basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS

MATHEMATICAL LITERACY P2

2017

MARKING GUIDELINES

MARKS: 150

Codes	Explanation
M	Method
MA	Method with Accuracy
CA	Consistent Accuracy
A	Accuracy
C	Conversion
D	Define
J	Justification/Reason/Explain
S	Simplification
RD	Reading from a table OR a graph OR a diagram OR a map OR a plan
F	Choosing the correct formula
SF	Substitution in a formula
O	Opinion
P	Penalty, e.g. for no units, incorrect rounding off, etc.
R	Rounding Off
NP	No penalty for rounding OR omitting units
MCA	Method with consistent accuracy

These marking guidelines consist of 15 pages.

KEY TO TOPIC SYMBOL:
F = Finance; M = Measurement; MP = Maps, plans and other representations DH = Data Handling; P = Probability.

QUESTION 1 [39 Marks]

Ques	Solution	Explanation	T&L
1.1.1	Probability $= \dfrac{3}{15}$ $\checkmark$A $\checkmark$A $= 0,2$ $\checkmark$CA	1A numerator 1A denominator 1CA simplification AO (3)	P L2
1.1.2	6 members scores decreased. As a percentage $= \dfrac{6}{15} \times 100\%$ $\checkmark$A $\checkmark$MA $= 40\%$ $\checkmark$CA	1A no. decreased 1MA percentage with denominator 15 1CA simplification AO (3)	D L2
1.1.3 (a)	Arranging scores in ascending or descending order: 27; 28; 30; **32**; 34; 38; 41; **42**; 43; 43; 44; **46**; 53; 56; 62 $\checkmark$MA Median is 42. $\checkmark\checkmark$A	1MA ordered data 2A median AO (3)	D L2
1.1.3 (b)	43 $\checkmark\checkmark$A	2A mode (2)	D L2
1.1.3 (c)	IQR = upper quartile – lower quartile $= Q_3 - Q_1$ $= 46 - 32$ $\checkmark$RT $\checkmark$RT $= 14$ $\checkmark$CA	CA from 1.1.3(a) 1RT 46 1RT 32 1CA IQR value (3)	D L3
1.1.4	The interquartile range of 1st tournament is smaller than that of the 2nd tournament (i.e. 14 compared to 50) $\checkmark\checkmark$J Range of scores is smaller (i.e. 35) in the 1st tournament compared to a range of 90 points scored in 2nd tournament. Majority improved their scores. $\checkmark\checkmark$J **OR**	2J comparison 2J comparison	D L4
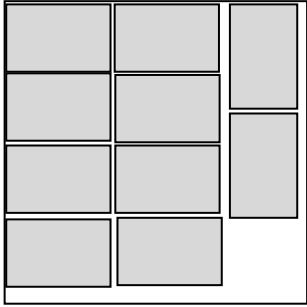
Ques	Solution	Explanation	T&L
	Highest score by a player in 1st tournament is 38 points less than a player in 2nd tournament. ✓✓J	2J comparison	
	The interquartile range of 2nd tournament is higher than that of the 1st tournament (i.e. 50 points higher than 14 points).	2J comparison	
	The lowest score of tournament 2 is 17 less than the lowest score in tournament 1.		
	OR ✓✓J Players' performance in Tournament 1 were more consistent because the IQR is smaller and also the range is smaller. ✓✓J	**OR** 2J comparison 2J comparison (4)	
1.2.1	✓MA Points : 3 × 1 = 3 8 × 2 = 16 3 × 3 = 9 ✓M ✓A Point scored = 3 + 16 + 9 = 28 Player F ✓CA **OR** ✓MA ✓M ✓A 3 × 1 + 8 × 2 + 3 × 3 = 28 points Player F ✓CA	1MA point in relation to position (multiply) 1M adding points 1A accumulated points 1CA player 1MA balls multiply by points 1M adding 1A total points 1CA player AO (4)	D L3
1.2.2	45 cm : 3,66 m ✓MA ✓C 0,45m : 3,66 m 15 : 122 ✓CA **OR** 45 cm : 3,66 m ✓MA 45 cm : 366 cm ✓C 15 : 122 ✓CA	1MA writing in correct ratio 1C convert cm to m 1CA simplification (no units) **OR** 1MA writing in correct ratio 1C convert m to cm 1CA simplification (no units) (3)	M L2

