basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P2

FEBRUARY/MARCH 2011

MEMORANDUM

MARKS: 150

SYMBOL	EXPLANATION
A	Accuracy
CA	Consistent accuracy
C	Conversion
J	Justification (Reason/Opinion)
M	Method
MA	Method with accuracy
P	Penalty for no units, incorrect rounding off, etc.
R	Rounding off
RT/RG	Reading from a table/Reading from a graph
S	Simplification
SF	Correct substitution in a formula
O	Own opinion

This memorandum consists of 22 pages.

QUESTION 1 [40 MARKS]			
Ques	**Solution**	**Explanation**	**AS**
1.1.1(a)	✓M A = 100% – (15,6 + 27,2 + 22,4 + 7,2 + 2,3 + 6,0 + 4,4)% = 14,8% ✓CA **OR** Number of learners in school = $\frac{340}{27,2\%}$ = 1 250 ✓M A = $\frac{185}{1\,250} \times 100\%$ = 14,8% ✓CA	1M subtracting from 100% 1CA value of A 1MA number of learners at school 1CA value of A (2)	12.4.4
1.1.1(b)	Total number of learners = $\frac{195}{15,6\%}$ = 1 250 ✓A $\frac{B}{1\,250} \times 100\% = 4,4\%$ ✓M B = $\frac{4,4\% \times 1\,250}{100\%}$ = 55 ✓CA	1A number of learners 1M using 4,8% 1CA value of B (3)	12.4.4 12.1.1

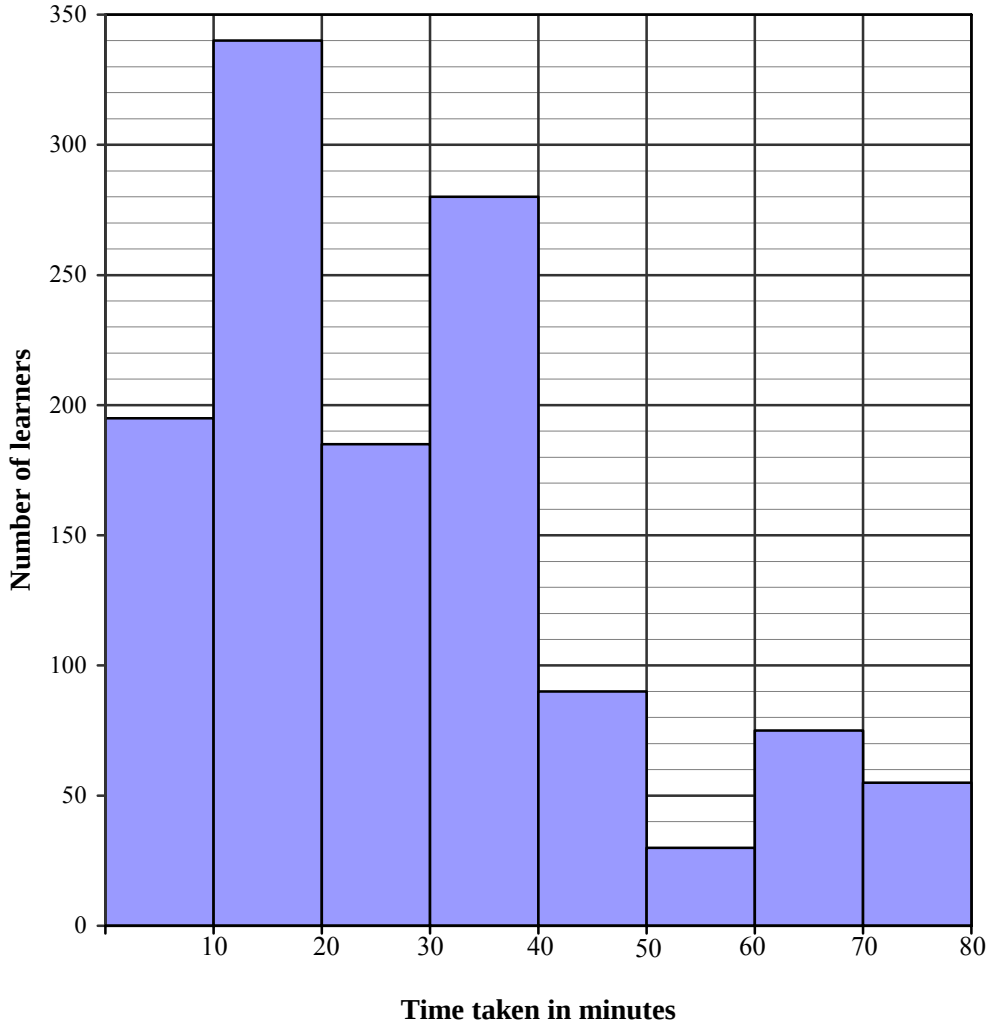
Ques	Solution	Explanation	AS
1.1.2	Percentage = 7,2% + 2,4% + 6% + 4,4% ✓M = 20% ✓CA **OR** Percentage = $\frac{90+30+75+55}{1\ 250}\times 100\%$ ✓M = $\frac{250}{1\ 250}\times 100\%$ = 20% ✓CA	1M adding 1CA percentage 1M finding percentage 1CA percentage (2)	12.4.4

