



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS

MATHEMATICAL LITERACY P2

2016

MEMORANDUM

MARKS: 150

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

This memorandum consists of 15 pages.

QUESTION 1 [39 MARKS]			
Ques	Solution	Explanation	TL
1.1.1	$\begin{aligned} \text{Range} &= \text{R}62\,500 - \text{R}29\,890 \\ &= \text{R}32\,610 \end{aligned}$	1A correct values 1M subtracting 1CA range AO (3)	D L2
1.1.2	$\begin{aligned} \text{Mean} &= \frac{\text{Sum of all scores}}{\text{Number of scores}} \\ \text{R}36\,586,11 &= \frac{\text{R}43\,320 + \text{R}33\,100 + Z + \text{R}29\,730 + \text{R}46\,000 + \text{R}35\,300 + \text{R}35\,970}{7} \\ Z &= 7 \times \text{R}36\,586,11 - \text{R}223\,420 \\ Z &= \text{R}32\,682,77 \\ Z &\approx \text{R}32\,683 \end{aligned}$	1M adding all correct values 1A dividing by 7 1M subtracting 1CA simplification 1R rounding to nearest rand AO (5)	D L2
1.1.3	NMMU does not offer these degree courses. OR No students attending OR No students took the course	2O reason (2)	D L4
1.1.4	$\begin{aligned} \text{Percentage increase} &= \frac{2016 \text{ Fee} - 2015 \text{ Fee}}{2015 \text{ Fee}} \times 100\% \\ &= \frac{\text{R}69\,000 - \text{R}46\,000}{\text{R}46\,000} \times 100\% \\ &= 50\% \\ 50\% \div 6,7\% &= 7,462686567 \end{aligned}$ <p>The student is correct; it is more than seven times the projected inflation rate.</p>	1M substituting correct values 1M calculating % increase 1CA percentage 1M dividing by 6,7% 1CA answer 1O verification	F L4 (6) OR

Ques	Solution	Explanation	TL
	$\checkmark M$ $R\ 69\ 000 - R\ 46\ 000 = R\ 23\ 000 \checkmark A$	1M for subtracting 1A answer	
	$\frac{6,7}{100} \times R\ 46\ 000 = R\ 3\ 082 \checkmark A$ $\checkmark M$	1M for multiplying 1A answer	
	$R\ 3\ 082 \times 7 = R\ 21\ 574 \checkmark CA$	1CA answer	
	The student is correct $\checkmark O$	1O verification	
	$6,7\% \times 7 = 46,9\% \checkmark A$ $\checkmark M$	OR 1M multiplying by 7 1A answer	
	$R\ 46\ 000 \times 46,9\% = R\ 21\ 574 \checkmark A$	1A answer	
	$R\ 46\ 000 + R\ 21\ 574 = R\ 67\ 574 \checkmark M$	1M adding	
	$R\ 69\ 000 - R\ 67\ 574 = R\ 1\ 426 \text{ more } \checkmark CA$	1CA subtraction	
	Student is correct. $\checkmark O$	1O verification	(6)

Ques	Solution	Explanation	TL
1.1.5	$R\ 46\ 000 \times 10,75\ \% = R\ 4\ 945 \quad \checkmark M$ $R\ 46\ 000 + R\ 4\ 945 = R\ 50\ 945 \quad \checkmark CA$ $R\ 50\ 945 \times 10,75\ \% = R\ 5\ 476,59$ $R\ 50\ 945 + R\ 5\ 476,59 = R\ 56\ 421,59 \quad \checkmark CA$ $\left. \begin{array}{l} \text{Monthly fee} = R38 \times 24 \\ = R912 \end{array} \right\} \checkmark A$ $\text{Total cost of loan} = R56\ 421,59 + R912 + R300 \quad \checkmark M$ $= R57\ 633,59 \quad \checkmark CA$ $\text{Difference in amounts} = R57\ 633,59 - R46\ 000 \quad \checkmark M$ $= R11\ 633,59$ <p>He is correct. $\checkmark O$</p>	<p>1M for calculating interest</p> <p>1CA for principal</p> <p>1CA accumulated value</p> <p>1A calculating the monthly fee for 24 months</p> <p>1M adding all values</p> <p>1CA total cost of loan</p> <p>1M subtracting the amounts</p> <p>1O verification</p>	<p>F</p> <p>L3(7)</p> <p>L4(1)</p>
	OR	OR	
	$\text{Total capital + interest} = R46\ 000 \times 110,75\ \% \times 110,75\ \% \quad \checkmark M \quad \checkmark M$ $= R56\ 421,59 \quad \checkmark CA$ $\left. \begin{array}{l} \text{Monthly fee} = R38 \times 24 \\ = R912 \end{array} \right\} \checkmark A$ $\text{Total cost of loan} = R56\ 421,59 + R912 + R300 \quad \checkmark M$ $= R57\ 633,59 \quad \checkmark CA$ $\text{Difference in amounts} = R57\ 633,59 - R46\ 000 \quad \checkmark M$ $= R11\ 633,59$ <p>He is correct. $\checkmark O$</p>	<p>2M multiplying by 110,75%</p> <p>1CA answer</p> <p>1A calculating the monthly fee for 24 months</p> <p>1M adding all values</p> <p>1CA total cost of loan</p> <p>1M subtracting the amounts</p> <p>1O verification</p>	(8)