Ques	Solution	Explanation	T&L

1.2.3	Shaded Area = $\pi r^2_{(hoop)} - \pi r^2_{(ball)}$
	    $\checkmark$A $\checkmark$M $\checkmark$A $\checkmark$SF
	    = $3{,}142 \times (22{,}5cm)^2 - 3{,}142 \times (12{,}4cm)^2$
	
	     $\checkmark$CA $\checkmark$CA
	    = $1\ 590{,}6375 \ cm^2 - 483{,}11392 \ cm^2$
	
	    = $1\ 107.52 \ cm^2$ $\checkmark$CA
	      OR
	
	 Area of circle (hoop) = $\pi \times (radius)^2$
	       $\checkmark$A
	     = $3{,}142 \times (22{,}5)^2$ $\checkmark$SF
	
	     = $1\ 590{,}6375 cm^2 \checkmark$CA
	
	 Area occupied by the ball = $\pi \times (radius)^2$
	       $\checkmark$A
	     = $3{,}142 \times (12{,}4)^2$
	     $\checkmark$CA
	     = $483{,}11392 \ cm^2$
	      $\checkmark$M
	 Shaded area = $1\ 590{,}6375 - 483{,}11392 \ cm^2$
	
	     = $1\ 107{,}52358 \ cm^2$ $\checkmark$CA
		1A radius hoop
		 1A radius ball
		 1M subtracting
		 1SF correct values
		 1CA area in cm^2
		 1CA area occupied by the ball
		 1CA simplification
		    OR
		
		 1A radius
		 1SF correct values
		
		 1CA area
		
		 1A radius of a ball
		
		 1CA area occupied by the ball
		
		 1M difference
		
		 1CA simplification
		 NPR
		       (7)
			M
			 L3

1.3	Proportional price money:
	
	      $\checkmark$M
	 Y group share R8,1 mil $\times \dfrac{3}{9} =$ R2,7 mil $\checkmark$CA
	      $\checkmark$MA
	
	 Each member of Y group will receive = $\dfrac{2{,}7 \ million}{5 \ \ \checkmark M}$
	
	       = R0,54 mil.$\checkmark$CA
	     $\checkmark$C
	   $0{,}54 \times 1\ 000\ 000 =$ R540 000
	
	 The player was correct.$\checkmark$O
		1MA getting 9
		 1M multiply by ratio
		 1CA price money to share
		
		 1M divide by 5
		
		 1CA each member's share
		
		 1C to 1000's
		
		 1O conclusion based on calculation
			F
			 L4

Ques	Solution	Explanation	T&L
	OR Group Y receives $\dfrac{3}{9}$ of the share ✓✓MA Each member receives $\dfrac{1}{5}$ ✓A A player from Y $= \overset{\checkmark M}{\dfrac{3}{45}} \times$ 8,1 million $\qquad\qquad = 0{,}54$ million ✓CA $\qquad\qquad = $ R540 000 ✓C The statement is correct ✓O	2MA correct ratio 1A each member's share 1M multiply with ratio 1CA simplification 1C conversion 1O conclusion [max 4 marks if divided by 15 first to get 0,54 mil Max 5 marks if dividing by 3 instead of working with the ratio $\dfrac{3}{9}$] (7)	
		[39]	

QUESTION 2 (37)

Ques	Solution	Explanation	T&L
2.1.1 (a)	$\checkmark$RT Amount $\times$ (106,18%) = R14,44 $\checkmark$A K = R14,44 $\div$ 106,18 % or 1,0618 = R13,599 = R13,60 $\checkmark$R	1RT correct values 1A dividing by 106,18% or dividing by 1,0618 1R value in rand (3)	F L2
2.1.1 (b)	$\checkmark$RT $\checkmark$M $Q = \dfrac{R11,50 - R10,88}{R10,88} \times 100\%$ $\checkmark$F = 5,7 $\checkmark$CA **OR** $\checkmark$RT $-0,81 + 12,2 + 7,82 + 2,28 + 6,18 + 5,24 + 10,07 + 11,34$ $+ Q = 6,00 \times 10$ $\checkmark$M $Q = 60 - 54,32$ $\checkmark$M = 5,68 $\checkmark$CA	1RT correct values 1M subtracting values 1F percentage change 1CA simplification **OR** 1RT correct values 1M mean concept 1M subtracting values 1CA simplification NPR (4)	D L2
2.1.1 (c)	$E =$ $\checkmark$MA $\dfrac{0,99 + 17,32 + 15,07 + 5,99 + 9,42 + 8,16 + 4,46 + 9,04 + 10,27 + 15,64}{10}$ $\checkmark$MCA $= \dfrac{96,36}{10}$ $= 9,64$ $\checkmark$CA	1MA adding values 1MCA mean concept $\div 10$ 1CA mean value (3)	D L 2