Ques	Solution	AS
1.1.3		12.4.2

TABLE 1: Time usually taken by all the learners of Vuka High School to travel to school each day

Time taken in minutes	0 to less than 10	10 to less than 20	20 to less than 30	30 to less than 40	40 to less than 50	50 to less than 60	60 to less than 70	70 to less than 80
Number of learners	195	340	185	280	90	30	75	**B**

RELATIONSHIP BETWEEN NUMBER OF LEARNERS AND TIME TAKEN TO TRAVEL TO SCHOOL



4A marks for any four bars correct
1A all bars correct
1CA histogram (bars adjacent to each other – no space between bars)

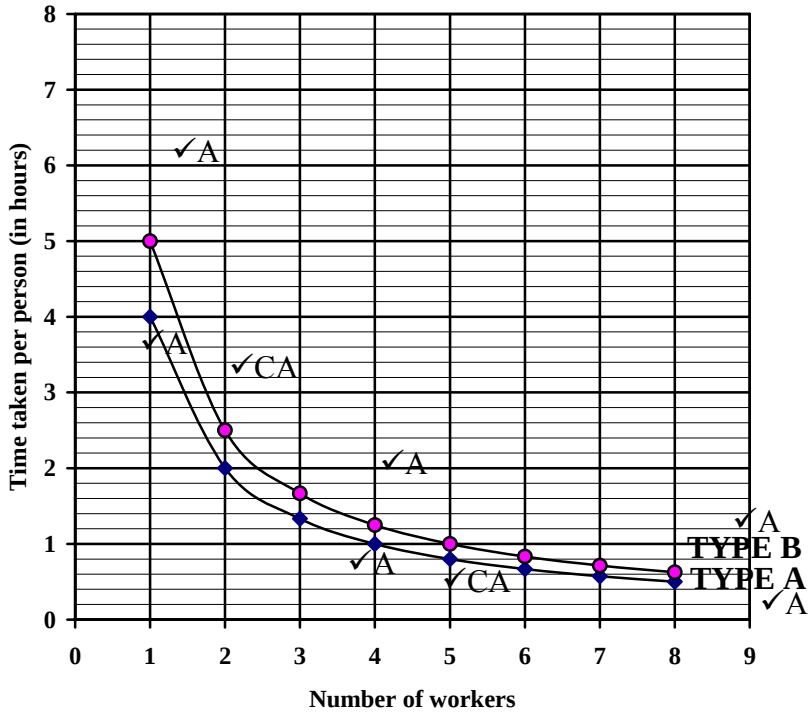
(6)

