



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICAL LITERACY

(First Paper)

NQF LEVEL 4

(10401034)

5 November 2019 (X-Paper)

09:00–12:00

Non-programmable calculators may be used.

This question paper consists of 10 pages 1 answer sheet and 1 addendum.

TIME: 3 HOURS MARKS: 150

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
 2. Read ALL the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Start each question on a NEW page.
 5. Clearly show ALL calculations, diagrams, graphs, et cetera used in determining the answers.
 6. Approved calculators may be used, unless otherwise stated.
 7. Round off the answers to TWO decimal places, unless otherwise stated.
 8. Use $\pi = 3,14$. Learners will be penalised if any other value is used.
 9. Drawing instruments including rulers, pairs of compasses and protractors may be used.
 10. Answer QUESTION 4.5 on the ANSWER SHEET 1.
 11. Diagrams are not necessarily drawn to scale.
 12. Work neatly.
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QUESTION 1

- 1.1 Calculate the following without using a calculator. Show ALL steps used to calculate the answer. Leave the answer as a mixed fraction.
No marks will be awarded for the final answer only.

$$\frac{7^2 - \sqrt{36} + \sqrt[3]{8}}{6 + 4(19 + 2)}$$



(4)

- 1.2 Rearrange the following fractions in ascending order. Show ALL steps that are used to determine the answer.

$$\frac{1}{2}; \frac{3}{5}; \frac{1}{3}$$

(4)

- 1.3 Convert 23,2 kilolitres to mℓ. Show ALL steps that are used to determine the answer.

$$(1\ 000\ \text{mℓ} = 1\ \text{litre and } 1\ 000\ \text{litres} = 1\ \text{kℓ})$$

(4)

- 1.4 The temperature is -2°C in the morning. At midday the temperature is 23°C .

Determine the increase in temperature in $^{\circ}\text{C}$.

(2)

- 1.5 Calculate the amount of time passed from Monday 6:53 pm to Wednesday 11:02 am of the same week. Show ALL steps that are used to determine the answer.
Write the answer in hours and minutes.



(3)

- 1.6 Tony's salary after a 5% increase is R14 105. Calculate Tony's original salary. Show ALL steps that are used to determine the answer.

(4)

- 1.7 Convert R1 300 to pounds (£) if the exchange rate is £1 = R17,52. Round off your answer to the nearest pound. Show ALL steps that are used to determine the answer.

(3)

- 1.8 Determine whether it is more cost effective to buy a 1 kg tin of milo that costs R99,99 or a 250 grams tin of coffee that costs R33,99?

Show ALL calculations to justify your answer.

(3)

- 1.9 Bheki wants to mix a diet formula consisting of the ingredient's turmeric, cayenne and cinnamon in the ratio 3:2:4 respectively. How many grams of each ingredient will he need if he wants to make 162 grams of the mixture?



(3)

[30]

QUESTION 2

- 2.1 The ADDENDUM (attached) shows a route map and information regarding a 56 km two oceans marathon.

Use the ADDENDUM to answer the questions.



- 2.1.1 Name ONE tourist attraction on the route map. (2)
- 2.1.2 Determine the exact number of refreshment stations on the 56 km route. (2)
- 2.1.3 Name the street that is on the halfway mark of the marathon. (2)
- 2.1.4 How far from the starting point is the first medical station? Give your answer in kilometres. (2)
- 2.1.5 Determine the approximate distance, in kilometres, between Kalk Bay and Chapmans Peak. (3)
- 2.1.6 The scale on the route map is 1:500 000. The map distance between Kalk Bay and Chapmans Peak is 33,6 mm along the route.