2.1.2	$\checkmark\checkmark$J
	Apr. 2015 to Jan. 2016: both prices increased.
	
	Jan. 2016 to Apr. 2016:
	               $\checkmark$J
	The price of the 600 g loaf of white bread remained the same (is constant).
	
	          $\checkmark$J
	The price of the 700 g loaf of white bread increased
	OR
		2J both increased
		
		1J 600 g constant
		
		1J 700 g increased
			D
			L4

Ques	Solution	Explanation	T&L
	Per period per bread 600 g: Apr 2015 – Jan 2016 : The price increased. ✓J Jan 2016 – Apr 2016: The price remained the same.✓J 700 g: Apr 2015 – Jan 2016 : The price increased. ✓J Jan 2016 – Apr 2016 The price increased. ✓J (4)	600g: 1J increased 1J constant 700g: 1J increased 1J increased	
2.1.3	✓✓J He will have to adjust his spending to cater for the increased price. That is money that he was saving to use for other things will be used for wheat products. **OR** ✓✓J Will experience financial difficulties (i.e. unable to afford bread any longer). **OR** If he buys the wheat products it will cost him more and he will have less money to spend on other stuff ✓✓J **OR** Can buy less and less ✓✓J **OR** Any other valid reason ✓✓J (2)	2J explanation **OR** 2J explanation **OR** 2J explanation **OR** 2J explanation **OR** 2J explanation	F L4

2.2	✓MA
	Increase in 2017 = 6,6% × R6,72
	
	        = R0,44 ✓A
	
	Increased price = R6,72 + R0,44 ✓M
	          = R7,16 ✓CA
	
	Increase in 2018 = R7,16 × 6%
	          = R0,43 ✓CA
	
	Increased price = R7,17 + R0,43
	          = R7,59 ✓CA
	
	 OR
	   ✓MA ✓A ✓M
	2017: R6,72 × 1,066 = R 7,16 ✓CA
	       ✓CA
	2018: R7,16 × 1,06 = R7,59 ✓CA
	 OR
	 ✓MA ✓A✓M ✓A✓M
	R6,72 × 1,066 × 1,06 = R7,59✓CA
	 (6)
		1MA multiplying correct values
		1A increase amount
		
		1M adding
		1CA increased price
		
		1CA increase %
		
		1CA increased price
		
		 OR 1MA multiplying correct values
		1A increase amount
		1M adding
		1CA increased price
		1CA increase %
		1CA increased price
			F
			L3

Ques	Solution	Explanation	T&L
2.3.1	$\checkmark$SF V = 690 mm × 445 mm × 180 mm $\checkmark\checkmark$CA = 55 269 000 mm^3	1SF correct values 2CA volume P if unit is wrong (3)	M L2
2.3.2	Number of crates lengthwise $= \dfrac{2}{0,69}$ $\checkmark$M $\checkmark$C = 2,89 $\therefore$ 2 crates $\checkmark$CA Number of crates breadthwise $= \dfrac{2}{0,445} = 4,4$ $\therefore$ 4 crates $\checkmark$CA Now the remaining space is 0,62 m × 2 m $\therefore$Turn crates: 1 more fit in $\left(\dfrac{0,62}{0,445}\right)$ and two down Total $\checkmark$M = (2 Lengthwise × 4 breadth wise + 2) × 9 on top of each other = 90 crates $\checkmark$CA $\therefore$ 80 will fit $\checkmark$J **Layout:** *box: $\dfrac{2\,000}{690}$ = 2,89* *box: $\dfrac{2\,000}{445}$ = 4,4*	1C conversion 1M dividing 1CA number length wise 1CA number 1M finding the total number 1CA number of crates 1J conclusion (7)	M L3