Ques	Solution	Explanation	AS
1.2.1(a)	Average speed $= \frac{\text{distance}}{\text{time}}$ ✓M $= \frac{12\,\text{km}}{60\,\text{min}}$ ✓SF $= \frac{12\,000\ \text{m}}{60\,\text{min}}$ ✓C = 200 metres per minute ✓CA **OR** Distance = average speed × time 12 km = average speed × 60 minutes ✓SF 12 000 m = average speed × 60 minutes ✓C $\frac{12\,000\ \text{m}}{60\,\text{min}}$ = average speed ✓M Average speed = 200 metres per minute ✓CA	1M rearranging the formula 1SF substitution 1C conversion 1CA solution **OR** 1SF substitution 1C conversion 1M rearranging the formula 1CA solution (4)	12.2.1
1.2.1(b)	200 m/minute is too fast for walking and too slow for travelling by car or by taxi. ✓O Thus, the learner was cycling/running/travelling in a donkey cart. ✓ ✓J **OR** ✓ ✓J Any other sensible reason	1O Own opinion 2J justification/reason (3)	12.1.2
1.2.2	The statement of the newspaper was NOT correct. ✓O ✓J The sample chosen was too small (not representative of the whole country) so cannot be used to make conclusions about the whole country. ✓J	1O conclusion of the newspaper 2J representivity of the sample (3)	12.4.6

Ques	Solution	Explanation	AS
1.3	Area needed for 1 bicycle = (1,8 m ×0,45 m) ✓C + 0,5 m² ✓MA = 0,81 m² ✓CA + 0,5 m² = 1,31 m² ✓CA So, area needed for 124 bicycles = 124 × 1,31 m² ✓A = 162,44 m² ✓CA ✓CA **OR** Area needed for 1 bicycle = (180 cm × 45 cm) ✓MA + 0,5 × 10 000 cm² ✓C ✓A = 8 100 cm² + 5 000 m² = 13 100 cm² ✓CA So, area needed for 124 bicycles = 124 × 13 100 cm² ✓CA = 1 624 400 cm² ✓CA = 162,44 m² ✓A	1C conversion to m 1MA area for a bicycle 1CA additional space 1A total area for a bicycle 1A multiplication by 124 1CA Solution 1CA correct unit 1C conversion to cm² 1MA area for a bicycle 1A additional space 1CA total area for a bicycle 1CA multiplication by 124 1CA Solution 1A correct unit (7)	12.3.1 12.3.1

Ques	Solution	Explanation	AS
1.4.1	Mean $= \frac{2+4+6+3+4+5+6+5+7+5+16+9+5+C+17+9}{16}$ ✓MA $= \frac{103+C}{16}$ ✓S Mean = 7 $\therefore \frac{103+C}{16} = 7$ ✓M $103 + C = 7 \times 16$ $C = 112 - 103$ $= 9$ ✓CA	1MA finding the mean 1S simplification 1M equating to 6 1CA value of C (4)	12.4.3 12.4.4
1.4.2	Responses in ascending order are: 2; 3; 4; 4; 5; 5; 5; 5; 6; 6; 7; 9; 9; 9; 16; 17 ✓CA The median = $\frac{5+6}{2}$ ✓M = 5,5 people ✓CA	1CA ascending order 1M finding the median 1CA median (3)	12.4.3
1.4.3	Mrs James should use the median rather than the mean ✓O The mean (i.e. 7 people) is not a good measure to use as 10 of the 16 households have less than 7 people. The mean is affected by large numbers. ✓J More than 50% of the households have 5 people or less ✓J thus making the median (i.e. 5,5 people) a more accurate measure.	1O correct measure 1J rejecting the mean 1J accepting the median (3)	12.4.3

QUESTION 2 [33 MARKS]			
Ques	**Solution**	**Explanation**	**AS**
2.1.1(a)	$P = \frac{4}{2}$ ✓M $= 2$ ✓CA	1 M method 1CA value of P (2)	12.2.1
2.1.1(b)	$1 = \frac{5}{Q}$ ✓M $Q = \frac{5}{1}$ $= 5$ ✓CA **OR** $0,8 = \frac{4}{Q}$ ✓M $Q = \frac{4}{0,8}$ $= 5$ ✓CA	1 M method 1CA value of Q 1 M method 1CA value of Q (2)	12.2.1

