



Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MATHEMATICAL LITERACY P2

PREPARATORY EXAMINATION

SEPTEMBER 2017

MARKS: 150

TIME: 3 hours

**This question paper consists of 11 pages, 2 Answer sheets and
an Addendum with 5 Annexures.**

INSTRUCTIONS AND INFORMATION

1. This question paper consists of **FOUR** questions. Answer **ALL** the questions.
2.
 - 2.1 Use the ANNEXURES in the ADDENDUM to answer the following questions:

ANNEXURE A for QUESTIONS 3.2 and 3.3
ANNEXURE B for QUESTIONS 3.4
ANNEXURE C for QUESTIONS 4.1
ANNEXURE D for QUESTIONS 4.1
ANNEXURE E for QUESTIONS 4.2
 - 2.2 Answer QUESTION 2.1.3 on the attached ANSWER SHEET1 and QUESTION 2.2.3 (a) on the attached ANSWER SHEET 2.
 - 2.3 Write your name in the spaces provided on the ANSWER SHEETS.
Hand in the ANSWER SHEETS with your ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Start **EACH** question on a **NEW** page.
5. An approved calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
6. **ALL** the calculations must be clearly shown.
7. Round off **ALL** final answers appropriately according to the given context unless stated otherwise.
8. Units of measurement must be indicated where applicable.
9. Maps and diagrams are NOT necessarily drawn to scale, unless stated otherwise.
10. Write neatly and legibly.

QUESTION 1

1.1

The recent drought has forced the government to impose water restrictions in all municipalities. Below is a water tariff structure for uMzinyathi District Municipality before water restrictions.

TABLE 1: Umzinyathi District Water Tariff Structure (With effect from 01 July 2014)

Residential (charged in a stepped tariff per kℓ)		Business and Industry (Flat rate per kℓ)
Consumption	Cost per kℓ (excluding VAT)	All consumption (per kℓ) = R 4,21
Up to 6 kℓ	R 0,00	
7 - 20 kℓ	R 4,03	
21 – 40 kℓ	R 4,11	
41 – 60 kℓ	R 4,19	
More than 60 kℓ	R 4,28	

Source: www.umzinyathi.gov.za

- 1.1.1 One of the car wash business paid R772,70 (including 14% VAT) for water used in a certain month. Determine how many kℓ of water they used. (4)
- 1.1.2 Give TWO possible reasons why residentials are charged in a stepped tariff not in a flat rate per kℓ as businesses. (4)
- 1.1.3 Some community members complained that this tariff structure favours the businesses. Is this true? Justify your answer by calculating the cost per litre paid by the family and the business for consuming 60 kℓ. (5)

1.2 Umzinyathi District Municipality has also amended its water tariff rates.

TABLE 2: Umzinyathi District Water Tariff Structure (Effective from 01 July 2016)

Residential (charged in a stepped tariff per kℓ)		Commercial (business) (Flat rate per kℓ)
Consumption	Cost per kℓ (including VAT)	All consumption (per kℓ) = R 8,78
Up to 6 kℓ	R6,75	
7 to 20 kℓ	R6,89	
21 to 40 kℓ	R8,78	
+ 40 kℓ	R10,45	

Source: www.umzinyathi.gov.za

- 1.2.1 Some people commented that the district is making money out of the poor people. Is this a fair comment? Justify your answer by referring to Table 1 and Table 2. (3)
- 1.2.2 Suggest a graphical representation that can be used to compare the two water tariff structures. Justify your choice. (3)

- 1.3 Lenyora Water purifies and sells water in 500ml, 1,5 litre and 5 litre bottles. The production costs (including water and the container) are as follows:

TABLE 3: Cost per Bottle

Size of container	Variable Unit cost for less than 3 000 bottles
500 mℓ	R2,20
1,5ℓ	R3,05
5ℓ	R11,50

- 1.3.1 The business pays a monthly fixed cost of R38 550. However, variable costs decrease by 9% if **more than** 3 000 bottles are made. The following is the equation that can be used to calculate monthly costs:

$$\text{Monthly Costs} = F + (c_1 \times k) + (c_2 \times m) + (c_3 \times p); \text{ where}$$

F = Fixed amount

c = variable cost per unit

k = Number of 500 mℓ

m = Number of 1,5ℓ

p = Number of 5ℓ

Use the above formula to calculate the monthly cost of making 25 000 (500mℓ), 5 000 (1,5ℓ) and 800 (5ℓ) bottles. (4)

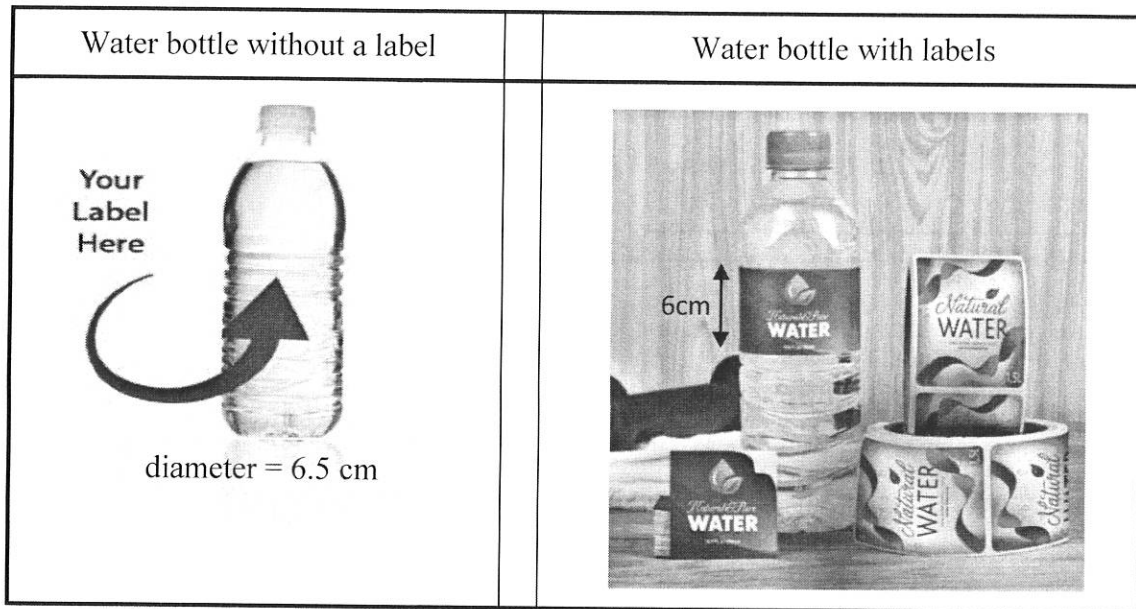
- 1.3.2 Lenyora Water produces 500 mℓ bottles in batches of 180 in 135 minutes. Calculate the number of 500 mℓ bottles that can be produced in 8 hours if workers take a break of 1 hour 15 minutes for tea and lunch. Assume that there were no disturbances during the production. (5)

- 1.3.3 On Monday (09 January 2017) they received an urgent order of 5 500 units of 500 mℓ bottles needed in 4 days time (Saturday, 14 January 2017).

- (a) Two 8-hour long shifts were used to produce this order. If the second shift ends at 22:00, at what time did the first shift start working. Show your workings. (3)

- (b) Lenyora Waters started producing water for this order with 1000 water bottles in stock but they failed to make the required balance. Verify the correctness of this statement by calculating how many bottles they made including those in stock. Show your workings. (5)

- 1.4 Customized labels can be wrapped around the water bottle. But to reduce costs, the label is not completely wrapped around the body of the bottle. The length of the label is the circumference of the bottle subtracting the length by which it is reduced. Rectangular label is 6 cm high and it costs 5 cents per cm^2 .



Calculate how much will be saved if the length of label for the above bottle is reduced by 8 cm and the cost of a complete label is R6,13.

You may use these formulae:

Circumference of the bottle = $\pi \times \text{diameter}$ where $\pi = 3,142$

Length of the label = Circumference of bottle – length to be reduced

Area of the label = length \times height of the label

(5)

[41]

QUESTION 2

2.1

Mr Dlamini is supplying the fresh water in an office building. Every morning the 20ℓ water bottles in the dispensers are replaced.