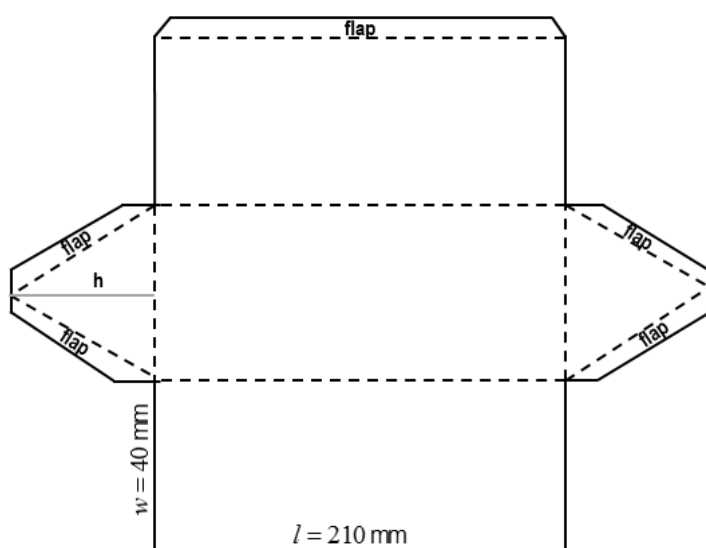
Determine the actual distance (in kilometres) between Kalk Bay and Chapmans Peak.



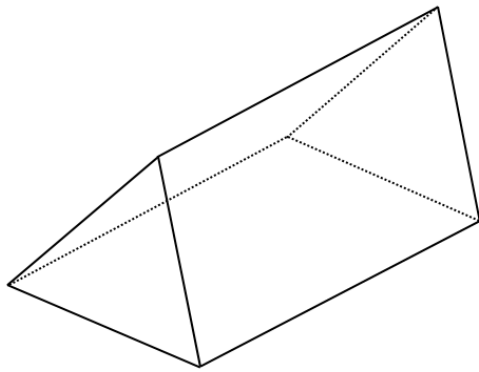
(5)

- 2.2 The first 100 participants who completed the marathon were given a chocolate that was packed in a triangular-shaped box. The box is made up of three identical rectangular faces, two identical equilateral triangles and flaps to hold the box together, as shown in the diagrams below:

Diagram 1: The net of the triangular box.



2.2 Diagram 2: The 3-dimensional representation of the triangular box.

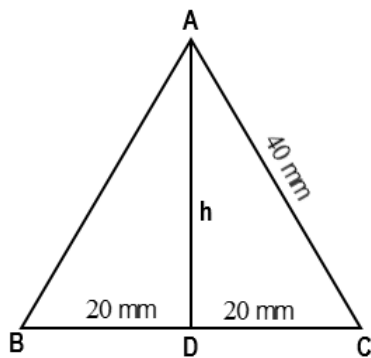


Dimensions of the rectangular faces:

- Length (l) = 210 mm
- Width (w) = 40 mm



Diagram 3: Dimensions of the triangular faces



- $AC = 40$ mm
- $DC = 20$ mm

2.2.1 Use the theorem of Pythagoras to show that the height of the triangular face of the chocolate box is 34,64 mm. Show ALL working.

$$\text{Pythagoras theorem: } AC^2 = AD^2 + DC^2 \quad (5)$$

2.2.2 Calculate the area of the triangular face of the chocolate box. Show ALL working.



$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height} \quad (4)$$

2.2.3 Hence, determine the total surface area of the triangular chocolate box, if the total surface area of the flaps is 370 mm^2 . Show ALL working.




$$\text{Total surface area} = 2 \times \text{area of triangular face} + 3 \times (l \times w) + \text{area of flaps} \quad (5)$$

[30]

QUESTION 3

- 3.1 Choose a definition from COLUMN B that matches a financial term in COLUMN A. Write only the letter (A–F) next to the question number (3.1.1–3.1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B
3.1.1	VAT exclusive	A plan which provides retirement income
3.1.2	SITE 	B a price that already includes tax
3.1.3	Pension fund	C standard Income Tax on Employees
3.1.4	Hire Purchase	D the level of sales at which profit is zero
3.1.5	Break-even point	E make regular payments until the full price is paid, then only the goods belong to you
		F a price to which tax is yet to be added to arrive at the final cost

(5 × 1)


(5)

- 3.2 Anele has been renting an apartment for 2 years. She wants to buy her own house instead of renting. She uses an online bond calculator, enters in a purchase price of R850 000, an interest rate of 10% p.a. and by changing the term of repayment gets the results as shown below:



Term	Minimum gross monthly income	Monthly instalment	Service Fee per month	Total cost
15 years	R30 447,15	R9 134,14	R69,00	R 1 656 565,20
20 years	R27 342,28	R8 202,68	R69,00	R 1 985 203,20
25 years	R25 746,52	R7 723,96	R69,00	R 2 337 888,00
30 years	R24 864,53	R7 459,36	R69,00	R 2 710 209,60

Study the above table to answer the questions:

- 3.2.1 Anele earns an annual gross salary of R331 000. Can Anele afford to buy a house with a purchasing price of R850 000, to be paid over 15 years? Show ALL the calculations. (4)
- 3.2.2 How much will Anele pay in interest, if she chooses to take the bond over 20 years? Show ALL the calculations. (5)
- 3.2.3  How much will Anele pay in service fees, if she chooses to take the bond over 20 years? Show ALL the calculations. (3)
- 3.2.4 Hence, show how the total cost of R1 985 203,20 over a 20-year bond term was calculated. (2)

3.2.5 How much will Anele save if she takes out a bond for 20 years instead of 30 years?



(3)

3.3 Sandile's salary advice for the month of June 2018 appears below. The missing values on the salary advice must be used to answer the following questions:

Salary Advice			
Employee information			
Employee number 1234	Name & Surname Anele Mapela	ID nr 920718 0158 085	Tax number 0740 334 24 5
Pay date 25/06/2018		Bank Money bank	
Income		Deductions	
Description	Amount	Description	Amount
Basic Salary	R26 083,33	UIF
Housing Subsidy	Union Fee	R149.45
		PAYE
		Pension fund	R1 564,99
Gross salary	R27 583,33	Total Deductions
		Net Salary

Use the salary advice to answer the questions:



3.3.1 How much does Anele receive towards her housing subsidy?

(2)

3.3.2 Anele pays 1% of her gross income towards UIF and 22% of her gross salary towards PAYE. Calculate Anele's net salary. Show ALL working.

(6)

[30]

QUESTION 4

Anele supplements her income by making and selling lunch packs at work. She takes orders in advance and delivers the lunch packs during her lunch break. Her fixed expense per order is R150 and it costs her R25 to make one lunch pack. She sells a lunch pack at R48.



Number of lunch packs (<i>n</i>)	0	5	10	15	25
Expense in rands	150	275	A	525	775
Income in rands	0	240	480	B	1200



Study the above table to answer the questions.

- 4.1 Use the information and the table to extend the numerical patterns by completing the missing values A and B. Write only the answer next to the letter (A–B) in the ANSWER BOOK. (2 × 2) (4)
- 4.2 Determine whether the income per lunch pack in rands, in the above table, is a constant ratio or a constant difference pattern. Write down the value of the constant ratio/difference to substantiate your answer. (2)
- 4.3 Derive a formula to calculate Anele's expense per order in rands. (3)
- 4.4 Derive a formula to calculate Anele's income per order in rands. (2)
- 4.5 Use the table to draw and label TWO-line graphs (on the ANSWER SHEET) showing Anele's expense per order and her income per order. Label each line, label the horizontal and vertical axes and give the graph a suitable heading. (9)
- 4.6 Use the graphs drawn in QUESTION 4.5 to answer the questions.
- 4.6.1 Is the income graph an example of a direct or an indirect relationship? Give a reason for your answer. (2)
- 4.6.2 Calculate the approximate rand value of the profit that Anele would make, if she had an order for 14 lunch packs. (3)
- 4.6.3 If Anele had an order for 5 lunch packs, would she make a profit or a loss? Calculate the approximate rand value of this profit or loss. (3)
- 4.6.4 What is the minimum number of lunch pack orders Anele must have to make a profit? (2)

[30]

QUESTION 5

- 5.1 The table below compares the number of household crimes in South Africa, to the nearest thousand, between 2015/2016 and 2016/2017 cycles. For example, theft of a motor vehicle for 2015/2016 is shown as 58 which represents 58 000.