QUESTION 2 [26 MARKS]			
Ques	Solution	Explanation	TL
2.1.1	<p>Final salary = R26 578 × 12 ✓MA = R318 936 ✓A</p> <p>Gratuity = 6,72% × final salary per year × years of pensionable service = 6,72% × R318 936 × 33 ✓SF = R707 272,4736 = R707 272 ✓R</p> <p style="text-align: center;">OR</p> <p style="text-align: center;">✓MA ✓MA</p> <p>Final salary = R 26 578 × 6,72% × 12 × 33 = R 707 272,473 ✓A = R 707 272 ✓R</p>	<p>1MA multiplying by 12 1A salary</p> <p>1SF substituting correct values in formula 1R rounding to the nearest rand</p> <p style="text-align: center;">OR</p> <p>1MA multiplying by 12 1MA multiplying by 6,72% and 33 1A salary 1R rounding to the nearest rand</p> <p style="text-align: right;">(4)</p>	F L2
2.1.2 (a)	<p>Annuity (p.a.) = $(\frac{1}{55} \times \text{final salary} \times \text{years of pensionable service}) + 360$ = $(\frac{1}{55} \times R26\,578 \times 12 \times 33) + 360$ ✓SF = R191 721,60 ✓CA</p> <p>Tax payable per annum = R32 742 + 26% × (R191 721,60 – R181 900) = R35 295,62 – R13 257 ✓CA = R22 038,62 ✓CA</p> <p>Annuity after tax = R191 721,60 – R22 038,62 ✓M</p> <p>Monthly annuity = R169 682,98 ÷ 12 ✓M = R14 140,25 ✓CA</p>	<p>CA from answer in Q 2.1.1</p> <p>1SF substituting correct values into formula 1CA calculating the annuity p.a. 1M correct tax bracket 1SF substituting correct values into formula CA tax before rebate 1CA calculating the tax due per year 1M subtracting tax due from yearly income 1M dividing by 12 1CA monthly income after tax</p> <p style="text-align: right;">(9)</p>	F L3
2.1.2 (b)	<p>Difference in income = R26 578 – R14 140,25 ✓M = R12 437,75 ✓CA</p> <p>He cannot retire ✓O</p> <p>✓J {</p> <ul style="list-style-type: none"> • His reduced income may not meet all his expenses. • Retire at 65 years he will get more money. • Any other suitable reason supported with a calculation. <p style="text-align: center;">OR</p> <p>He can retire ✓O</p> <ul style="list-style-type: none"> • He will get the gratuity. ✓J 	<p>1M subtracting 1CA difference</p> <p>1O stating conclusion</p> <p>1J Any one of the listed bullets</p> <p style="text-align: right;">(4)</p>	F L4

Ques	Solution	Explanation	TL
2.2.1	No money for transport \checkmark M/A \checkmark MA $= 100\% - (11,0\% + 8,7\% + 4\% + 73\%)$ $= 3,3\%$ \checkmark CA \checkmark CA \checkmark CA \checkmark CA $P = 3,3\%$ OR $0,033$ OR $\frac{3,3}{100}$ OR $\frac{33}{1000}$	1MA pie chart concept 1MA adding correct values 1CA probability AO (3)	P L3
2.2.2	The number of boys with other reasons is very small and will not account for a sector on the pie chart. $\checkmark\checkmark$ O	2O opinion (2)	D L4
2.2.3	During the examination period learners do not come to school on the days they are not writing. $\checkmark\checkmark$ O OR They do not prepare for the examinations. $\checkmark\checkmark$ O OR Afraid of writing. $\checkmark\checkmark$ O OR Studying at home. $\checkmark\checkmark$ O OR They bunk classes. $\checkmark\checkmark$ O	2O reason (2)	D L4
2.2.4	The pie charts only give percentages and not actual numbers. $\checkmark\checkmark$ O	2O Opinion (2)	D L4
		[26]	