TABLE 4: Time taken and number of delivery workers

Delivery time (minutes)	35	29,16	25	19,44	15	11,67	B
Number of delivery workers	10	12	14	18	A	30	45

- 2.1.1 Write down a formula that can be used in completing Table 4. (3)
- 2.1.2 Use the formula in 2.1.1 or otherwise, to calculate the values of **A** and **B**. (4)
- 2.1.3 Use ANSWER SHEET 1 and Table 4 to draw a graph showing relationship between the number of delivery workers and the time taken to replace water in the dispensers. (5)
- 2.1.4 What type of relationship does this graph show? Justify your answer by referring to the graph. (3)

2.2 Mr Dlamini wants to buy a reliable car. He saw the following advert in the newspaper.

AUDI CAR DEALERS																				
WE' VE WON A SMILE																				
When it comes to customer satisfaction*, we're smiles ahead																				
Audi	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	77%
Sabura	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	76%
Toyota	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	76%
Honda	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	75%
Mazda	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	74%
Chrysler	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	73%
Chevrolet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	73%
Lexus	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	73%

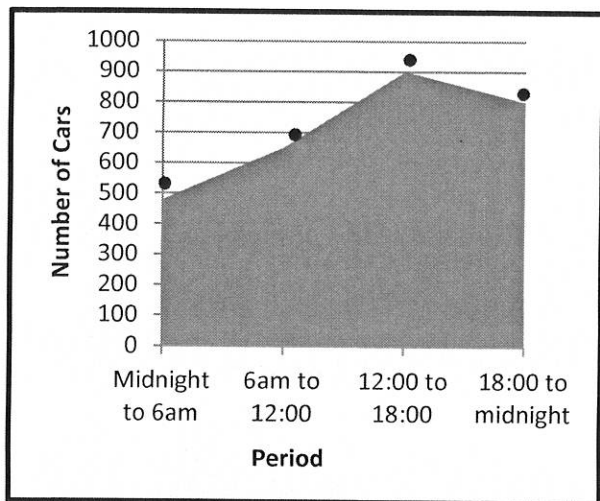
source:www.consumerreports.org/cars

- 2.2.1 Explain why this advert is misleading. (2)
- 2.2.2 Explain the aim of this advertisement. (2)
- 2.2.3 (a) Use ANSWER SHEET 2 to complete the vertical bar graph. (5)
- (b) Explain why the two graphs look so different regarding the length or height of the bars. (2)

2.3 A certain insurance company issued a pamphlet showing times in which cars are stolen and book values of stolen cars in a particular year.

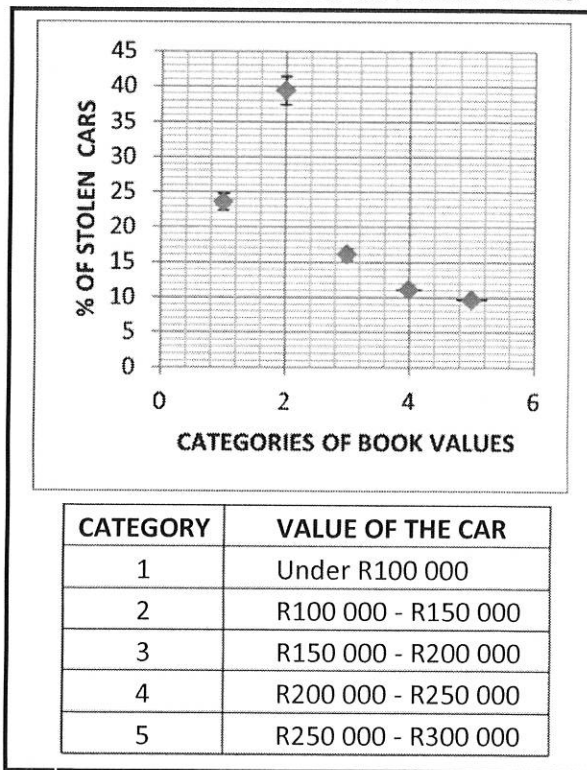
GRAPH 1

NUMBER OF CAR STOLEN DURING THE YEAR PER TIME PERIOD



GRAPH 2

BOOK VALUE OF STOLEN CARS



CATEGORY	VALUE OF THE CAR
1	Under R100 000
2	R100 000 - R150 000
3	R150 000 - R200 000
4	R200 000 - R250 000
5	R250 000 - R300 000

NOTE: Book value refers to present value of the car.

- 2.3.1 Which time of the day is less likely for a car to be stolen and what could the possible reason be? (2)
- 2.3.2 Calculate the mean number of cars stolen per month in the time period 18:00 to midnight. (2)
- 2.3.3 Refer to Graph 2 above which shows the percentage of stolen cars and their book values and answer the following questions.
 - (a) Identify the category of cars which do not follow the trend of this graph and provide the possible reason for this. (3)
 - (b) Suggest a possible reason why the cars with a value between R250 000 and R300 000 are the least stolen cars. (2)

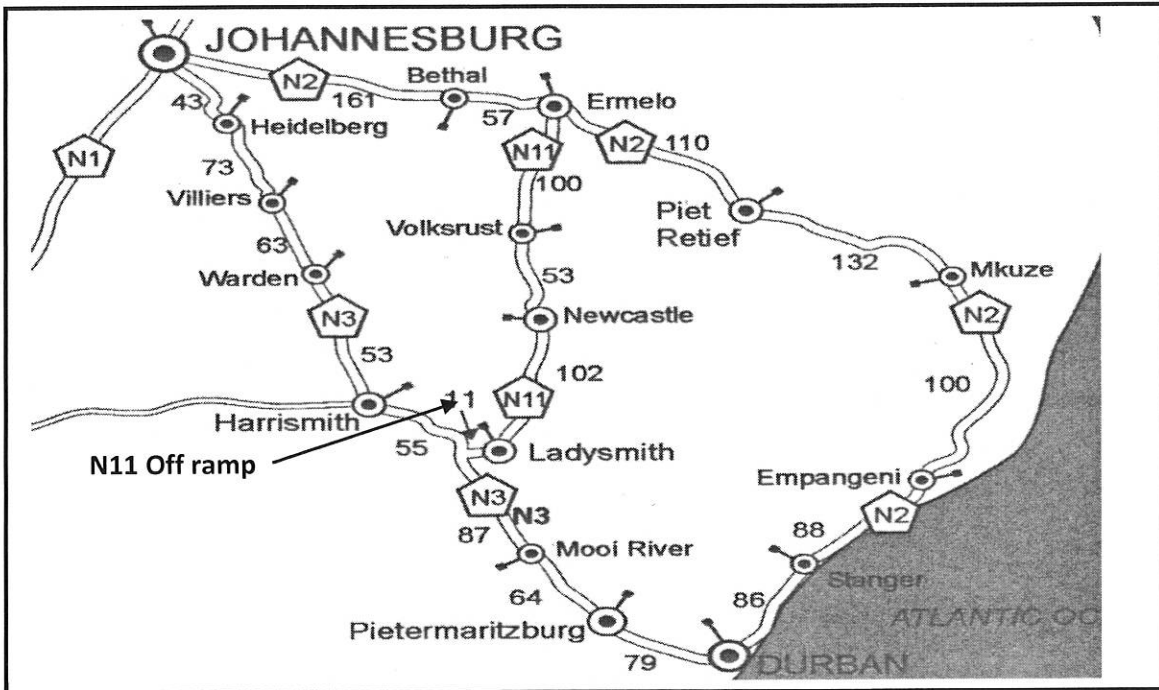
[35]

QUESTION 3

3.1

Marlon, is travelling on N11 from Ermelo to Cape Town. His friend was brought by car from Pietermaritzburg to meet him at the N11 off ramp. The following distance map shows the distances between towns and cities.

Distance Map between Durban and Johannesburg



source: [www, google.co.za](http://www.google.co.za)

- 3.1.1 (a) Calculate how many kilometers were travelled by Marlon from Ermelo to N3 (N11 off ramp) (2)
- (b) Hence, calculate the time at which he was going to arrive at the N11 off-ramp if he left Ermelo at 6:15 and drove at an average speed of 100 km/h. (4)
- 3.1.2 Marlon and his friend's cars were driven at different average speeds. Provide TWO possible reasons why their average speeds differ. (4)
- 3.1.3 If this map was drawn to a scale of $1 : 8\,000\,000$, what would be the map distance (in mm) between Newcastle and Ladysmith? Show your workings. (3)
- 3.1.4 The actual distance from Pietermaritzburg and Harrismith is 222 km. Marlon's colleague from Pietermaritzburg used a road map with number scale to calculate the actual distance. His calculations gave him 193 km. Provide a possible reason why these distances differ. (2)

- 3.2 After the budget speech Marlon used the summary of 2017/18 budget (**in ANNEXURE A**) to analyze the budget for his newspaper.
- 3.2.1 Calculate the amount (in Rands) by which the state revenue increased from 2014/2015 to 2017/2018 financial year. (3)
- 3.2.2 Show how percentage of GDP of 29,2% was calculated for the revenue at the medium term-estimates for 2017/18. (2)
- 3.2.3 One of the journalist commented that the country's deficit is from bad to worse. Does the estimated budget balance indicated in Annexure A justify this comment? Explain your answer. (2)
- NOTE: Deficit is the amount spent that is more than the income generated.**
- 3.3 In 2016 there were strikes in almost all institutions for higher education (post school education and training) started by “#Fees Must Fall Campaign” and demanding the state to pay 100% of their fees. Use ANNEXURE A to answer the following questions.
- 3.3.1 Compare the percentage increase from 2015/2016 to 2017/2018 financial years to verify whether this year's budget for Post-school education and training was influenced by the campaign. (5)
- 3.3.2 Identify the function in 2017/2018 that has the greatest average annual growth and calculate the growth in Rands. (3)
- 3.4 After the trip, Marlon decided to do a research about fees of toll gates in South Africa. **ANNEXURE B** shows one of the tables he got from the internet.
- 3.4.1 The mean cost for Class 1 cars in N1 is R30,17. Compare it with the mean for same class in N3 to determine the road with expensive toll gate fees. (4)
- 3.4.2 Which measure of central tendency (between the mean and the median), can be used by motorists to budget for toll fees? (3)
- [37]

QUESTION 4

4.1

ANNEXURE C is a salary advice showing Koos de Bruyn's monthly salary and deductions for March 2017. Koos de Bruyn is 50 years old. **Income tax** is calculated using the tax brackets as in shown in ANNEXURE D.

