



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P2

FEBRUARY/MARCH 2010

MARKS: 150

TIME: 3 hours

This question paper consists of 12 pages and 3 annexures.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE questions. Answer ALL the questions.
2. Parts of QUESTIONS 1, 2 and 3 must be answered on the attached ANNEXURES. Write your centre number and examination number in the spaces on each ANNEXURE and hand in the ANNEXURES with your ANSWER BOOK.
3. Number the questions correctly according to the numbering system used in this question paper.
4. An approved calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
5. ALL the calculations must be clearly shown.
6. ALL the final answers must be rounded off to TWO decimal places, unless stated otherwise.
7. Units of measurement, where applicable, must be indicated.
8. Start each question on a NEW page.
9. Write neatly and legibly.

QUESTION 1

The Department of Health advertised for companies to tender to supply sterile disposable rubber gloves to a local clinic.

Rubber gloves come in different sizes and are generally sold in boxes containing 50 pairs of the same size.

The clinic required 100 boxes of each of the following sizes of gloves: $6\frac{1}{2}$; 7 ; $7\frac{1}{2}$ and 8.



High Five Co-operative, which is 100% black-owned, decided to submit a tender to the Department of Health.

It costs High Five R98,00 per box (excluding VAT, that is value-added tax) to manufacture the gloves, regardless of the size of the gloves. High Five first adds a profit of 25% on the price of each box and then charges a further 20% for transport and administration costs.

- 1.1 TABLE 1 on ANNEXURE A shows High Five's format for calculating the selling price of their gloves.

Use the spaces provided on TABLE 1 on ANNEXURE A to determine the values of items A, B, C, D, E, F and G.

Show ALL working details in Column 2 and enter the amounts in Column 3. (12)

- 1.2 The Department of Health uses the following formula to make decisions about which company will be granted the tender:

$$P_s = 80 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right) + 2,5 *$$

where:

P_s = points scored for the tender

P_t = value of the tender under consideration (in rand)

P_{min} = lowest acceptable tender value (in rand)

*** 2,5 is only added in the case of a 100% black-owned business.**

The lowest acceptable tender value (**P_{min}**) for the rubber gloves is R56 000.

Use the total selling price (**P_t**) calculated in TABLE 1 to calculate **P_s**, the number of points scored by High Five Co-operative. (3)

- 1.3 The total selling price tendered (**Pt**) by another company, L&R Enterprises, which is 100% white-owned, was R66 000.

The Department of Health announced that the tender that scored the highest number of points will be awarded the contract.

Show, with the aid of the formula given in QUESTION 1.2, whether High Five or L&R Enterprises will be awarded the tender. (5)

- 1.4 The dimensions of each rectangular box of rubber gloves are: 8 cm × 10 cm × 20 cm.

The boxes will be packed in a larger rectangular container that can hold exactly 40 boxes, which will be arranged in four identical layers.

- 1.4.1 Draw a diagram to show a possible layout of one layer of the boxes in the large container. (3)

- 1.4.2 Determine, showing ALL calculations, the dimensions of the larger container that can hold exactly 40 boxes. (3)

[26]

QUESTION 2

2.1

Nthabiseng studies Food and Nutrition at a university. Her research project requires her to analyse the nutritional content of some food items. She starts off by analysing the nutritional content of two different flavours of chips.

FOOD AND NUTRITION FACTS

The three main food groups are carbohydrates, proteins and fats.

- Carbohydrates are the major source of energy in the diet.
- Protein is needed for the growth and repair of body tissue. It is recommended that the average child consumes 0,8 g of protein per kg body mass daily.
- Fats provide fuel (energy) for the body. 1 g of fat gives approximately 38 kJ (kilojoules) of energy. A large quantity of fat in a diet is not healthy.

A child with a body mass of 44,5 kg requires an average of 9 572 kJ of energy daily.

TABLE 2: Nutritional content of two different flavours of chips

		
Nutritional Content	per 100 g	per 100 g
Carbohydrates	54,3 g	48,7 g
Protein	5,2 g	6,8 g
Fat	28,6 g	36,0 g
Fibre	5,0 g	4,0 g
Sodium	0,9 g	0,8 g
Energy	2 110,0 kJ	2 227,0 kJ

- 2.1.1 Explain why the total mass of the nutrients in each column of the table is NOT equal to 100 g. (2)
- 2.1.2 (a) Calculate the recommended number of grams of protein a child with a body mass of 44,5 kg should consume daily. (2)
- (b) Suppose a child eats 100 g of salt and vinegar chips daily. What percentage of this child's daily recommended energy intake will be provided by these chips? (4)
- 2.1.3 Calculate the approximate energy (in kilojoules) produced by the fat in a 100 g packet of cheese and onion chips. (3)
- 2.1.4 Nthabiseng states that chips with a higher total carbohydrate and protein content and with the least amount of fat are healthier.
- According to Nthabiseng, which of the two different flavours of chips is healthier? Use calculations to explain your answer. (5)

2.2

Nthabiseng needs to use the internet in order to gather information for her research. She investigates internet providers and finds that one of the providers is offering internet usage according to the following rates:

TABLE 3: Monthly cost for internet usage

	OPTION 1: 500 MB (megabytes)	OPTION 2: 1 GB (gigabyte, where 1 000 MB = 1 GB)
Fixed monthly cost	R150	R220
Additional monthly costs	30c for every MB used over 500 MB	30c for every MB used over 1GB

Nthabiseng needs to choose either OPTION 1 or OPTION 2.