Type of household crimes	Number of crime incidents experienced by households to the nearest thousand	
	2015/2016	2016/2017
Theft of motor vehicle	58	48
Housebreaking or burglary	647	777
Home robbery	160	151
Theft of livestock, poultry and other animals	113	161
Theft of crops planted by the household	23	15
Murder	15	16
Theft out of motor vehicle	127	139
Deliberate damaging, burning, destruction of buildings	38	47
Motor vehicle vandalism/deliberate damage of motor vehicle	42	32
Theft of bicycle	35	21

[Adapted from www.statssa.gov.za]

Study the above table to answer the questions.

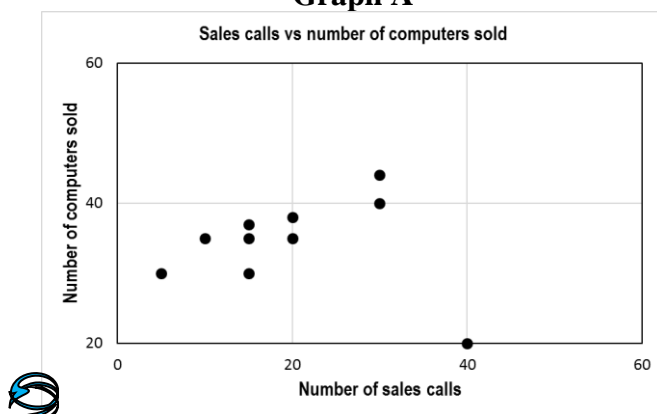
- 5.1.1 Identify the type of household crime that accounted for more than 50% of the total number of household crime incidents in South Africa during the 2015/2016 and 2016/2017 cycle. (2)
- 5.1.2 Name the type of household crime that showed the most significant decrease between 2015/2016 and 2016/2017 cycles. (2)
- 5.1.3 Calculate the range of the number of household crime incidents during the 2016/2017 cycle. (3)
- 5.1.4 Calculate the percentage decrease in the number of home robberies between 2015/2016 and 2016/2017. (5)
- 5.1.5 Did the average (mean) number of household crimes increase or decrease between 2015/2016 and 2016/2017? Justify your answer by calculating the average (mean) increase or decrease. (6)
- 5.1.6 Which types of household crime/s represent the median of the number of household crime incidents during the 2016/2017 cycle? (4)

- 5.2 The owner of a computer supply company researched the relationship between the number of sales calls made by the sales representatives in a month and the number of computers sold in that month. She asked her manager to present the findings on a table and a graph.

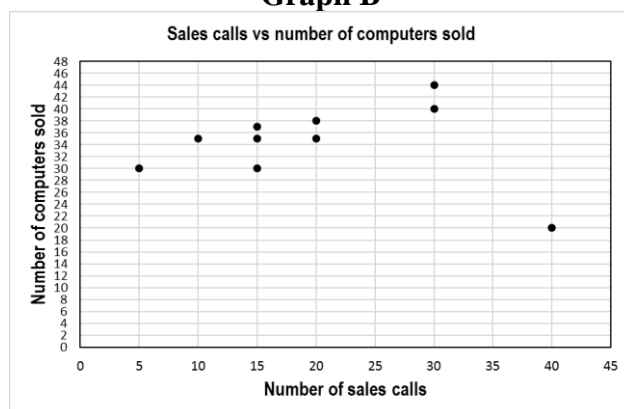
The manager's findings are shown in the table and two scatter plot graphs below: 

SALES REPRESENTATIVE	NUMBER OF SALES CALLS	NUMBER OF COMPUTERS SOLD
REPRESENTATIVE 1	20	35
REPRESENTATIVE 2	40	20
REPRESENTATIVE 3	20	38
REPRESENTATIVE 4	30	44
REPRESENTATIVE 5	5	30
REPRESENTATIVE 6	10	35
REPRESENTATIVE 7	15	35
REPRESENTATIVE 8	15	37
REPRESENTATIVE 9	15	30
REPRESENTATIVE 10	30	40