Taxable income is the annual gross salary less pension or GEPF contribution in government employees. Pension fund contribution (**GEPF**) is 7,5% of the basic salary or R1 750, whichever is higher.)

NOTE: Income Tax is calculated on taxable income.

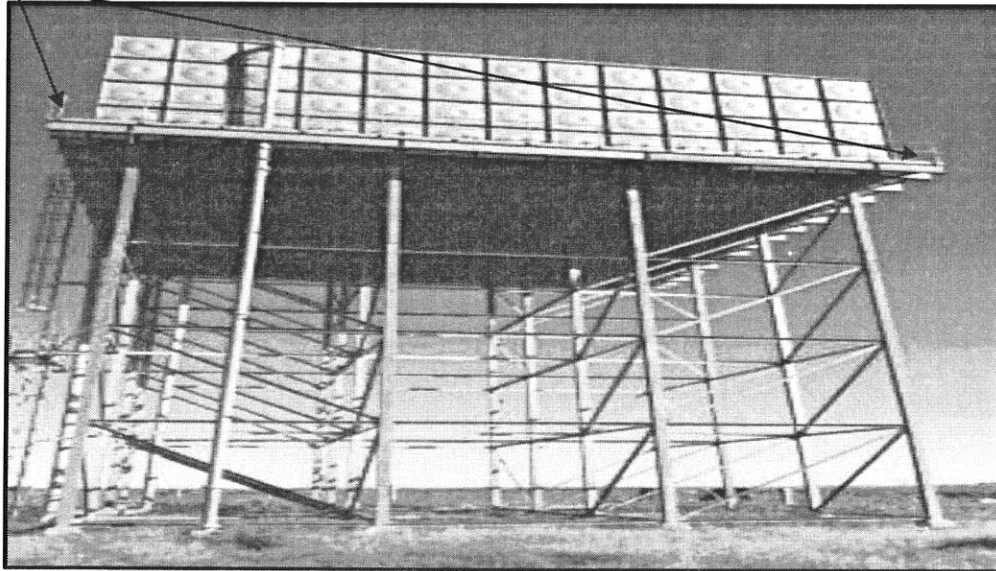
Use ANNEXURE C and ANNEXURE D to answer the following questions.

- 4.1.1 Calculate the annual taxable income of this employee. (3)
- 4.1.2 This employee has 4 medical aid dependants as indicated in ANNEXURE C. Show how the **medical tax credit** of R1 148 indicated in the Salary Advice was calculated. (3)
- 4.1.3 Use ANNEXURE D and taxable income calculated in 4.1.1 to calculate the monthly income tax to be paid by this employee (6)
- 4.1.4 Calculate Koos de Bruyn's take home salary (that is the amount after all the deductions are made) . (3)
- 4.2 The seat layout of Kings Park Stadium is shown in ANNEXURE E. Seat numbers are a combination of alphabets and numbers , for example A59, D87. If all 26 alphabets have been used, they are doubled , for example , AA or BB or FF
Use ANNEXURE E to answer the following questions.
- 4.2.1 The numbers in Block 33 start from A64 up to GG94. Refer to the Block 33 seat layout in ANNEXURE E and determine the total number of seats in this Block. (2)
- 4.2.2 Koos and his friend are seated in Block 33. Determine the probability that Koos' s seat is between A64 and A76. Express your answer as decimal fraction. (3)
- 4.2.3 Does the probability calculated in 4.2.2 indicate that it is **less likely, likely** or **more likely** that Koos was seated in one of these seats. Explain your answer. (3)
- 4.2.4 Koos entry ticket costs less than tickets for seats near the players entrance/exit tunnel. Suggest TWO reasons why ticket prices for these stands differ. (4)

- 4.3 Koos has a square based water tank. He pumps water into the tank to use at a later stage.

Guard Rails

Elevated water tank



The height of the water tank 1,5 m and its width is 3,5 m.

- 4.3.1 Determine the capacity (in kℓ) of this tank.

You may use this formula:

Volume of square base prism = side² × height

NOTE: 1 m³ = 1 kℓ (3)

- 4.3.2 The pump can supply water at a rate of 4,1 kℓ per hour. Determine how long (in hours, minutes and seconds) can the pump fill the tank up to three quarters full. (4)

- 4.3.3 The guard rail was to be erected around the tank. It must be exactly 1m away from the tank. Determine the length of the guard rail required for this tank.

You may use this formula: **Perimeter of a square = 4 × side** (3)
[37]

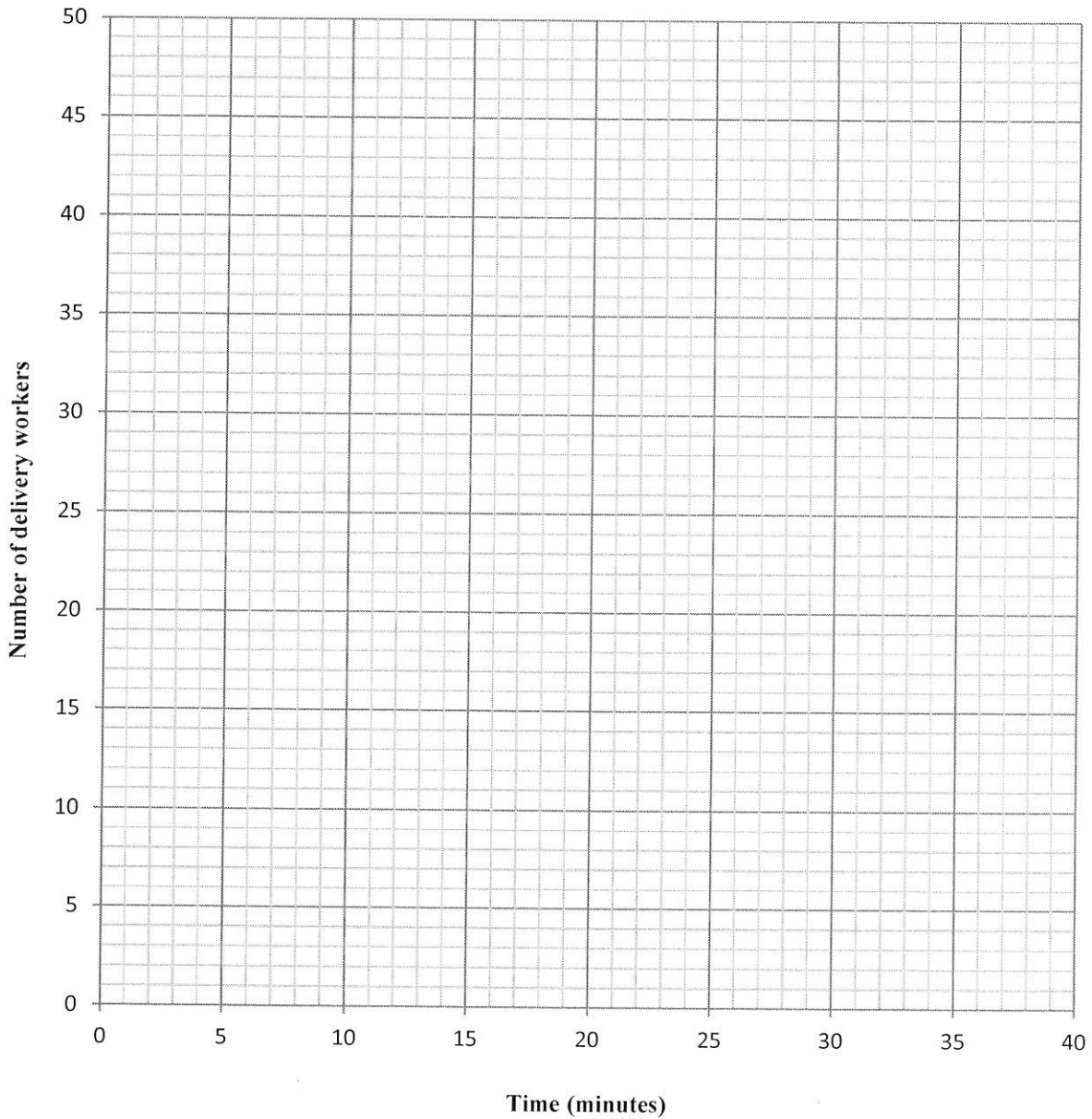
TOTAL: 150

ANSWER SHEET 1

NAME:

Question 2.1.3

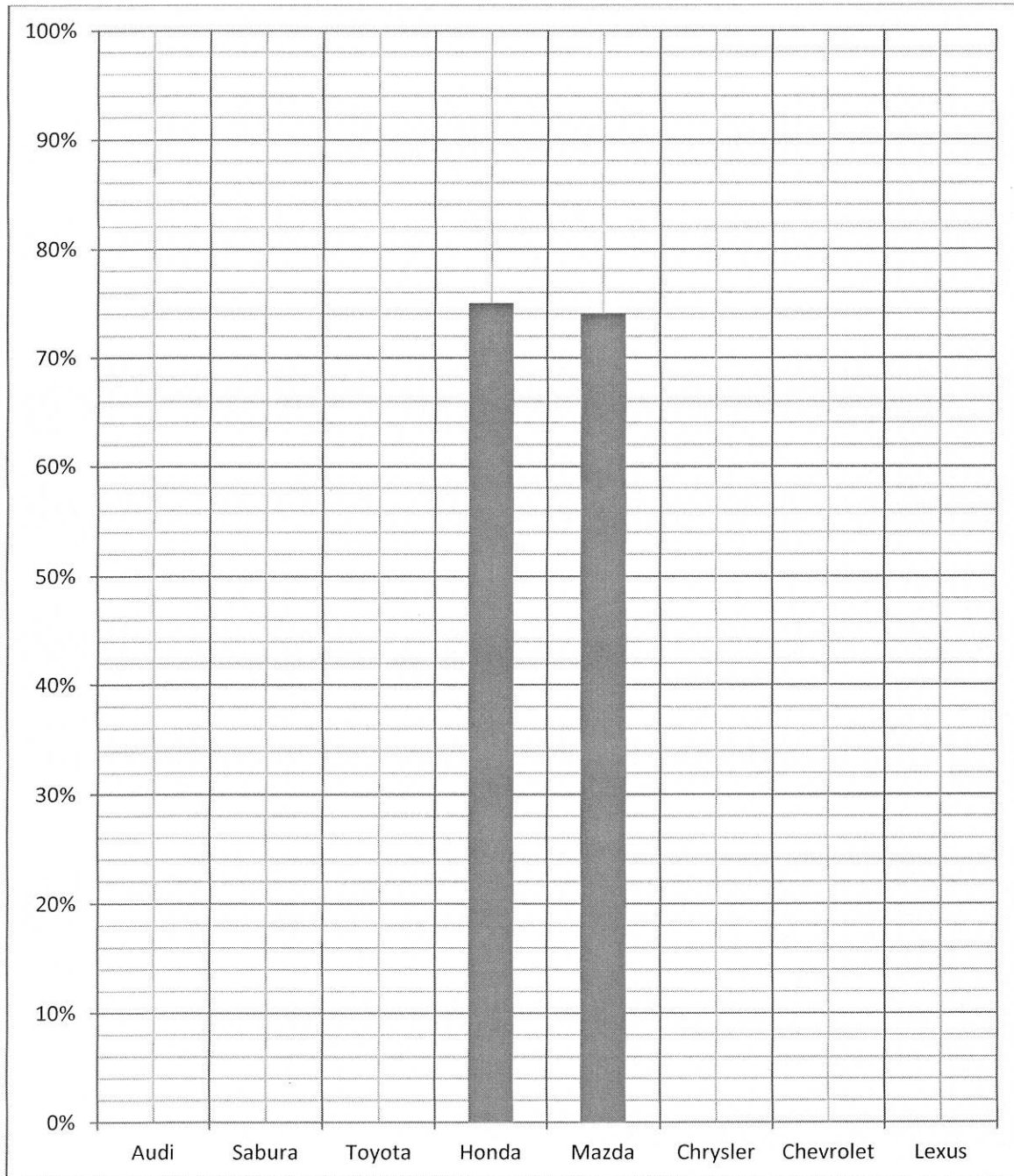
Relationship between the time taken and the number of delivery workers

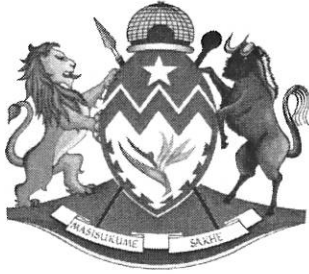


ANSWEER SHEET 2

NAME:

Question 2.2.3 (a)





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ADDENDUM

SEPTEMBER 2017

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GRADE 12

This Addendum consists of 6 pages with 5 Annexures.

ANNEXURE A

QUESTION 3.2

CONSOLIDATED GOVERNMENT FISCAL FRAMEWORK				
	2014/15	2015/16	2016/17	2017/18
R billion/percentage of GDP	Revised estimate	Medium-Term Estimates		
Revenue	1 091.0	1 188.9	1 331.5	1 439.5
Percentage of GDP	28.1%	28.4%	29.3%	29.2%
Expenditure	1 243.4	1 351.0	1 448.8	1 561.7
Percentage of GDP	32.0%	32.2%	31.9%	31.7%
Budget balance	-152.4	-162.2	-117.3	-122.2
Percentage of GDP	-3.9%	-3.9%	-2.6%	-2.5%
Gross domestic product	3 879.9	4 191.8	4 538.8	4 926.1

CONSOLIDATED GOVERNMENT EXPENDITURE BY FUNCTION, 2014/15 – 2017/18					
	2014/15	2015/16	2016/17	2017/18	2014/15–2017/18
R billion	Revised estimate	Medium-term estimates			Average annual growth
Basic education	189.5	203.5	216.0	227.8	6.3%
Health	144.6	157.3	167.5	177.5	7.1%
Defence, public order and safety	163.0	171.2	181.2	192.7	5.7%
Post-school education and training	56.6	62.2	65.6	69.6	7.1%
Economic affairs	189.4	206.2	219.5	225.5	6.0%
Local development and social infrastructure	176.6	199.6	210.2	223.8	8.2%
General public services	64.7	64.4	66.8	69.8	2.6%
Social protection	143.9	155.3	166.0	176.5	7.0%
Debt-service costs	115.0	126.4	141.0	153.4	
Unallocated reserves	–	5.0	15.0	45.0	
Consolidated expenditure	1 243.4	1 351.0	1 448.8	1 561.7	7.9%

Source: noreply@sanlam.co.za

ANNEXURE B

QUESTION 3.4

**N3 TOLL ROAD TARIFFS
(Effective 3 March 2017)**

N3 JOHANNESBURG – DURBAN			Operator	Class I	Class II	Class III	Class IV
De Hoek	Main line	Heidelberg – Villiers	N3Toll	R44,00	R69,00	R105,00	R152,00
Wilge	Main line	Villiers – Warden	N3 Toll	R62,00	R106,00	R142,00	R201,00
Tugela	Main line	Warden – Frere	N3 Toll	R66,00	R109,00	R171,00	R237,00
Tugela East	Ramp	Harrismith – Ladysmith	N3 Toll	R41,00	R68,00	R10,00	R139,00
Bergville	Ramp	Ladysmith – Escourt	N3 Toll	R20,00	R23,00	R43,00	R66,00
Mooi River	Main line	Frere – Cedara	N3 Toll	R46,00	R113,00	R158,00	R214,00
Mariannhill	Mainline	Key Ridge – Paradise Valley	SANRAL	R11,00	R19,00	R24,00	R37,00

**N1 TOLL ROAD TARIFFS
(Effective 3 March 2017)**

N1: JOHANNESBURG – CAPE TOWN			Operator	Class I	Class II	Class III	Class IV
Grasmere	Main line	Armadale – Louisrus	SANRAL	R18,00	R54,00	R63,00	R82,00
	S ramp	Grasmere – Louisrus	SANRAL	R9,00	R27,00	R32,00	R41,00
	N ramp	Grasmere – Armadale	SANRAL	R9,00	R27,00	R32,00	R41,00
Vaal	Main line	Louisrus – Kroonstad	SANRAL	R58,00	R112,00	R135,00	R180,00
Verkeerdevlei	Main line	Kroonstad – Bloemfontein	SANRAL	R51,50	R103,00	R154,00	R216,00
Huguenot	Main line	Rawsonville – Paarl	SANRAL	R35,50	R99,00	R154,00	R250,00

