓MCA} (61mm to 64 mm)</p> <p>Scaled length = $62 \text{ mm} \div 5 = 12,4 \text{ mm} \neq 22 \text{ mm}$^{✓M ✓CA}</p> <p>$\therefore$ NOT valid^{✓O}</p> <p style="text-align: center;">OR</p> <p>On the enlarged map: The measured width = 24 mm^{✓A} (23 mm to 26 mm)</p> <p>widths: $9 \text{ mm} \times 5 = 45 \text{ mm} \neq 24 \text{ mm}$^{✓M ✓CA}</p> <p>$\therefore$ NOT valid^{✓O}</p> <p style="text-align: center;">OR</p>	<p>CA from Q3.1.2</p> <p>1MCA measured length</p> <p>1M dividing by 5 1CA simplification 1O verification</p> <p style="text-align: center;">OR</p> <p>1A measured length</p> <p>1M multiplying with 5 1CA simplification</p> <p>1O verification</p>	MP L4

Ques	Solution	Explanation	T&L
	<p style="text-align: center;">OR</p> <p>On the enlarged map: Measured length = 62 mm $\checkmark A$ (61mm to 64 mm) Measured width = 24 mm (23 mm to 26 mm)</p> <p style="text-align: center;">Scale factor = $\frac{62}{22} \checkmark M$ OR width = $\frac{24}{9}$ $\approx 2,82 \checkmark CA$ $\approx 2,67$</p> <p>\therefore Not valid $\checkmark O$</p>	<p style="text-align: center;">OR</p> <p>1A measured</p> <p>1M dividing</p> <p>1CA scale factor</p> <p>1O verification</p> <p style="text-align: right;">(4)</p>	
3.2.1	<p style="text-align: center;">$\checkmark MA$</p> <p>Length = 5 240 mm – 2×220 mm = 4 800 mm $\checkmark CA$</p> <p>Width = 4 040 mm – 2×220 mm = 3 600 mm $\checkmark CA$</p> <p style="text-align: center;">$\checkmark MCA$</p> <p>Floor area = 4 800 mm \times 3 600 mm = 17 280 000 mm² = 17 280 000 \div 1 000 000 $\checkmark C$ = 17,28 m² $\checkmark CA$</p> <p style="text-align: center;">OR</p> <p>Length = 5 240mm = 5,24m $\checkmark C$ Width = 4 040mm = 4,04m Wall thickness = 220mm = 0,22m</p> <p style="text-align: center;">$\checkmark MA$</p> <p>Interior Length = 5,24m – $2(0,22m)$ = 4,8m $\checkmark CA$ Interior Width = 4,04m – $2(0,22m)$ = 3,6m $\checkmark CA$</p> <p>Floor Area = 4,8 m \times 3,6 m $\checkmark MCA$ = 17,28m² $\checkmark CA$</p>	<p>1MA subtracting of thickness</p> <p>1CA internal length</p> <p>1CA internal width</p> <p>1MCA substitution</p> <p>1C conversion</p> <p>1CA internal area in m²</p> <p style="text-align: center;">OR</p> <p>1C conversion of all values</p> <p>1MA subtracting thickness</p> <p>1CA length</p> <p>1CA width</p> <p>1MCA substitution</p> <p>1CA internal area in m²</p> <p style="text-align: right;">(6)</p>	M L3
3.2.2	<p>Area of Ceiling board = 2 400 mm \times 900 mm $\checkmark SF$ = 2 160 000 mm² $\checkmark A$</p> <p>Number of boards needed = $\frac{17\,280\,000}{2\,160\,000} \checkmark M$ = 8 $\checkmark CA$</p> <p>\therefore Need more than 7 $\checkmark O$</p> <p style="text-align: center;">OR</p> <p>Number needed = 4 800 mm \div 2 400 mm $\checkmark M$ = 2 for length $\checkmark CA$</p> <p>Number needed = 3 600 mm \div 900 mm $\checkmark CA$ = 4 for width</p> <p>Total needed = $2 \times 4 = 8 \checkmark CA$</p> <p>$\therefore$ Need more than 7 $\checkmark O$</p> <p style="text-align: center;">OR</p>	<p>CA from Q3.2.1</p> <p>1SF substitution</p> <p>1A area of board</p> <p>1M dividing</p> <p>1CA number of boards</p> <p>1O deduction</p> <p style="text-align: center;">OR</p> <p>1M dividing</p> <p>1CA number length wise</p> <p>1CA number width wise</p> <p>1CA number of boards</p> <p>1O deduction</p>	M L4