Ques	Solution	Explanation	T&L
2.3.3	Number of loaves = $80 \times 8 = 640$　✓A Cost price per bread = $\dfrac{R5\,350}{640}$　✓M 　　　　　　　= R8,36　✓CA Number of loaves to break even = $\dfrac{FC}{SP-CP}$ 　　　　　　　= $\dfrac{R1\,720,70}{R11,50-R8,36}$　✓SF 　　　　　　　= 548　✓CA	1A total number of loaves 1M dividing 1CA cost price 1SF substitution (at least 2 correct values) 1CA number of whole loaves (5)	F L3
		[37]	

QUESTION 3 (38 marks)

Ques	Solution	Explanation	T&L
3.1.1	Total population $= \dfrac{22\,574\,500}{41{,}1\%}$ ✓RT ✓M $= 54\,925\,790{,}75$ ✓CA $\approx 54\,925\,800$ people ✓R	1RT correct values 1M dividing by % 1CA population 1R number of people (4)	D L3
3.1.2 (a)	$\text{P}_{(\text{White female})} = \dfrac{2\,325\,100}{55\,908\,900}$ ✓MA $= 0{,}042$ ✓CA **OR** $4{,}2\%$ **OR** $\dfrac{1}{24}$	1MA numerator and denominator 1CA simplification **AO** (2)	P L3
3.1.2 (b)	Total males = RSA population – Female population $= 55\,908\,900 - 28\,529\,100$ ✓MA $= 27\,379\,800$ ✓CA $\text{P}_{(\text{male})} = \dfrac{27\,379\,800}{55\,908\,900}$ ✓CA $= 0{,}489721672 \approx 0{,}49$ **OR** $48{,}97\%$ **OR** $\text{P}_{(\text{female})} = \dfrac{28\,529\,100}{55\,908\,900} = 0{,}51027... \approx 0{,}51$ or $51{,}03\%$ ✓A $\text{P}_{(\text{male})} = 1 - 0{,}51027..$ or $1 - 0{,}51$ or $100\% - 51{,}03\%$ ✓M $= 0{,}489721672$ or $0{,}49$ or $49{,}97\%$ ✓CA	1MA difference 1CA males total 1CA probability **OR** 1A P(female) 1M subtracting from 1 1CA P(male) (3)	P L3
3.1.3	$2016 = \dfrac{684\,100}{28\,529\,100} \times 100\%$ ✓MA ✓M $= 2{,}3979024 \approx 2{,}4\%$ ✓CA $2015 =$ **or** $2014 =$ $\dfrac{673\,900}{28\,078\,700} \times 100\%$ $\dfrac{664\,900}{27\,635\,900} \times 100\%$ ✓MA $= 2{,}4\%$ $= 2{,}4\%$ ✓CA **OR**	1MA numerator and denominator 1M multiply by 100% 1CA percentage 1MA numerator and denominator 1CA percentage OR	D L4