Source: www.foresightpublications.co.za

ANNEXURE C

QUESTION 4.1.1- 4.1.3

SALARY ADVICE										
Tax Number		Tax Status		Medical Tax Credits		Number of Medical Dependents		Pension Number		Notch
772079216				1 148,00		A = 2 C = 3		96922830		342 753
Leave Credits:			Capped Leave							Sick Leave
			89,00							0.00
Earnings						Deductions				
Item	Description	Arrears	Amount	Item	Description	Reference	Arrears	Balance	Amount	
0001	Basic Salary		28 562,75	0001	Tax RSA	077077216			...	
				0002	GEPF	96622530			...	
					Employer					
				0005	GEMS	00104191			3 876,00	
					Employer					
				0010	Member's fee					
				0010	Sanlam Sky	HS81060571			258,93	
				0010	Regent Life	15490338			390,53	
				0011	Old Mutual	6331125			261,00	
				0192	Old Mutual	00903664			195,00	
				0192	Sadtu	103976			74,00	
				0201	SACE	62107565			10,00	
				0202	ELRC	72055650			5,00	
					ABSA Lifco	42107565			198,00	
					PSBSC				1,18	

Source: adapted from Kwazulu-Natal DOE Payslip

ANNEXURE D**QUESTION 4.1.4****RATES OF TAX FOR INDIVIDUALS****2017 tax year (1 March 2017 – 28 February 2018)**

Taxable income (R)	Rates of tax (R)
0 – 189 880	18% of taxable income
189 881 – 296 540	34 178 + 26% of taxable income above 189 880
296 541 – 410 460	61 910 + 31% of taxable income above 296 540
410 461 – 555 600	97 225 + 36% of taxable income above 410 460
555 601 – 708 310	149 475 + 39% of taxable income above 555 600
708 311 – 1 500 000	209 032 + 41% of taxable income above 708 310
1 500 001 and above	533 625 + 45% of taxable income above 1 500 000

Tax Rebates

Tax Rebate	Tax Year				
	2018	2017	2016	2015	2014
Primary	R13 635	R13 500	R13 257	R12 726	R12 080
Secondary (65 and older)	R7 479	R7 407	R7 407	R7 110	R6 750
Tertiary (75 and older)	R2 493	R2 466	R2 466	R2 367	R2 250

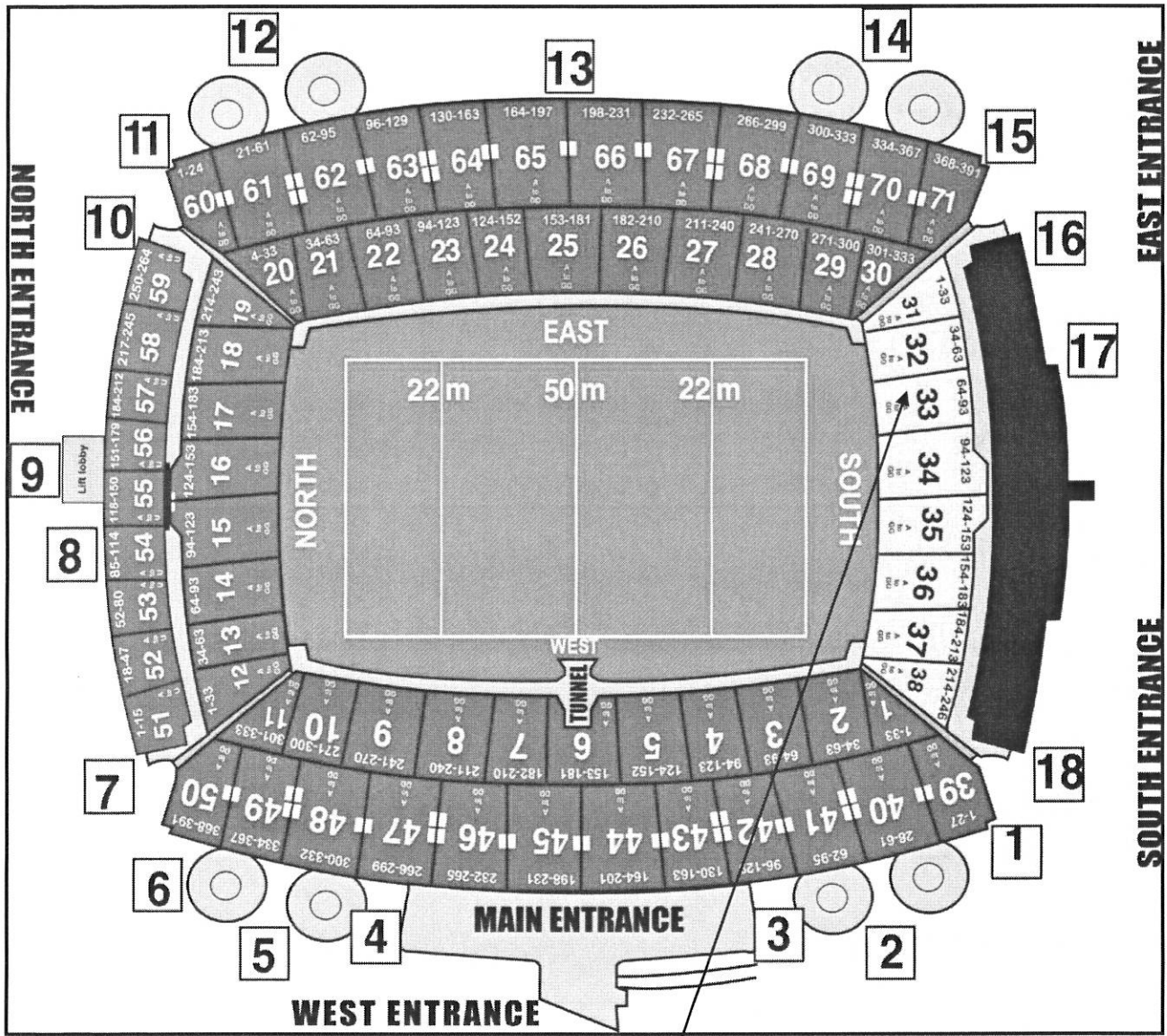
Medical Tax Credit Rates

Per month (R)	2018	2017	2016	2015	2014
For the taxpayer who paid the medical scheme contributions	R303	R286	R270	R257	R242
For the first dependant	R303	R286	R270	R257	R242
For each additional dependant(s)	R204	R192	R181	R172	R162

<http://www.sars.gov.za>

ANNEXURE E

QUESTION 4.2



source: www.google.co.za/seating plan

Seat Layout of Block 33

	A	B	C	....	EE	FF	GG
Seat numbers	64	64	64	....	93	93	93
	65	65	65	....	65	65	65
	66	66	66	....	66	66	66

	91	91	91	91	91	91
	92	92	92	92	92	92
	93	93	93	93	93	93

Row number A is nearest to the field



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MARKING GUIDELINES

SEPTEMBER 2017

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MARKS: 150

SYMBOL	EXPLANATION
A	Accuracy
C	Conversion
CA	Consistent accuracy
E	Explanation deriving a formula
F	Justification
M	Method
MA	Method with accuracy
NPR	No Penalty for Rounding
O	Opinion/ reason/deduction/example
AO	Answer Only full Marks
P	Penalty e.g. for no units, incorrect rounding
R	Rounding off
RT/RG/RD	Reading from a table/ graph/ diagram
S	Simplification
SF	Correct substitution in a formula

This marking guidelines consists of 17 pages.