<table>
<tr>
<td>2.1.2</td>
<td>
<table>
<tr><td>No. of workers</td><td>1</td><td>2</td><td>4</td><td>5</td><td>8</td></tr>
<tr><td>Time taken (in hours) for TYPE A</td><td>4</td><td>2</td><td>1</td><td>0,8</td><td>0,5</td></tr>
<tr><td>Time taken (in hours) for TYPE B</td><td>5</td><td>2,5</td><td>1,25</td><td>1</td><td>0,625</td></tr>
</table>
TIME TAKEN PER WORKER TO MAKE ONE PAIR OF SANDALS


</td>
<td>Type A Sandal
2A all points plotted

1CA correct graph
1A label

Type B Sandal
2A all points plotted

1CA correct graph
1A label

(8)</td>
<td>12.2.2</td>
</tr>
<tr>
<td>2.1.3</td>
<td>Inverse proportion or Indirect proportion ✓ ✓CA</td>
<td>2CA type of proportion
(2)</td>
<td>12.2.1</td>
</tr>
</table>

Ques	Solution	Explanation	AS
2.2.1	Jabu's wages = R11,25/hour × 40 hours ✓M = R450,00 ✓CA ✓M ✓CA Each worker earns 80% of R450,00 = R360,00 Total paid = R450,00 + 3 × R360 ✓M = R1 530,00 ✓CA **OR** Jabu's wages = R11,25/hour × 40 hours ✓M = R450,00 ✓CA ✓M Each worker earns 80% of R11,25 = R9,00 ✓CA Total paid = R450,00 + 3 × R9,00/hour × 40 hours ✓M = R1 530,00 ✓CA	1M calculating Jabu's wages 1CA Jabu's wages 1M calculating worker's wages 1CA worker's wages 1M adding all wages 1CA total wages 1M calculating Jabu's wages 1CA Jabu's wages 1M calculating worker's wages 1A worker's hourly wage 1M adding all wages 1CA total wages (6)	12.1.3 12.2.1
2.2.2	Overtime pay per hour = 1,5 × R11,25 ✓M = R16,875 ≈ R16,88 ✓CA Jabu's earning = R450,00 + R16,88/hour × 8 hours ✓M = R450,00 + R135,04 ✓CA = R585,04 ✓CA **OR** ✓A ✓A Jabu's earning = R450,00 + 8 × (1,5 × R11,25) ✓M = R450,00 + R135,00 ✓CA = R585,00 ✓CA	1M calculating overtime rate 1CA overtime rate 1M calculating Jabu's wages 1CA overtime pay 1CA total earnings 1A number of hours overtime 1A multiplying by overtime rate 1M calculating Jabu's wages 1CA overtime pay 1CA total earnings (5)	12.1.3

Ques	Solution	Explanation	AS
2.3.1(a)	Percentage = 25% ✓ ✓A **OR** Percentage = $\frac{3}{12}\times 100\%$ ✓A = 25% ✓CA	2A percentage 1A number of days 1CA percentage (2)	12.4.3
2.3.1(b)	Percentage = 50% ✓ ✓A OR Percentage = $\frac{6}{12}\times 100\%$ ✓A = 50% ✓CA	2A percentage 1A number of days 1CA percentage (2)	12.4.3
2.3.2(a)	P(3 Type B) = $\frac{2}{12}$ ✓A ✓A $= \frac{1}{6}$ = 0,1666… ≈ 0,167	1A number of days 1A total number of days (2)	12.4.5
2.3.2(b)	P(more than 4 Type A) = $\frac{6}{12}$ ✓A ✓A $= \frac{1}{2}$ = 0,25	1A number of days 1A total number of days (2)	12.4.5