Ques	Solution	Explanation	T&L
	$\checkmark$MA $\qquad\checkmark$M $\qquad\qquad\qquad\checkmark$CA 2014: $100\% - (80,2\% + 8,9\% + 8,5\%) = 2,4\%$ $\checkmark$ MA 2015: $100\% - (80,4\% + 8,9\% + 8,3\%) = 2,4\%$ $\checkmark$CA 2016: $100\% - 80,6\% - 8,9\% - 8,1\% = 2,4\%$	1MA subtracting from 100% 1M adding other values 1CA percentage 1MA another year 1CA another year (5)	
3.2.1	Total distance of a space and a post $= 100 \text{ mm} + 40 \text{ mm}$ $= 140 \text{ mm}$ $\quad\checkmark$A $\qquad$ or $0,1 \text{ m} + 0,04 \text{ m}$ $\qquad\qquad\qquad\qquad\qquad = 0,14 \text{ m}$ Distance between posts that must have a space and a post $= 3\,460 \text{ mm} - 100 \text{ mm}$ $\quad$ or $3,460 \text{ m} - 0,14 \text{ m}$ $= 3\,360 \text{mm}$ $\quad\checkmark$M $\qquad\qquad = 3,360 \text{ m}$ Number of small posts $= \dfrac{3360}{140}$ $\quad\checkmark$M $\qquad$ or $\dfrac{3,360}{0,140}$ $\qquad\qquad = 24$ $\quad\checkmark$CA $\qquad\qquad\qquad = 24 \text{ m}$	1A correct distance 1M subtracting 1M dividing by 140 1CA number of small post [Accept 26 full marks] (4)	M L2
3.2.2	$\checkmark\checkmark$J Direct sunlight coming into the rooms through the windows for much longer. **OR** $\checkmark\checkmark$J Sun spend most of the time on the north side of the house. **OR** $\checkmark\checkmark$J It is the side on which the sun shines most of the time during the day.	2J sun and time **OR** 2J direction and time **OR** 2J sunshine (2)	MP L4
3.2.3	Open outward because they have short width $\checkmark\checkmark$O **OR** $\checkmark\checkmark$O Designed to store things, as such they will obstruct inward opening of the doors. **OR** $\checkmark\checkmark$O Storage space will be lost if doors open inwards **OR** $\checkmark$O $\qquad\qquad\checkmark$O Other rooms open inward because it is the entrance to the room.	2O wideness **OR** 2O purpose **OR** 2O space **OR** 1O way of opening 1O purpose (2)	MP L4

Ques	Solution	Explanation	T&L

3.2.4	Carpeted floor = Area of a Passage + Dining + Living rooms
	
	DR area = 3,3274 × 3,6576 ✓SF
	
	     = 12,17029824 m² ✓CA
	
	LR area = 4,5720 × 4,2672
	
	     = 19,5096384 m² ✓CA
	
	      ✓M
	Area of passage = 15% of (12,17 + 19,51) m²
	
	     = 15 % of 31,68 m²
	
	     = 4,751990496 m² ✓CA
	
	Total area = 12,17 m² + 19,51 m² + 4,75 m² ✓M
	     = 36,43 m² ✓CA
	     ≈ 37 m² ✓R
		
		1SF finding area
		
		1CA area of DR
		
		1CA area of LR
		
		1M finding 15%
		
		1CA area of passage
		
		1M adding 3 or 4 values
		1CA total area
		1R rounding
		[Max 6 marks if total area is calculated]
		
		(8)
			M
			L3

3.2.5	✓MA
	Labour Cost: R1 600 + 37 × R70
	
	     = R1 600 + R2 590
	
	     = R4 190 ✓CA
	
	Number of boxes = 37 ÷ 2,15 ✓M
	     = 17,209
	     ≈ 18
	
	Cost for boxes flooring:
	     18 × R299,90
	     = R5 398,20 ✓CA
	
	Number of underlay rolls: 37 ÷ 10
	     = 3,7
	     ≈ 4
	Underlayer: 4 × R56,90
	
	     = R227,60 ✓CA
	
	        ✓MCA
	Total cost = R4 190 + R5 398,20+ R227,60
	
	     = R9 815,80 ✓CA
	
	The budget is sufficient. ✓O
		Area CA from 3.2.4 above
		1MA finding labour
		
		1CA labour cost
		
		1M dividing by 2,15
		
		1CA cost of boxes
		
		1CA underlayer cost
		
		1MCA adding all 3 different cost types
		1CA total cost
		
		1O conclusion
		(8)
			F
			L4

		[38]	

QUESTION 4 [36 marks]

Ques	Solution	Explanation	T&L
4.1.1	✓RT✓RT ✓RT Tax bracket 3, 4 and 5 [Accept Tax bracket 1] **OR** $37 001 – $87 000 ✓RT ✓RT $87 001 − $180 000. $180 001 and over. ✓RT [Accept $0 – $1 200]	1RT bracket3 1RT bracket 4 1RT bracket 5 **OR** 1RT tax bracket 1RT tax bracket 1RT tax bracket (3)	F L2
4.1.2	Pay <u>extra</u> tax (2% on taxable income)✓✓O **OR** ✓✓O The levy is an <u>extra (additional, more)</u> tax on their income. **OR** ✓✓O <u>Higher income earners</u> are subjected to <u>an extra tax</u> in addition to usual income tax paid.	2O reason **OR** 2O reason **OR** 2O reason (2)	F L4