Ques	Solution	Explanation	T&L
	<p style="text-align: center;">OR</p> <p>Area of one ceiling board = $2,4 \text{ m} \times 0,9 \text{ m} = 2,16 \text{ m}^2$ ✓SF ✓A</p> <p>Total area coved by 7 boards = $2,16 \text{ m}^2 \times 7 = 15,12 \text{ m}^2$ ✓M ✓CA</p> <p>∴ Need more than 7 ✓O</p>	<p>1SF substitution 1A area of board</p> <p>1M multiplying 1CA total area</p> <p>1O deduction</p> <p style="text-align: right;">(5)</p>	M L4
3.2.3	<p>Length of cornice = $2 \times (4\,800 \text{ mm} + 3\,600 \text{ mm})$ ✓CA ✓SF</p> <p style="text-align: center;">$= 16\,800 \text{ mm}$ ✓CA</p>	<p>1CA values from Q 3.2.1 or RT if reworked 1SF substitution 1CA length</p> <p style="text-align: right;">(3)</p>	M L2
3.2.4	<p>$16\,800 \div 2\,000 = 8,4$</p> <p>Hence 9 lengths cornice needed. ✓CA</p> <p>Total cost = $8 \times \text{R}91,44 + 9 \times \text{R}53,64$ ✓A ✓M</p> <p style="text-align: center;">$= \text{R}731,52 + \text{R}482,76$</p> <p style="text-align: center;">$= \text{R}1\,214,28$ ✓CA</p> <p>The statement is correct. ✓O</p>	<p>CA from Q3.2.3 and Q3.2.2</p> <p>1CA number of lengths</p> <p>1A using 2 correct prices 1M multiplying 1CA cost</p> <p>1O conclusion</p> <p style="text-align: right;">(5)</p>	F L4
3.3.1	<p>Above ground is a higher security risk ✓✓O</p> <p>OR</p> <p>Safety reasons ✓✓O</p> <p>OR</p> <p>Below the ground the cost will be less. ✓✓O</p> <p>OR</p> <p>Above the ground it takes up space. ✓✓O</p> <p>OR</p> <p>Underground, the water stays cooler/fresher than in direct sun/ lessen evaporation. ✓✓O</p> <p>OR</p> <p>Aesthetic reasons. ✓✓O</p> <p>OR</p> <p>Below the ground for water to easily run into it. ✓✓O</p> <p>OR</p> <p>Less maintenance ✓✓O</p>	<p>2O reason</p> <p style="text-align: right;">(2)</p>	MP L4

Ques	Solution	Explanation	Level
3.3.2	$8\,000\,\ell = 8\,000\,000\,\text{cm}^3$ $= 8\,\text{m}^3 \quad \checkmark\text{C}$ <p>Volume of a cylindrical tank = $\pi \times \text{radius}^2 \times \text{length}$</p> $8\,\text{m}^3 = 3,142 \times \text{radius}^2 \times 2,9\,\text{m} \quad \checkmark\text{SF}$ $(\text{radius})^2 = \frac{8\,\text{m}^3}{3,142 \times 2,9\,\text{m}} \quad \checkmark\text{A}$ $= 0,87798239... \checkmark\text{S}$ $\text{Radius} = \sqrt{0,87798239}$ $\approx 0,937\,\text{m} \quad \checkmark\text{CA}$ <p>Diameter = 1,874 m $\checkmark\text{CA}$</p> <p style="text-align: center;">OR</p> <p>Volume of a cylindrical tank = $\pi \times \text{radius}^2 \times \text{length}$</p> $8\,000\,000\,\text{cm}^3 = 3,142 \times \text{radius}^2 \times 290\,\text{cm} \quad \checkmark\text{SF}$ $(\text{radius})^2 = \frac{8\,000\,000\,\text{cm}^3}{3,142 \times 290\,\text{cm}} \quad \checkmark\text{A}$ $= 8\,779,8239... \checkmark\text{S}$ $\text{Radius} = \sqrt{8779,8239}$ $\approx 93,7\,\text{cm} \quad \checkmark\text{CA}$ <p>Diameter = 187,4 cm $\checkmark\text{CA}$</p> $= 1,874\,\text{m} \quad \checkmark\text{C}$	<p>1C Conversion</p> <p>1SF substitution</p> <p>1A change subject of formula</p> <p>1S simplification</p> <p>1CA radius</p> <p>1CA diameter</p> <p style="text-align: center;">OR</p> <p>1SF substitution</p> <p>1A change subject of formula</p> <p>1S simplification</p> <p>1CA radius</p> <p>1CA doubling the radius</p> <p>1C conversion to m</p> <p>NPR</p> <p style="text-align: right;">(6)</p>	M L3
		[40]	