QUESTION 3 [25 MARKS]			
Ques	**Solution**	**Explanation**	**AS**
3.1.1	Distance around the pencil $= 6 \times 3$ mm ✓M $= 18$ mm ✓A Length of pencil covered by beads $= \frac{1}{3} \times 180$ mm ✓C $= 60$ mm ✓A Surface area of pencil covered by beads $= 18$ mm $\times 60$ mm ✓MA $= 1\,080$ mm^2 ✓CA **OR** Area of one of the beaded sides of the pencil $= 3$ mm $\times (\frac{1}{3} \times 180$ mm) ✓MA ✓C ✓CA $= 3$ mm $\times 60$ mm $= 180$ mm^2 ✓CA ∴ Surface area of the pencil covered by beads $= 6 \times 180$ mm^2 ✓CA $= 1\,080$ mm^2 ✓CA	1M multiplying by 6 1A distance 1C conversion 1A length 1MA use of area formula 1CA area of beaded section 1MA use of area formula 1C conversion 1CA width 1CA area of one beaded side 1CA multiplying by 6 1CA area of beaded section (6)	12.3.1

Ques	Solution	Explanation	AS
3.1.2	Distance around the pencil = 18 mm ✓M ∴ The number of beads = 18 mm ÷ 1,5 mm = 12 ✓CA Length of beaded area = 60 mm ✓M The number of beads = 60 mm ÷ 1,5 mm = 40 ✓CA So the number of beads needed = 12 × 40 ✓M = 480 ✓CA **OR** Width of one side of pencil = 3 mm Number of beads needed for width = 3 mm ÷ 1,5 mm = 2 ✓M ✓A Length of pencil to be beaded = 60 mm Number of beads needed for length = 60 mm ÷ 1,5 mm = 40 ✓M ✓A Number of beads needed for one side of pencil = 2 × 40 = 80 beads ✓CA Number of beads needed for six sides of pencil = 6 × 80 = 480 ✓CA	1M dividing 1CA number of beads 1M dividing 1CA number of beads 1M multiplying 1CA solution 1M dividing 1A number on width 1M dividing 1A number on length 1CA number on side 1CA number on six sides (6)	12.3.1 12.1.1

Ques	Solution	Explanation	AS
3.2.1	Cost of labour (for beading) $= \frac{5}{60} \times$ R15,50 ✓MA $=$ R1,29 ✓CA Cost of beads $= \frac{480}{1\,000} \times$ R8,00 ✓MA $=$ R3,84 ✓CA Cost of pencil $= \frac{\text{R30,00}}{12}$ ✓MA $=$ R2,50 ✓CA Total cost price of the beaded pencil $=$ R1,29+ R3,84 + R2,50 $=$ R7,63 ✓CA % Selling price $= 100\% + 35\% = 135\%$ Selling price $= \frac{135}{100} \times$ R7,63 ✓M $= 1{,}35 \times$ R7,63 $=$ R10,30 ✓CA	1MA fraction and multiplication 1CA cost of labour 1MA fraction and multiplication 1CA cost of beads 1MA dividing by 12 1CA cost of one pencil 1CA total cost of a pencil 1M calculating increase % 1CA cost of pencil (9)	12.1.1

Ques	Solution	Explanation	AS
3.2.2	Price of pencil = R10,30 R1 = ARS 0,54895 R10,30 = ARS 0,54895 × 10,30 ✓A = ARS 5,654185 Price of one pencil = ARS 5,654185 ✓CA Number of pencils = $\frac{\text{ARS } 100}{\text{ARS } 5{,}654185}$ ✓M = 17,686 ≈ 17 ✓CA	1A using the exchange rate 1CA price of pencil in Argentinean peso 1M finding number of pencils 1CA number of pencils (4)	12.1.1

QUESTION 4 [34 MARKS]