QUESTION 3 [42 MARKS]			
Ques	Solution	Explanation	TL
3.1.1	$\checkmark\checkmark A$ Gauteng and North West $\checkmark\checkmark A$	2A for 1 st province 2A for 2 nd province (4)	MAP L2
3.1.2	$\checkmark A$ $\checkmark A$ De Hoop Limpopo $\checkmark A$ $\checkmark A$ Umtata Eastern Cape $\checkmark A$ $\checkmark A$ Darlington Eastern Cape	Any two correct pairs 4 marks 1A correct dam 1A correct province 1A correct dam 1A correct province (4)	MAP L2
3.1.3	$P = \frac{5\checkmark\checkmark A}{16\checkmark A}$ OR $0,32$ OR 31%	2A numerator 1A denominator AO (3)	P L3
3.1.4	2014 $\checkmark MA$ $\checkmark CA$ 5 340 000 megalitres $\times 67,9\% = 3\ 625\ 860$ megalitres 2015 $\checkmark CA$ 5 340 000 megalitres $\times 58,7\% = 3\ 134\ 580$ megalitres Difference = 3 625 860 megalitres – 3 134 580 megalitres = 491 280 megalitres $\checkmark CA$ = 491 280 000 kilolitres $\checkmark C$ OR $\checkmark M$ $67,9\% - 58,7\% = 9,2\%$ $\checkmark A$ $9,2\% \times 5\ 340\ 000$ megalitres $\checkmark M$ = 491 280 megalitres $\checkmark CA$ = 491 280 000 kilolitres $\checkmark C$	1MA multiply with % 1CA answer(2014) in megalitres 1CA answer (2015) in megalitres 1CA calculating the difference 1C conversion OR 1M subtracting correct percentages 1A simplification 1M multiplying by 9,2% 1CA calculating the difference 1C conversion (5)	M L3

Ques	Solution	Explanation	TL
3.1.5	Low rainfall ✓✓O OR No rainfall ✓✓O OR Drought ✓✓O OR Evaporation ✓✓O OR Water usage for human activities ✓✓O OR Bad infrastructure ✓✓O OR Leakages ✓✓O OR Population increases ✓✓O OR Climatic changes ✓✓O OR Agriculture ✓✓O OR Global warming ✓✓O	2O first reason 2O second reason	M L4
			(4)

Ques	Solution	Explanation	TL
3.2.2	\checkmark^A In the summer/high temperature the duration of the shower time decrease. $\checkmark\checkmark^O$ \checkmark^A OR $\checkmark\checkmark^O$ In the winter/low temperature the duration of the shower time increase.	1A high temp. 2O time decrease (3)	D L 4
3.2.3	The authorities must provide more water in the winter months for showering as people use more water to shower in the winter months. $\checkmark\checkmark^O$ OR They can educate people not to run the water in the shower to heat up the bathroom in the winter months, but to use other heating methods. $\checkmark\checkmark^O$ OR Build bigger dams. $\checkmark\checkmark^O$ OR Educate people to save water. $\checkmark\checkmark^O$	2O for any valid reason (2)	D L4
3.2.4	$\checkmark\checkmark^O$ This is not a representative sample because the sample is too small.	2O for stating that the sample is too small (2)	D L4
3.2.5	7 minute 10 seconds = 430 seconds \checkmark^C $\frac{11}{26}$ \checkmark^A $\frac{11}{26}$ \checkmark^A	1C converting to seconds 1A numerator 1A denominator Accept denominator of 52 Answer in decimal form full marks (3)	P L2
3.2.6	Winter shower duration Lower quartile = 385 \checkmark^A Upper quartile = 410 \checkmark^A IQR = 410 – 385 \checkmark^M = 25 \checkmark^{CA} Summer shower duration IQR = 29 Difference = 29 – 25 \checkmark^M = 4 \checkmark^{CA}	1A reading the lower quartile 1A reading the upper quartile 1M subtracting 1CA IQR 1M subtraction 1CA difference Accept Lower quartile 380 Upper quartile 405 (6)	D L3
		[42]	