2.2.1 OPTION 1 can be represented by the following equation:

$$\text{Cost (in rand)} = 150 + 0,3 \times (\text{number of megabytes used} - 500)$$

Calculate how much she would pay if she chose OPTION 1 and used 800 MB.

(2)

2.2.2 The following table shows the monthly costs for OPTION 2:

TABLE 4: Monthly cost for using OPTION 2

Number of MB used each month	0	500	800	1 000	1 100	1 400
Cost (in rand)	220	220	220	220	A	340

(a) Write down an equation that can be used to represent OPTION 2. (3)

(b) Calculate the missing value **A** in TABLE 4. (2)

2.2.3 Use ANNEXURE B to draw TWO line graphs representing the equation for OPTION 1 and the table showing OPTION 2. Clearly label each line graph. (9)

2.2.4 Use the graphs drawn in QUESTION 2.2.3 to determine which of the two options you would advise Nthabiseng to take if she wants to pay only R300 per month for her internet usage. Justify your answer. (4)
[36]

QUESTION 3

The South African Weather Service recorded the temperatures for ten towns and cities in South Africa on 2009-05-13.

TABLE 5: Temperatures recorded on 2009-05-13 for ten South African towns and cities

Temperature in °C	Bloemfontein (Bfn)	Cape Town (Ctn)	Durban (Dbn)	Johannesburg (Jhb)	Kimberley (Kmb)	Mafikeng (Mfk)	Musina (Msn)	Nelspruit (Nls)	Pretoria (Pta)	Polokwane (Pol)
Minimum	5	13	15	6	10	8	20	9	7	6
Maximum	23	22	A	21	24	23	40	22	22	22

Mean (average) maximum temperature = 25,6 °C

Use the information in TABLE 5 to answer the following questions:

- 3.1 The upper quartile for the **minimum** temperatures is 13 °C .
Identify the towns and cities of which the **minimum** temperatures were less than the upper quartile. (3)
- 3.2 Calculate:
- 3.2.1 The **maximum** temperature, A, for Durban (4)
- 3.2.2 The median of the **maximum** temperatures (3)
- 3.2.3 The percentage of the towns and cities that had a **maximum** temperature that was greater than the median (2)
- 3.3 Would the **maximum** temperatures best be represented by the median or the mean? Justify your answer. (3)
- 3.4 A bar graph showing the **minimum** temperatures of the ten towns and cities in TABLE 5 has been drawn on ANNEXURE C.
- 3.4.1 Draw a bar graph representing the **maximum** temperatures of the ten towns and cities on the same set of axes on ANNEXURE C. (5)
- 3.4.2 Which town or city had the greatest difference between its **minimum** and **maximum** temperatures? Show ALL your workings. (4)

3.5

Kimberley is extremely hot in summer and very cold in winter, therefore houses in Kimberley need to be cooled and heated. Often, air conditioners are used to cool and heat houses.

Air conditioners require electricity and come in different output capacities. The output capacity is a measure of the amount of heat either removed from a room (cooling) or added to a room (heating).



Output capacity is measured in kilowatts (kW), where $1 \text{ kW} = 1\,000 \text{ watts (W)}$.

The output capacity of a specific model air conditioner needed to cool a living room, is 125 watts per square metre of floor area.

Calculate:

- 3.5.1 The output capacity (in kW) of an air conditioner that would cool or heat a living room of $4 \text{ m} \times 5,25 \text{ m}$ (4)
- 3.5.2 The recommended area (in m^2) of a living room which could be cooled by this model air conditioner having a 2 000 watt output capacity (3)
- [31]

QUESTION 4

Mosima wants to buy an LCD TV and saw it advertised at R25 000. She does not have enough money to pay cash for the TV, so she has the option of either taking a loan from a microlender or the option of paying by means of an instalment sale (hire-purchase) agreement.

- 4.1 Suppose Mosima borrows R25 000 from a microlender to pay for the TV. The amount she has to repay every month depends on the length of time she takes to repay the loan. TABLE 6 shows the different loan options she can choose from.