Graph A



Graph B



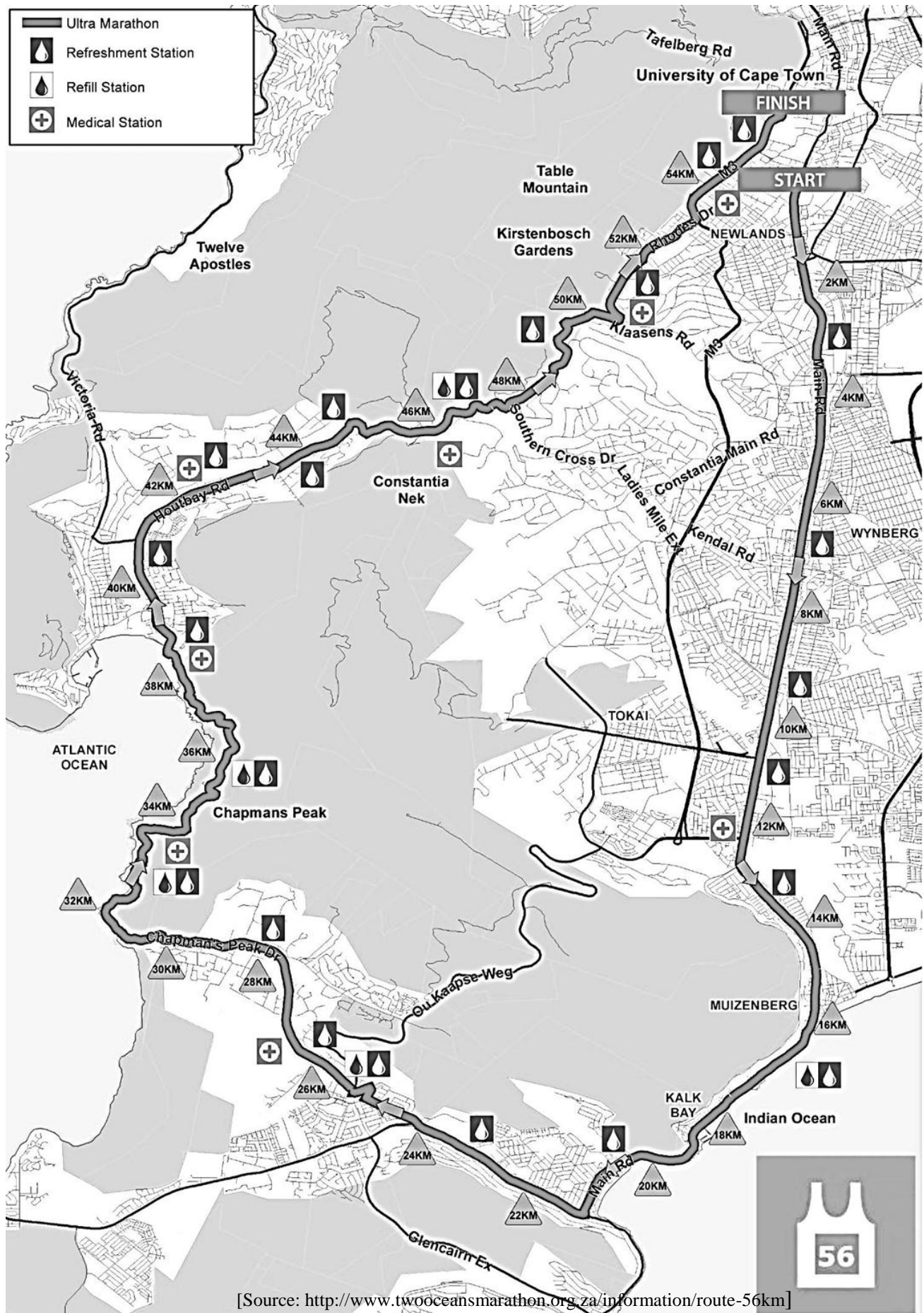
Study the above table and graphs to answer the questions.

- 5.2.1 Name THREE differences between the two scatter plot graphs. (3)
- 5.2.2 Is there a strong or a weak relationship between the number of sales calls made and the number of computers sold? (1)
- 5.2.3 Which sales representative is under performing? (1)
- 5.2.4 Give ONE way in which the manager can improve productivity in that representative.  (1)
- 5.2.5 Which graph should the manager submit to the owner of the company? Give one reason for your answer. (2)

[30]

TOTAL: 150

ADDENDUM: 56 km TWO OCEANS MARATHON



ANSWER SHEET

EXAMINATION NUMBER:

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QUESTION 4.5