QUESTION 4 [43 MARKS]			
Ques	Solution	Explanation	HL
4.1.1 (a)	Rental for 2-berth vehicle (unlimited km) $= (R1\ 225 + R220) \times 8 \checkmark MA$ $= R11\ 560 \checkmark CA$ Rental per person $= R11\ 560 \div 3 \checkmark M$ $= R3\ 853,33 \checkmark CA$	1MA adding and multiplying 1CA rental cost 1M dividing by 3 1CA rental per person (4)	F L2
4.1.1 (b)	Rental for 2-berth vehicle (limited km) $= (R1\ 050 + R220) \times 7 \checkmark M$ $= R8\ 890 \checkmark CA$ Free kilometres = $300 \times 7 = 2\ 100 \checkmark A$ $\checkmark M$ Extra kilometres = $3\ 050\ km - 2\ 100\ km$ $= 950\ km \checkmark CA$ Cost for extra km $= 950\ km \times R3,50$ $= R3\ 325 \checkmark CA$ Total cost $= R8\ 890 + R3\ 325$ $= R12\ 215 \checkmark CA$ \therefore The 8-day option is the most economical. $\checkmark O$	1M adding and multiplying 1CA rental cost 1A free kilometres 1M subtracting values 1CA extra km 1CA extra cost 1CA total cost 1O comparing and giving advice Use Q4.1.1.(a) answer for opinion mark (8)	F L4

Ques	Solution	Explanation	HL
4.1.2	$\begin{aligned} \text{Length of bed on plan} &= 2,010 \text{ m} \div 80 \quad \checkmark\text{M} \\ &= 0,025125 \text{ m} \times 1\,000 \\ &= 25,125 \text{ mm} \quad \checkmark\text{C} \\ &= 25 \text{ mm} \quad \checkmark\text{R} \end{aligned}$	<p>1M working with ratio(dividing by 80)</p> <p>1C for answer in mm</p> <p>1R rounding to nearest mm AO 25mm</p> <p style="text-align: right;">(3)</p>	Map L3
4.1.3	<p>4-berth vehicle $\checkmark\text{M}$</p> $\begin{aligned} \text{Amount of diesel used} &= 3\,050 \text{ km} \times 0,1321 \text{ } \ell/\text{km} \\ &= 402,905 \text{ } \ell \quad \checkmark\text{CA} \end{aligned}$ <p>Cost of diesel = $402,905 \text{ } \ell \times \text{R}11,78/\ell$</p> $= \text{R}4\,746,22 \quad \checkmark\text{CA}$ <p>2-berth vehicle $\checkmark\text{M}$</p> $\begin{aligned} \text{Amount of diesel used} &= 3\,050 \text{ km} \div 10,362 \text{ km}/\ell \\ &= 294,3447211 \text{ } \ell \quad \checkmark\text{CA} \end{aligned}$ <p>Cost of diesel = $294,3447211 \text{ } \ell \times \text{R}11,78/\ell$</p> $= \text{R}3\,467,38 \quad \checkmark\text{CA}$ <p>Difference in cost = $\text{R}4\,746,22 - \text{R}3\,467,38 \quad \checkmark\text{M}$</p> $= \text{R}1\,278,84 \quad \checkmark\text{CA}$ <p>Maria is correct; they will be saving R1 278,84 on the cost of diesel. $\checkmark\checkmark\text{O}$</p>	<p>1M multiplying by rate</p> <p>1CA amount of diesel used</p> <p>1CA cost of diesel</p> <p>1M dividing by the rate</p> <p>1CA amount of diesel used.</p> <p>1CA cost of diesel</p> <p>1M subtracting</p> <p>1CA difference</p> <p>2O for stating that Maria is correct NPR</p> <p style="text-align: right;">(10)</p>	F L4