Ques	Solution	Explanation	AS
4.1.1	**METHOD 1** Discount = 5% of R139 900 ✓M $= \frac{5}{100} \times$ R139 900 = 0,05 × R139 900 = R6 995,00 ✓A Price after discount = R139 900 – R6 995,00 = R132 905 ✓CA VAT = 14% of R132 905 $= \frac{14}{100} \times$ R132 905 = R18 606,70 ✓CA Total cost including VAT = R132 905 +R18 606,70 = R151 511,70 ✓CA **METHOD 2** Price after discount = 95% of R139 900 ✓M ✓M $= \frac{95}{100} \times$ R139 900 = 0,95 × R139 900 = R132 905 ✓CA Total cost including VAT = 114% of R132 905 ✓M $= \frac{114}{100} \times$ R132 905 = 1,14 × R132 905 = R151 511,70 ✓CA Pre-delivery cost = 0,75% of R151 511,70 $= \frac{0,75}{100} \times$ R151 511,70 ✓M = 0,0075 × R151 511,70 = R 1 136,34 ✓CA Full purchase cash price = R151 511,70 + R 1 136,34 + R1 400,00 + R4 950,00 = R158 998,04 ✓CA	1M calculating % 1A calculating 5% 1CA cash price (ex VAT) **OR** 1M subtracting from 100% 1M calculating percentage 1CA discounted price 1M adding 14% 1CA price including VAT **OR** 1CA calculating VAT 1CA cash price (incl. VAT) 1M calculating % 1CA delivery cost 1CA purchase price (8)	12.1.3

<table>
<tr><th>Ques</th><th>Solution</th><th>Explanation</th><th>AS</th></tr>
<tr><td>4.1.2</td><td>
Deposit = 20% of R158 998,04
= R31 799,61 ✓CA

Amount to be financed = R158 998,04 – R31 799,61 ✓M
= R127 198,43 ✓CA
OR
% to be financed = 100% – 20%
= 80% ✓CA
Amount to be financed = $\frac{80}{100}$ × R158 998,04 ✓M
= 0,8 × R158 998,04
= R127 198,43 ✓CA

A = P(1 + $i \times n$) ✓SF ✓A
= R127 198,43 (1 + 0,12 × 5)
= R203 517,49 ✓CA

<table>
<tr><th>METHOD 1</th><th>METHOD 2</th></tr>
<tr><td>Monthly instalment
= $\frac{\text{R203 517,49}}{60}$ ✓M
= R3 391,95816..
≈ R3 391,96 ✓CA

The monthly instalment is over by R7,04 ✓J</td><td>R3 399,00 × 60 ✓M
= R203 940,00 ✓CA

The monthly instalment is over by R422,51 over the 60 months. ✓J</td></tr>
</table>
</td><td>
1CA deposit amount

1M subtracting
1CA amount financed

1CA correct %
1M calculating %
1CA amount financed

1SF substituting P
1A value of i
1CA amount to be repaid

1M multiplying by 60
OR 1M dividing by 60

1CA monthly instalment
OR 1CA total paid

1J conclusion

(9)
</td><td>12.1.3</td></tr>
</table>

Ques	Solution	Explanation	AS
4.2	Area to be paved = 2,99 m × 10,35 m ✓MA = 30,9465 m^2 ✓CA Area of the top face of a brick = 23 cm × 11,5 cm ✓MA = 264,5 cm^2 ✓A = 0,02645 m^2 ✓C Number of bricks = $\frac{30{,}9465\,\text{m}^2}{0{,}02645\,\text{m}^2}$ ✓M = 1 170 bricks ✓CA Number of pallets = $\frac{1\,170}{354}$ ✓M = 3,305 So, 4 pallets will be needed ✓CA **OR**	1MA using area formula 1CA paving area 1MA using area formula 1A area of each brick 1C converting 1M dividing 1CA number of bricks 1M dividing by 160 1CA number of pallets	12.3.1