QUESTION 4 [33 MARKS]			
Ques	Solution	Explanation	T&L
4.1.1	<p>Dineo's maximum wind speed is 95 (MPH)</p> $95 \text{ MPH} = \frac{80,4672}{50} \times 95 \text{ km/h} \quad \checkmark C$ $= 152,887 \dots \text{ km/h} \quad \checkmark CA$ $= 152,89 \text{ km/h} \quad \checkmark R$ <p style="text-align: center;">OR</p> <p>50 mile = 80,4672 km 1 mile = 1,609344 km</p> $95 \text{ MPH} = 95 \text{ miles / hour} \times 1,609344 \quad \checkmark C$ $= 152,88768 \text{ km/h} \quad \checkmark CA$ $\approx 152,89 \text{ km/h} \quad \checkmark R$ <p style="text-align: center;">OR</p> <p>95 miles – 50 miles = 45 miles 50 miles = 80,4672 km 45 miles = x km $x \text{ km} = 80,4672 \text{ km} \times 45 \text{ miles} \div 50 \text{ miles}$ $= 72,4205 \text{ km} \quad \checkmark C$</p> <p>Total distance = 80,4672 km + 72,4205 km $= 152,887 \text{ km} \quad \checkmark CA$</p> <p>$\therefore 95 \text{ MPH} = 152,89 \text{ km/h} \quad \checkmark R$</p>	<p>1C conversion</p> <p>1CA simplification</p> <p>1R rounding</p> <p style="text-align: center;">OR</p> <p>1C conversion</p> <p>1CA simplification</p> <p>1R rounding</p> <p style="text-align: center;">OR</p> <p>1C conversion</p> <p>1CA simplification</p> <p>1R rounding</p> <p>AO</p> <p style="text-align: right;">(3)</p>	M L2
4.1.2	<p>Measured distance between gridlines is 17 mm $\checkmark A$ Measured distance between P and Q is 39 $\checkmark A$</p> $\text{Actual distance} = \frac{205,043 \text{ km}}{17 \text{ mm}} \times 39 \text{ mm} \quad \checkmark M \quad \checkmark MCA$ $\approx 470,39 \text{ km} \quad \checkmark CA$ <p>Distance = Ave. speed \times time</p> $\text{Ave. speed} = \frac{470,39 \text{ km}}{24 \text{ hours}} \quad \checkmark S \quad \checkmark SF$ $\approx 19,56 \text{ km/h} \quad \checkmark CA$ <p>(Accept 16 mm to 18 mm for gridlines and 38 mm to 42mm for PQ distance)</p> <p style="text-align: center;">OR</p>	<p>1A distance between gridlines</p> <p>1A distance P to Q</p> <p>1M using scale</p> <p>1MCA using correct values</p> <p>1CA actual distance</p> <p>1S changing the subject of the formula</p> <p>1SF substitution</p> <p>1CA Ave speed</p> <p>NPR</p> <p style="text-align: right;">(8)</p>	M&P L3 (5) Meas L3 (3)