Ques	Solution	Explanation	HL
<p>4.2.1 (a)</p>	<p>Full tank can drive: $50 \times 10,362 \text{ km} = 518,1 \text{ km}$ $\checkmark M$ $\checkmark CA$</p> <p>Distance from Bloemfontein to Kimberley = 175 km $\checkmark RT$</p> <p>Total distance from Harrismith to Kimberley = 337 km + 175 km = 512 km $\checkmark CA$</p> <p>512 km is less than 518,1 km. $\checkmark O$</p> <p style="text-align: center;">OR</p> <p>Full tank can drive: $50 \times 10,362 \text{ km} = 518,1 \text{ km}$ $\checkmark CA$</p> <p>Distance on map from Kimberley to Bloemfontein = 15 mm Scale 22 mm = 300 km / 3mm = 50 km / 9 mm = 100 km Distance from Kimberley to Bloemfontein in km</p> $\left. \begin{array}{l} = \frac{15 \text{ mm} \times 300 \text{ km}}{22 \text{ mm}} \\ = 204,55 \text{ km} \end{array} \right\} \checkmark M$ $\left. \begin{array}{l} = \frac{15 \text{ mm} \times 50 \text{ km}}{3 \text{ mm}} \\ = 250 \text{ km} \end{array} \right\}$ $\left. \begin{array}{l} = \frac{15 \text{ mm} \times 100 \text{ km}}{9 \text{ mm}} \\ = 166,67 \text{ km} \end{array} \right\}$ <p style="text-align: center;">Total distance from Harrismith to Kimberley</p> $\left. \begin{array}{l} = (337 + 204,55) \text{ km} \\ = 542,55 \text{ km} \end{array} \right\} \checkmark CA$ $\left. \begin{array}{l} = (337 + 250) \text{ km} \\ = 587 \text{ km} \end{array} \right\}$ $\left. \begin{array}{l} = (337 + 166,67) \text{ km} \\ = 503,67 \text{ km} \end{array} \right\} \checkmark O$ <p>542 > 518,1 587 > 518,1 503,67 < 518,1</p>	<p>1M multiplying 1CA distance</p> <p>1RT reading of distance</p> <p>1CA total distance</p> <p>1O conclusion</p> <p style="text-align: center;">OR</p> <p>1M multiplying 1CA distance</p> <p>1M calculating distance using bar scale</p> <p>1CA total distance</p> <p>1O conclusion Allow ± 1mm</p> <p style="text-align: right;">(5)</p>	<p>Maps L2</p>
<p>4.2.1 (b)</p>	<p>Distance from Kimberley to Upington = 401 km $\checkmark RT$</p> <p>Scale on map: 9 mm = 100 km $\checkmark MA$</p> <p>Length on map from Upington to Kakamas = 9 mm $\checkmark MA$</p> <p>Distance from Upington to Kakamas = 100 km $\checkmark CA$</p> <p>Total distance: Kimberley to Kakamas = 401 km + 100 km = 501 km $\checkmark CA$</p> <p>501 km is less than 518,1 km. $\checkmark O$</p>	<p>1RT reading of distance</p> <p>1MA measuring scale</p> <p>1MA measuring</p> <p>1CA calculating the distance</p> <p>1CA total 1O Stating less than 518,1 km</p> <p style="text-align: right;">(6)</p>	<p>Maps L4</p>

Ques	Solution	Explanation	HL
4.2.2	<p>Time = Distance ÷ speed</p> <p style="padding-left: 40px;">✓CA</p> <p style="padding-left: 40px;">= 1 300 km ÷ 94 km/h ✓M</p> <p style="padding-left: 40px;">= 13,82978723</p> <p style="padding-left: 40px;">≈ 13 hours and 50 minutes ✓CA</p> <p>Time on road + breaks</p> <p style="padding-left: 40px;">= 13 hours + 50 minutes + 2 × 20 minutes + 2 $\frac{1}{4}$ + 180 minutes ✓M</p> <p style="padding-left: 40px;">= 19 hours and 45 minutes ✓CA</p> <p>Time of arrival = 00:45 Tuesday ✓CA</p> <p style="padding-left: 40px;">✓CA</p> <p style="text-align: center;">OR</p> <p>Total distance from Harrismith to Springbok</p> <p style="padding-left: 40px;">= 512 km + 800 km</p> <p style="padding-left: 40px;">= 1 312 km ✓CA</p> <p>Distance = speed × time</p> <p style="padding-left: 40px;">1 312 km = 94 Km/h × time</p> <p style="padding-left: 40px;">Time = 13,95744681 hours ✓M</p> <p style="padding-left: 40px;">= 13 hours 57 minutes ✓CA</p> <p>Time on road + breaks</p> <p style="padding-left: 40px;">= 13 hours + 57 minutes + 2 × 20 minutes + 2 $\frac{1}{4}$ + 180 minutes ✓M</p> <p style="padding-left: 40px;">= 19 hours and 45 minutes ✓CA</p> <p>Time of arrival = 00:52 Tuesday ✓CA</p> <p style="padding-left: 40px;">✓CA</p>	<p>1CA distance</p> <p>1M dividing by speed</p> <p>1CA hours and minutes</p> <p>1M adding all the times</p> <p>1CA total time spent on road</p> <p>1CA time of arrival</p> <p>1CA day of arrival</p> <p style="text-align: center;">OR</p> <p>1CA distance</p> <p>1M dividing by speed</p> <p>1CA hours and minutes</p> <p>1M adding all the times</p> <p>1CA total time spent on road</p> <p>1CA time of arrival</p> <p>1CA day of arrival</p> <p style="text-align: right;">(7)</p>	<p>M</p> <p>L3</p>
		[43]	
		TOTAL:	150