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Please Turn Over

QUESTION 1 [41 MARKS]

Ques.	Solution	Explanation	T / L
1.1.1	$\text{Cost/ k\text{€}} (\text{including VAT}) = R4,21 + \frac{14}{100} \times R4,21 \checkmark \text{MA}$ $= R4,7994 \checkmark \text{S}$ $\therefore \text{No. of k\text{€}} = \frac{R772,70}{R4,7994} \checkmark \text{M}$ $= 160,999 \text{ k\text{€}}$ $\approx 161 \text{ k\text{€}} \checkmark \text{A}$ <p style="text-align: center;">OR</p> $\text{Total Cost (excl. VAT)} = R772,70 - \frac{14}{114} \times R772,70 \checkmark \text{MA}$ $= R677,807 \checkmark \text{S}$ $\therefore \text{No. of k\text{€}} = \frac{R677,807}{R4,21} \checkmark \text{M}$ $= 160,999 \text{ k\text{€}}$ $\approx 161 \text{ k\text{€}} \checkmark \text{A}$ <p style="text-align: center;">OR</p> $\text{No. of k\text{€}} = \frac{R772,70}{1,14} \checkmark \text{M}$ $= R677,807 \checkmark \text{S}$ $= \frac{R677,807}{R4,21} \checkmark \text{M}$ $= 160,999 \text{ k\text{€}}$ $\approx 161 \text{ k\text{€}} \checkmark \text{A}$	IMA Adding VAT to cost per k€ IS Simplification IM Dividing total cost by cost per k€ (incl. VAT) 1A No. of k€ <p style="text-align: center;">OR</p> IMA Subtracting VAT IS Simplification IM Dividing total cost by cost per k€ (incl. VAT) 1A Number of k€ IM Dividing by 1,14 IS Simplification IM Dividing by R4,21 1A Number of k€ Accept 183,54 k€ NPR 20X 2 Reasoning (4)	F L2
1.1.2	To discourage people from using more water. ✓✓ O To enable the poor to get clean water. ✓✓ O <p style="text-align: center;">OR</p> Any other valid reason.	1A Number of k€ Accept 183,54 k€ NPR 20X 2 Reasoning (4)	F L4

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1.1.3	Cost for the family = $14k\text{€} \times R4,03 + 20k\text{€} \times R4,11 + 20k\text{€} \times R4,19$ ✓MA = $R56,42 + R82,20 + R83,80$ = $R222,42(\text{excl.})$ ✓CA ✓MA ∴ Cost per litre: $R222,42(\text{excl.}) \div 60000 = R0,003407$ Cost for the business = $60k\text{€} \times R4,21$ = $R252,60(\text{excl.})$ ✓A ∴ Cost per litre: $R252,60(\text{excl.}) \div 60000 = R0,00421$ No, the tariff structure favours the family ✓CA	IMA Multiplying k€ by correct unit price ICA Simplification IMA Dividing by 60000 Litres IA Cost for business ICA reason (5)	F L4
1.2.1	Yes ✓A According to the new tariff structure there is no free water. ✓✓J	IA Yes 2J Justification (3)	F L4
1.2.2	Bar graph. ✓A The height of bars will show a clear difference between costs of these water tariff structures. ✓✓J OR Pie Chart. ✓A Pie charts can show clearly which tariff structure has bigger pieces ✓✓J	IA Bar or Pie Graph 2J Justification stating sizes (3)	DH L4
1.3.1	Monthly costs = $F + (c \times k) + (c \times m) + (c \times p)$ = $R38\,550 + (R2,00 \times 25\,000) + (R2,78 \times 5\,000) + (R11,50 \times 800)$ ✓SF ✓A = $R38\,550 + R50\,000 + 13\,900 + R9\,200$ ✓S = $R111\,650$ ✓CA	ISF Correct substitution to a formula IA % reduction of R2,20 and R3,05 IS Simplification ICA Monthly cost (4)	F L2

1.3.2	No of hours = (8 hours – 1,25 hours) ✓MA Number of batches = $6,75 \text{ hours} \div 2,25 \text{ hours}$ ✓M = 3 ✓S ✓MA ∴ There are 3×180 bottles = 540 bottles ✓CA OR Minutes per day = 8×60 minutes = 480 minutes (day) ✓C = $480 - 75$ minutes (breaks) ✓MA 405 minutes – 135 minutes (Batch 1) ✓M 270 minutes – 135 minutes (Batch 2) 135 minutes – 135 minutes (Batch 3) ✓MA ∴ There are 3×180 bottles = 540 bottles ✓CA OR Minutes per day = 8×60 minutes = 480 minutes (day) ✓C = $480 - 75$ minutes (breaks) ✓MA = 405 minutes = $\frac{405}{135}$ ✓M = 3 ✓S ✓MA ∴ There are 3×180 bottles = 540 bottles ✓CA	IMA Subtracting break times from 8 hrs IM Dividing by 2,25 hrs IS Simplification IMA Multiplying 180 x 3 ICA 540 bottles OR IC Converting hours to Minutes IMA Subtracting break times from 480 minutes IM Subtracting batch times from 405 IMA Multiplying 180 x 3 ICA 540 bottles OR IC Converting hours to Minutes IMA Subtracting break times from 480 minutes IM Dividing 405 by 135 IS Simplification ICA 540 bottles (5)	M L3
1.3.3 (a)	Starting Time = $22:00 - (8 \text{ hrs} \times 2)$ = $06:00$ ✓A ✓MA ✓A OR Starting Time = $22:00 - 16$ hours = $06:00$ ✓A ✓MA ✓A OR Starting time (for second shift) = $22:00 - 8$ hours ✓MA = $14:00$ ✓A Starting time (for first shift) = $14:00 - 8$ hours = $06:00$ ✓A	IMA Subtracting 16 hours from 22:00 IA Total hours IA Answer OR IMA Subtracting 16 hours from 22:00 IA Total hours IA Answer OR IMA Subtracting 16 hours from 22:00 IA Total hours IA Answer (3)	L2

1.3.3 (b)	<p>\checkmarkMA No of bottles = 540×2 shifts $\times 4$ days = $4\,320 + 1\,000$ bottles \checkmarkCA</p> <p>They are not going to make the required balance since they will be short of 180 bottles \checkmarkJ</p> <p>OR</p> <p>Day 1 = $(2 \text{ shifts}) 540 \times 2$ \checkmarkMA = 1 080 bottles \checkmarkMA</p> <p>No. of bottles = $(1\,080 \times 4) + 1\,000$ = 5 340 bottles \checkmarkCA</p> <p>They are not going to make the required balance since they will be short of 180 bottles \checkmarkJ</p>	<p>IMA Multiplying 540 by 2 shifts IMA Multiplying by 4 days ICA Bottles produced</p> <p>2J Not making it</p> <p>OR</p> <p>IMA Multiplying 540 by 2 shifts IMA Multiplying by 4 days ICA Bottles produced</p> <p>2J Not making it</p>	L4 M
	<p>OR</p> <p>Day 1 = 540×2 (shifts) \checkmarkMA = 1080 bottles</p> <p>Day 2 = 540×2 (shifts) = 1080 bottles</p> <p>Day 3 = 540×2 (shifts) = 1080 bottles</p> <p>Day 4 = 540×2 (shifts) = 1080 bottles</p> <p>No of bottles = $1\,080 + 1\,080 + 1\,080 + 1\,080$ + 1 000 (in stock) \checkmarkMA = 5 320 bottles \checkmarkCA</p> <p>They are not going to make the required balance since they will be short of 180 bottles \checkmarkJ</p>	<p>IMA Multiplying by 2 shifts</p> <p>OR</p> <p>IMA Adding all bottles ICA Bottles produced</p> <p>2J Not making it (5)</p>	

1.4	<p>Circumference = $\pi \times$ diameter = $3,142 \times 6,5$cm = 20,423 cm \checkmarkMA</p> <p>Length of label = $(20,423 - 8)$ cm \checkmarkM = 12,423 cm</p> <p>Area of label = $12,423$ cm \times 6 cm = 74,538 cm² \checkmarkCA</p> <p>Cost of label = $74,538 \times R0,05$ \checkmarkM = R3,73</p> <p>Amount saved = $R6,13 - R3,73$ = R2,40 \checkmarkCA</p>	<p>IMA circumference</p> <p>IM Subtracting 8cm</p> <p>ICA Area of the label</p> <p>IM Multiplying the length by cost of label</p> <p>ICA Saved amount (5)</p>	[41]
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QUESTION 2 [35 MARKS]

Ques.	Solution	Explanation	T / L
2.1.1	$\checkmark F$ $\text{Delivery workers} = \frac{350}{\text{deliverytime}} \checkmark F$	IF Time in minutes IF Correct Constant value IF Dividing by the number of workers (3)	M L2
2.1.2	$A = \frac{350}{\text{deliverytime}}$ $= \frac{350}{15}$ $A = 23,3 \checkmark CA$ $= 24 \checkmark R$ $B = \frac{350}{\text{no. of workers}}$ $B = \frac{350}{45} \checkmark M$ $B = 7,7 \text{minutes} \checkmark A$	1CA Value of A IR Rounding 1M Dividing by 45 1A Value of B (4)	M L2
2.1.3	"Graph Paper"	1A Smooth Curve 1A Starting point 2A Any other 2 correct points 1A Ending point (5)	M L2
2.1.4	$\checkmark A$ Inverse proportion / indirect proportion because when the number of delivery workers increase the time taken decreases proportionally or vice versa	1A Inverse / indirect proportion 2O Decrease of time and increase of workers (3)	M L4
2.2.1	It shows a big difference between 77% and 73% as if there are many units between these numbers. $\checkmark O$ OR A percent is represented by 3 stars as a result it creates a big difference between 77 and 73. $\checkmark O$	2O Showing a big difference (2)	DH L4