Ques	Solution	Explanation	T&L
	<p style="text-align: center;">OR</p> <p>App. distance from P to Q is $2\frac{1}{3}$ gridlines ✓✓A</p> <p>Distance = $2\frac{1}{3} \times 205,043$ km ✓M ✓A</p> <p style="padding-left: 40px;">= 478,4336667 km ✓CA</p> <p>Distance = Ave. speed \times time</p> <p>478,4336667 km = Ave. speed \times 24 hours ✓SF</p> <p style="padding-left: 40px;">Ave. speed \approx 19,93 km/h ✓CA ✓S</p> <p>(Accept $2\frac{1}{6}$ up to $2\frac{1}{3}$)</p> <p style="text-align: center;">OR</p> <p>18 mm ✓A = 205,043</p> <p style="padding-left: 40px;">1 mm = 11,39 ✓M</p> <p>Measured distance from the gridline to Q is 3 mm ✓A (2 to 4)mm</p> <p>Distance from P to Q ✓M</p> <p style="padding-left: 40px;">= 205,043 + 205,043 + 3 \times 11,39</p> <p style="padding-left: 40px;">= 444,256 km ✓CA</p> <p>Ave. speed = $\frac{444,256 \text{ km}}{24 \text{ hours}}$ ✓SF ✓S</p> <p style="padding-left: 40px;">\approx 18,51 km/h ✓CA</p>	<p>2A distance P to Q</p> <p>1M multiplying</p> <p>1A using correct values</p> <p>1CA actual distance</p> <p>1SF substitution</p> <p>1S changing the subject of the formula</p> <p>1CA ave. speed</p> <p style="text-align: center;">OR</p> <p>1A distance between gridlines</p> <p>1M unit scale</p> <p>1A distance to Q</p> <p>1M using scale</p> <p>1CA actual distance</p> <p>1SF substitution</p> <p>1S changing the subject of the formula</p> <p>1CA Ave speed</p> <p>NPR</p> <p style="text-align: right;">(8)</p>	
4.2.1	10 ✓✓RT	2RT correct value (2)	D L2

Ques	Solution	Explanation	T&L																																			
4.2.2	<div><p style="text-align: center;">Total number of storms per year according to affected world oceanic regions</p><table><caption>Data extracted from the graph</caption><thead><tr><th>Year</th><th>Indian (dashed black)</th><th>Western Pacific (solid red)</th><th>Eastern Pacific (dashed black)</th><th>North Atlantic (solid grey)</th></tr></thead><tbody><tr><td>2015</td><td>8</td><td>39</td><td>31</td><td>12</td></tr><tr><td>2014</td><td>8</td><td>30</td><td>23</td><td>9</td></tr><tr><td>2013</td><td>10</td><td>52</td><td>21</td><td>13</td></tr><tr><td>2012</td><td>5</td><td>34</td><td>17</td><td>19</td></tr><tr><td>2011</td><td>10</td><td>40</td><td>13</td><td>19</td></tr><tr><td>2010</td><td>12</td><td>19</td><td>12</td><td>21</td></tr></tbody></table><p>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</p></div>	Year	Indian (dashed black)	Western Pacific (solid red)	Eastern Pacific (dashed black)	North Atlantic (solid grey)	2015	8	39	31	12	2014	8	30	23	9	2013	10	52	21	13	2012	5	34	17	19	2011	10	40	13	19	2010	12	19	12	21		D L2
Year	Indian (dashed black)	Western Pacific (solid red)	Eastern Pacific (dashed black)	North Atlantic (solid grey)																																		
2015	8	39	31	12																																		
2014	8	30	23	9																																		
2013	10	52	21	13																																		
2012	5	34	17	19																																		
2011	10	40	13	19																																		
2010	12	19	12	21																																		
4.2.3	North Atlantic ✓✓RT	2RT correct region	D L2																																			

Ques	Solution	Explanation	T&L
4.2.4	<p>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</p> <p>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</p> <p>NOT valid statement, ✓O</p> <p>Western Pacific had the most storms but North Atlantic had the greatest amount of damages. ✓✓O</p>	<p>1A number of storms WP 1RT using amounts from table 1MCA adding amounts</p> <p>1CA number of storms in NA 1RT only using values to 2011 1CA amount of damage</p> <p>1O not valid 2O reason</p> <p>(9)</p>	D (4) F(4) L4
4.3	<p>Growth rate per 1 000 = $38,3 - 11,9 - 1,9$ ✓MA = $24,5$ ✓CA</p> <p>∴ percentage growth rate = $\frac{24,5}{1000} \times 100\%$ ✓MCA = $2,45\%$ ✓CA</p> <p>OR</p> <p>Percentage growth rate ✓MA = $\left(\frac{38,3}{1000} - \frac{11,9}{1000} - \frac{1,9}{1000} \right) \times 100\%$ ✓M = $\frac{24,5}{1000} \times 100\%$ ✓CA = $2,45\%$ ✓CA</p>	<p>1MA subtracting rates 1CA growth rate</p> <p>1MCA calculating percentage ($\div 1\,000 \times 100$) 1CA simplification</p> <p>OR</p> <p>1MA subtracting rates 1M calculating percentage 1CA growth rate 1CA simplification</p> <p>AO</p> <p>(4)</p>	D L2
		[33]	
		TOTAL :150	