Ques	Solution	Explanation	T&L
4.1.3	**Tax due 2016:** $\quad\quad\quad\checkmark$RT $\quad\quad\quad\checkmark$SF = \$54 547 + 45% × (\$289 303,26 − \$180 000) = \$54 547 + 45% × \$109 303,26 =\$54 547 + \$49 186,47 =\$103 733,47 $\checkmark$CA Medical levy = \$289 303,26 × 2% $\quad\quad\quad\quad$ = \$5 786,07 $\checkmark$MA Total due = \$103 733,47 + \$5 786,07 $\quad\quad\quad\quad$ = \$109 519,54 $\checkmark$CA **Tax due 2017:** $\quad\quad\quad\checkmark$RT $\quad\quad\quad\checkmark$SF = \$54 232 + 45% × (\$311 001 − \$180 000) = \$54 232 + 45% × \$131 001 = \$54 232 + \$ 58 950,45 = \$113 182,45 $\checkmark$CA Medical levy = 2% × \$311 001 $\quad\quad\quad\quad$ = \$6 220,02 Total for 2017: \$113 182,45 + \$6 220,02 $\checkmark$CA $\quad\quad\quad\quad$ = \$119 402,47 $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ $\checkmark$M Tax due difference: \$119 402,47 − \$109 519,54 $\quad\quad\quad\quad$ = \$9 882,93. $\checkmark$CA The statement is VALID. $\checkmark$O	1RT tax bracket 1 SF correct substitution 1CA tax due 1MA levy value 1CA total due 1RT tax bracket 1SF correct values 1CA tax due 1CA total 1M finding difference 1CA simplification 1O conclusion $\quad\quad\quad\quad\quad\quad\quad$ (12)	F L3/4
4.2.1	$\quad\quad\checkmark$A $\quad\quad\quad\quad\checkmark$A $\quad\quad\quad\checkmark$A Mary Rose restaurant; Denmark hotel; Civic Centre	3A venues Accept hotel $\quad\quad\quad\quad\quad\quad\quad$ (3)	MP L2

Ques	Solution	Explanation	T&L
4.2.2	✓✓O Because it runs over the river. **OR** ✓✓O Portions of the river not visible from above where the highway crosses or passes over the river.	2O reason **OR** 2O reason (2)	MP L4
4.2.3	✓✓RT ✓✓RT ✓✓RT North west **OR** NW **OR** West of North	2RT direction (2)	MP L2
4.2.4	Turn right walk along Walker Str ✓A Turn right into Strickland Str ✓A Pass South Coast Highway And turn left into Mount Shadforth Rd ✓A Restaurant will be on his right **OR** Turn SW into Walker Street and proceed. At the corner turn NW and continue. ✓A ✓A Cross South Coast Highway Turn W into Mount Shadforth Rd. ✓A The restaurant is on the northern side of the road.	1A route and turn 1A route and turn 1A turn and road **OR** 1A route and turn 1A route and turn 1A turn and road (3)	MP L3
4.2.5	Measured distance between = 23 mm ✓✓MA Scale 23 mm is 100 m ✓C How long it will take him = Time = $\dfrac{\text{Distance}}{\text{Speed}}$ ✓F $= \dfrac{100\text{m}}{1{,}1\text{m/s}}$ ✓A $= 90{,}91$ seconds ✓CA ✓C In minutes $90{,}909 \div 60 = 1{,}52$ minutes. ✓CA ✓O No. He can walk in less than 2 minutes at that speed. **OR** ✓C ✓A 2 min = 120 sec ✓A ✓F Distance = 1,1 m/s x 120 s = 132 m ✓CA Measured distance = 23 mm ✓✓MA Scale 23 mm = 100 m ✓C He will have passed the Indigo Cuisine ✓O **[Accept measurements 23 mm to 25 mm]**	2MA measuring 1C using scale 1F formula 1A dividing by speed 1CA calculating time 1C divide by 60 1CA minutes 1O conclusion **OR** 1C multiply by 60 1A time in seconds 1A multiply with speed 1F formula 1CA distance 2MA measurement 1C using scale 1O conclusion (9)	MP L4
		[36]	

		TOTAL:	**150**