2.2.2	To show that customers are very happy about Audi cars dealers. $\checkmark O$ OR To depict a picture showing that Audi are bought by many people as compared to other cars. $\checkmark O$ OR To convince customers that Audi cars are bought by many people. $\checkmark O$ OR Any other valid point	2O Answer must show more people about "own cars" DH L4
2.2.3 (a)	"Graph Paper"	1A Complete correct graph 2A Correct 1st 3 bars 2A Correct last 3 bars (5)
2.2.3 (b)	The height of the bars shows a little difference between the highest and lowest car dealer whereas the horizontal graph shows a big difference $\checkmark O$	2O DH L4
2.3.1	Midnight to 6am $\checkmark A$ Most cars are locked in safe places $\checkmark O$ OR Most cars are parked in safe places $\checkmark O$ OR Any other valid reason	1A Midnight to 6am 1O Reason M L4
2.3.2	$\text{Mean} = \frac{800}{12} \checkmark RG$ $= 66,67$ $\approx 67 \text{ cars} \checkmark A$	1RG Reading 800 from the graph 1A Answer (2) DH L2

	1A 2A	Category 1 Reason	DH L3
2.3.3 (a)	Category 1 or Under R100 000 ✓ Most of these cars are not in good condition and therefore they are not attractive to thieves ✓ OR They are usually old cars and their parts are not on demand ✓ OR Any other valid point	(3)	
(b)	May be there are very few cars that cost this money ✓ OR The cars in this category have high security systems ✓ OR There are few potential buyers for these cars. ✓ OR Any other valid reason	Reason 20 x (2)	DH L4
		[35]	

QUESTION 3 [31 Marks]

Ques.	Solution	Explanation	T / L
3.1.1 (a)	Total Distance = 100 km + 53 km + 102 km + 11 km ✓ = 266 km ✓ 100 km = 1 hour 266 km = hours	IMA Adding correct values 1A Answer Accept 255 km (2)	MP L2
3.1.1 (b)	Hours = $\frac{266}{100}$ ✓ = 2,66 hours ✓ = 2 hours 40 minutes ∴ Arrival time = 6:15 + 2 hours 40 minutes ✓ = 08:55 ✓ OR The road conditions are not the same ✓ OR The cars they are driving are not the same ✓ OR There was traffic in one of the roads ✓ OR Any other valid reason	IMA Dividing correct values IS Simplification IM Adding departing and travelling time ICA Arrival time Accept 08:48 (4) 20 x 2 Reasons	MP L
3.1.1.2			MP L4
3.1.3	Map distance = 102 km 1 = 8 000 000 Map distance = $\frac{102000000}{8000000}$ ✓ = 12,75 mm ✓ Any other valid reason	IM Dividing actual distance by 8 000 000 IC Converting km to mm 1A Map distance NPR (3)	MP L3

3.3.2	Local Development and Social Infrastructure ✓RT Increase = 223,8 – 176,6 ✓MA = R47,2 billion ✓CA OR Local Development and Social Infrastructure ✓RT Increase = 223 800 000 000 – 176 600 000 000 ✓MA = R47 200 000 000 ✓CA	IRT Local Development IMA Subtracting correct values ICA Difference OR IRT Local Development IMA Subtracting correct values ICA Difference (3)	DH L2
3.4.1	Mean (N3) = $\frac{\checkmark\text{MA}}{7} = \frac{R44 + R62 + R66 + R41 + R20 + R46 + R11}{7} = R41,43 \checkmark\text{A}$ The mean on N3 is R41,43 and is more than the mean R30,17 for N1 and therefore N3 toll gates are expensive ✓O	IMA Adding correct values IM Dividing by 7 IA Answer IO Comparing (4)	DH L3
3.4.2	Mean ✓✓✓A	3A Mean (3)	DH L3
		[37]	

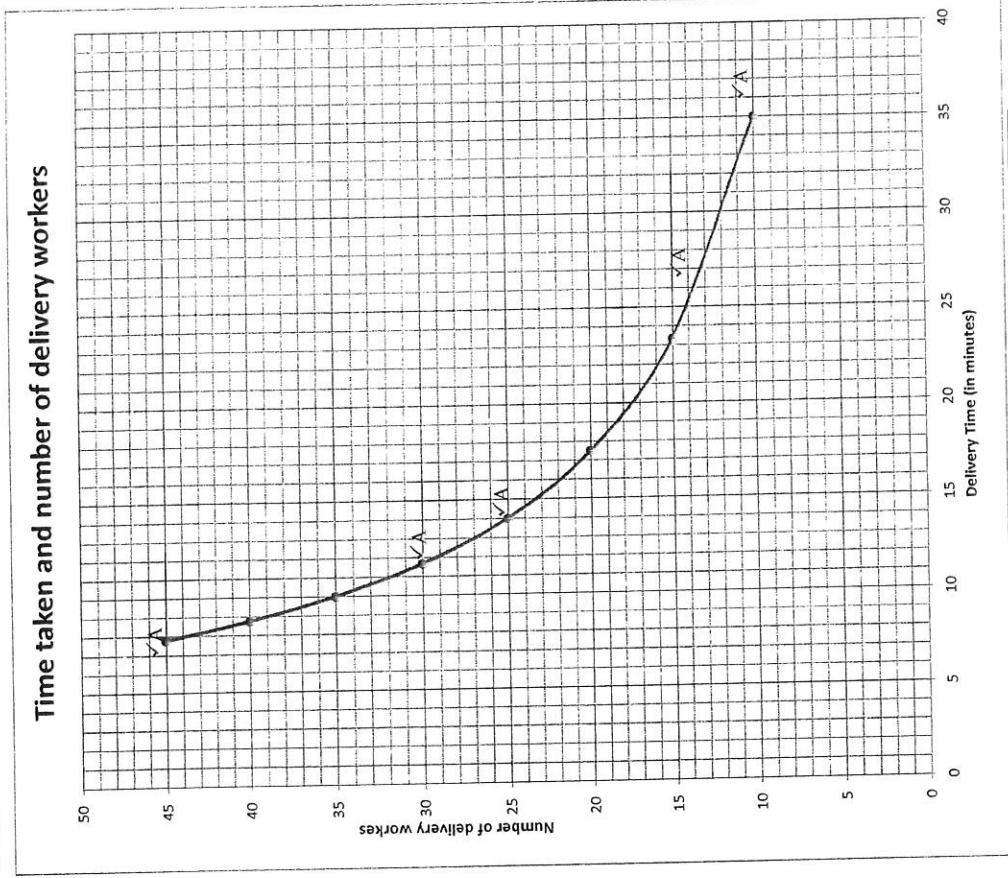
3.1.4	<ul style="list-style-type: none"> The road is not straight as indicated on the map. ✓✓O OR The map size might have changed but number scale was not changed. ✓✓O OR Distance indicated in the map are estimates not actual distances. ✓✓O OR Any other valid point 	20 Valid opinion include roads not being straight/ number scale/estimated distances (2)	MP L4
3.2.1	Revenue = R1 439,5 – R1 091,0 ✓MA = R348,5 billion ✓✓A	IMA Subtracting 2015 from 2017 budget increase IA answer IA indicating billions in words or figures (3)	F L3
3.2.2	$\% \text{ GDP} = \frac{\checkmark\text{MA}}{49261} \times 100\% = 29,2\%$	IMA Dividing correct values IM % concept (2)	F L3
3.2.3	Yes it is true, the budget balance has been increasing from 2014 up to 2018 except in 2016/17 ✓✓O	2 O Reason indicating increase of deficit (2)	DH L4
3.3.1	% Increase (2015/16 to 2016/17) $\% \text{ Increase} = \frac{65,6 - 62,2}{62,2} \times 100\% = 5,5\% \checkmark\text{A}$ % Increase (2016/17 to 2017/18) $\% \text{ Increase} = \frac{69,6 - 65,6}{65,6} \times 100\% = 6,1\% \checkmark\text{A}$ No ✓CA the budget was not influenced by the campaign because campaign demanded 100% subsidy but the increase is only 0,6%. ✓J	IMA % increase IA Answer IA Answer ICA For No IJ Valid Justification (5)	DH L4

QUESTION 4 [35 MARKS]