	2,99 m = 299 cm ✓C	1C conversion	
	METHOD 1 Number bricks lengthwise $= \frac{299\,\text{cm}}{23\,\text{cm}}$ ✓M = 13 bricks ✓CA **METHOD 2** Number of bricks lengthwise $= \frac{299\,\text{cm}}{11{,}5\,\text{cm}}$ ✓M = 26 bricks ✓CA	1M dividing 1CA no. of bricks	
	10,35 cm = 1 035 cm ✓C	1C conversion	
	METHOD 1 Number of bricks breadthwise $= \frac{1\,035\,\text{cm}}{11{,}5\,\text{cm}}$ = 90 bricks ✓CA **METHOD 2** Number of bricks breadthwise $= \frac{1\,035\,\text{cm}}{23\,\text{cm}}$ = 45 bricks ✓CA	1CA no of bricks	
	Total number of bricks = 13 × 90 ✓CA = 1 170 bricks ✓CA Total number of bricks = 26 × 45 ✓CA = 1 170 bricks ✓CA	1CA multiplying 1CA total no. of bricks	
	Number of pallets $= \frac{1\,170}{354}$ ✓M = 3,305 So, 4 pallets will be needed ✓CA	1M dividing 1CA no. of pallets (9)	
4.3.1	Delivery charge ✓A ✓A ✓A = R95 + R5,45 × (no of kilometres above 10 km) **OR** ✓A ✓A ✓A Delivery = R 95 + R5,45 × (total distance – 10 km)	1A constant amount 1A rate per km 1A correct equation 1A constant amount 1A rate per km 1A correct equation (3)	12.2.1

4.3.2	Delivery charge by ABC Transport = R95 + R5,45 × (35 km – 10 km) ✓SF = R95 + R5,45 × 25 km = R 231,25 ✓A Friend's charge = R250,00 ✓CA Ravi should use ABC transport because he would save R18,75 ✓✓J	1SF substitution 1A delivery charge 1CA choice 2J justification (5)	12.2.1

Question 5 [18 MARKS]			
Ques	**Solution**	**Explanation**	**AS**
5.1.1	Capacity = 2,5 m × 2,5 m × 2 m ✓SF = 12,5 m^3 ✓CA = 12,5 kℓ ✓C	1SF substitution 1CA computation 1C converting to kℓ (3)	12.3.1 12.3.2
5.1.2	65% of capacity = 0,65 of 12,5 kℓ = 8,125 kℓ ✓A Full output = 3,6 kℓ/hour $\frac{2}{3}$ of output = $\frac{2}{3}\times 3{,}6\,k\ell$/hour ✓M = 2,4 k$\ell$/hour ✓CA Time taken to fill 65% = $\frac{8{,}125\,k\ell}{2{,}4\,k\ell/hour}$ ✓M = 3,385… hours ✓CA = 3 hours + 0,385… × 60 min = 3 hours + 23,125 minutes = 3 h 24 min ✓CA	1A 65% of tank 1M multiplication 1CA operating output rate 1M finding time 1CA time in hours 1CA time in minutes and hours (6)	12.1.1 12.2.1 12.3.2
5.2.1	Daily water consumption ✓M ✓M = 40 × 90 ℓ + 20 × 50 ℓ + 30 × 50 ℓ + 50 × 5 ℓ = 6 350 ℓ ✓CA = 6,350 kℓ ✓C	2M substitution 1CA simplification 1C conversion (4)	12.2.1 12.3.1 12.3.2

Ques	Solution	Explanation	AS
5.2.2	Water needed for ten days = 6,35 kℓ × 10 ✓M = 63,5 kℓ = 63,5 m^3 ✓C 3,14 × $(radius)^2$ × 2 m = 63,5 m^3 ✓SF $(radius)^2 = \frac{63,5\,m^3}{3,14 \times 2\,m}$ $(radius)^2$ = 10,111… m^2 ✓CA radius = $\sqrt{10,111...m^2}$ radius = 3,17985…m radius = 3,18 m ✓CA	1M multiplication 1C conversion 1SF substitution 1CA simplification 1CA solution (5)	12.1.1 12.2.1 12.3.2

TOTAL: 150