Ques.	Solution	Explanation	T / L
4.1.1	$\begin{aligned} \text{Taxable income} &= R342\,753 - (7,5\% \text{ of } R342\,753) \checkmark M \\ &= R317\,046,53 \checkmark CA \\ \text{OR } \checkmark MA \\ \text{Taxable income} &= (R28\,562,75 \times 12) - (7,5\% \times R28\,562,75 \times 12) \\ &= R342\,753 - (7,5\% \times R342\,753) \checkmark M \\ &= R317\,046,53 \checkmark CA \end{aligned}$	IMA Subtracting Pension IM Finding pension ICA Taxable income OR IMA Subtracting Pension IM Finding pension ICA Taxable income AO (3)	F L3
4.1.2	$\begin{aligned} \text{Medical Tax credit} &= (R286 \times 2) + (R192 \times 3) \\ &= R572 + R576 \checkmark M \\ &= R1\,148 \\ \text{OR} \\ \checkmark MA \quad \checkmark M \quad \checkmark MA \\ \text{Medical Tax credit} &= R286 + R286 + (192 \times 3) \\ &= R1\,148 \\ \text{OR} \\ \checkmark MA \quad \checkmark MA \\ \text{Medical Tax credit} &= R572 + R576 \checkmark M \\ &= R1\,148 \end{aligned}$	IMA Multiplying R286 by 2 IMA Multiplying R192 by 3 IM Adding contributions OR IMA Adding contributions of main member and the first dependent IMA Multiplying R192 by 3 IM Adding contributions OR 2MA Adding R572 and R576 IM Adding contributions (3)	F L3
4.1.3	$\begin{aligned} \text{Income tax} &= R61\,910 + 31\% \text{ of amount above } R296\,540 \checkmark SF \\ &= R61\,910 + 31\% \times R20\,506,53 \checkmark MA \\ &= R61\,910 + R6\,357,02 \\ &= R68\,267,02 - \text{Rebates} - \text{Tax credit} \\ &= R68\,267,02 - R13\,500 - R13\,776 \\ &= R40\,991,02 \checkmark S \\ \text{Monthly Tax} &= R40\,991,02 \div 12 \\ &= R3\,415,92 \checkmark CA \end{aligned}$	ISF Correct bracket IMA Adding amount above 2MA Subtracting rebate and tax credit IS Simplification ICA Monthly tax (6)	F L3

4.1.4	$\begin{aligned} \text{Total deductions in rand} &= R3\,415,92 + R2\,142,21 + R3\,876,00 \\ &+ R\,258,93 + R390,53 + R261,00 + \\ &R10,00 + R195,00 + R74,00 + \\ &R1,18 \checkmark M \\ &= R10\,827,77 \\ \text{Take home salary} &= R28\,562,75 - R10\,827,77 \checkmark M A \\ &= R17\,734,98 \checkmark CA \end{aligned}$	IM Adding all deductions IMA Subtracting deductions from monthly salary ICA Answer (3)	F L3
4.2.1	$\begin{aligned} \text{Total seats} &= \text{total alphabets} \times \text{total numbers} \\ &= 33 \times 30 \checkmark M \\ &= 990 \text{ seats } \checkmark A \end{aligned}$	IM Multiplying seats and numbers IA Seats Accept 991 seats AO (2)	MP L2
4.2.2	$\begin{aligned} P(A64 \text{ to } A76) &= \frac{11}{990} \checkmark M \\ &= 0,01 \checkmark CA \end{aligned}$	IM Adding seats IMA Dividing by 990 OR 991 ICA Correct decimal fraction AO (2)	P L3
4.2.3	Less likely $\checkmark A$ because there are very few chances $\checkmark \checkmark J$ OR There are 11 out of 990 or 991 chances $\checkmark \checkmark J$ OR Any other valid justification	IA Less likely 2J Justification (3)	P L4
4.2.4	Sometimes the game is played more than 50m away from the spectators seated in Southern stand $\checkmark \checkmark O$ OR The game is played within 50m distances the whole match $\checkmark \checkmark O$ OR The spectators seated in the western stand are not facing the sun $\checkmark \checkmark O$ OR Players are always close to them. $\checkmark \checkmark O$ OR Any other valid reason	2O x 2 Valid opinion (4)	F L4

Mathematical Literacy/P2
ANSWER SHEET 1
QUESTION 2.1.3



- 1A Smooth Curve
- 1A Starting point
- 2A Any other 2 correct points
- 1A Ending point

(5)

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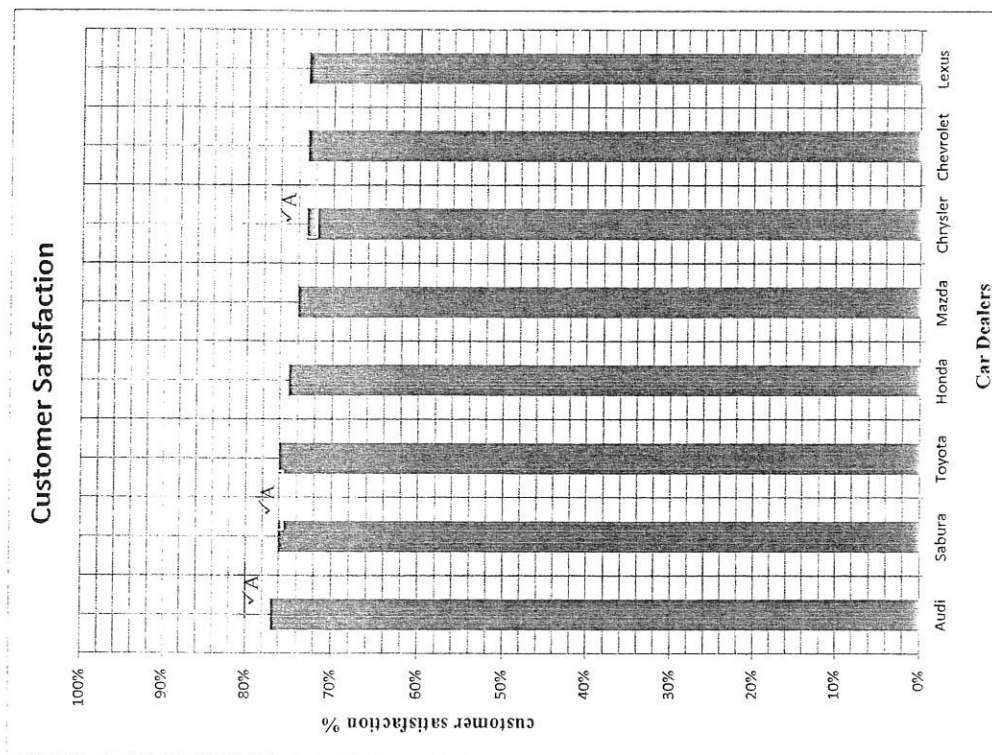
<p>4.3.1</p> <p>Volume = (side)² × height = (3,5m)² × 1,5m ✓SF = 18,375m³ ✓S</p> <p>∴ Capacity of the tank = 18,375m³ × 1kℓ = 18,375 kℓ ✓A = 18 kℓ</p>	<p>ISF Correct substitution 1S Simplification</p> <p>1A Correct kilolitres NPR AO</p> <p>(3)</p>	<p>M L2</p>
<p>4.3.2</p> <p>4,1kℓ = 1 hour ✓MA (0,75 of 18 kℓ) = hours Hours = $\frac{13,5kℓ}{4,1kℓ}$ ✓M = 3,292..... hours ✓CA = 3 hours 17 minutes 34 seconds ✓C</p>	<p>1MA Multiplying 18kℓ by three quarters 1M Dividing 4,1 kℓ</p> <p>1CA Simplification 1C Converting to hours, minutes and seconds</p> <p>(4)</p>	<p>M L3</p>
<p>4.3.3</p> <p>Length of guard rail = 4 × (3,5m + 1m + 1m) = 4 × 5,5m ✓MA = 22m ✓CA</p> <p>OR</p> <p>Length of guard rail = 4 × (3,5m + 2m) = 4 × 5,5m ✓MA = 22m ✓CA</p> <p>Length of guard rail = (3,5 m + 2 m) + (3,5 m + 2 m) + (3,5 m + 2 m) + (3,5 m + 2 m) = 5,5 m + 5,5 m + 5,5 m + 5,5 m ✓MA = 22 m ✓CA</p>	<p>ISF Adding 1m + 1m and 3,5m 1MA Multiplying 5,5m by 4 1CA Answer</p> <p>OR</p> <p>ISF Adding 2m and 3,5m 1MA Multiplying 5,5m by 4 1CA Answer</p> <p>OR</p> <p>1MA Adding 2m and 3,5m 1MA Adding all 4 sides 1CA Answer</p> <p>(3)</p>	<p>M L3</p>
<p>[37]</p>		

TOTAL: 150

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ANSWER SHEET 2
QUESTION 2.2.3



1A	Complete correct graph
2A	Correct 1st 3 bars
2A	Correct last 3 bars

(5)