TABLE 6: Repayment options, in rand, for a loan from a microlender

	Number of monthly instalments				
	12	18	24	36	42
Loan amount	25 000,00	25 000,00	25 000,00	25 000,00	25 000,00
Initiation fee*	1 140,00	1 140,00	1 140,00	1 140,00	1 140,00
Monthly instalment**	2 283,00	1 875,00	1 562,50	1 145,83	A
Monthly administration fee ***	57,00	57,00	57,00	57,00	57,00
Total amount paid by the end of the loan period (in rand)	29 220,00	35 916,00	40 008,00	44 441,88	48 534,06

NOTE:

* An **initiation fee** is the amount charged by the microlender to process the loan application and is payable when the loan has been approved.

** A **monthly instalment** is the amount paid monthly.

*** A **monthly administration fee** is an additional cost that is added to the monthly instalment.

The total amount to be repaid is given by the following formula:

Total amount in rand to be repaid

= initiation fee + number of instalments × (monthly instalment + monthly administration fee)

- 4.1.1 Use the formula to calculate the missing value **A**. (5)

- 4.1.2 Suppose Mosima chose to repay the loan over 42 months. How much will the loan cost her in total? (2)

- 4.1.3 Calculate the annual percentage interest rate if the loan is taken over 24 months. Use the formula:

$$1 + i = \sqrt[n]{\frac{A}{P}} \quad \text{where: } A = \text{monthly instalment in rand} \times \text{number of months}$$

P = amount of the loan in rand

n = number of monthly instalments

i = interest rate per month

(7)

- 4.2 If Mosima buys the LCD TV, costing R25 000, by means of an instalment sale agreement, she must first pay a 10% deposit, and then pay off the balance owing in equal instalments over 24 months at 33% per annum simple interest.

The following formula may be used:

$A = P(1 + i \times n)$, where

- A = amount she still needs to pay
- P = balance owing after paying the deposit
- i = interest rate per annum
- n = number of years

Calculate:

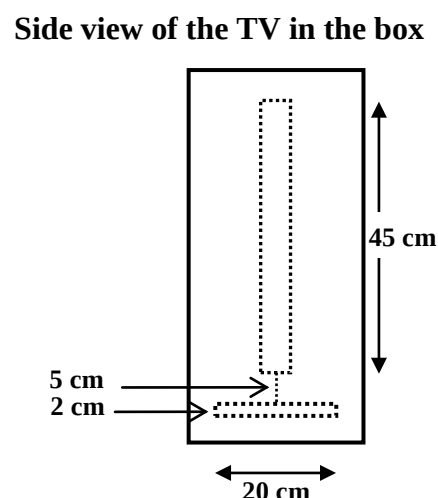
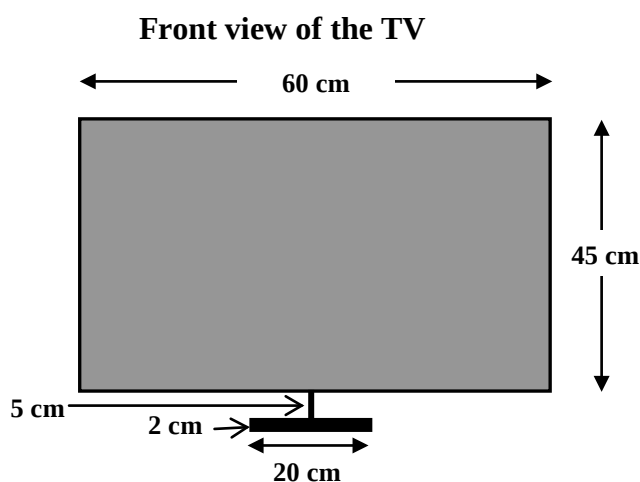
- 4.2.1 The amount she is required to pay for the deposit (2)
- 4.2.2 The amount she is required to pay for her equal monthly instalments (5)
- 4.2.3 The total cost of the TV if she used this method of payment (2)
- 4.3 Mosima decides that she wants to pay for the LCD TV over a period of 24 months.

State, giving full reasons for your answer, whether Mosima should take a loan from the microlender or choose the hire-purchase agreement. (3)

- 4.4 Mosima's LCD TV screen is a new slim model that is only 39,7 mm thick.

The rectangular screen is 45 cm high and 60 cm wide.

The TV stands on a round base with a diameter of 20 cm, that is 2 cm thick and is held up by a swivel that is 5 cm high, as shown in the diagram below.



Determine the volume (in cm^3) of the rectangular box that the TV will be delivered in if there is an allowance of 2 cm for all measurements to package the TV, as shown in the side view above.

Given the formula: **Volume** = *length* × *breadth* × *height*

(5)
[31]

QUESTION 5

5.1

Yusuf Khan is a property developer who has bought a large piece of land on which he wants to build houses to rent to tenants.

He surveyed a representative sample of the rented houses in the area in order to find out how many people live in each house. He obtained the following results:

TABLE 7: Number of people living in each house surveyed

Single-member households		Multiple-member households			
Male	Female	2	3	4	5 or more
723	219	534	427	298	291

[Source: Stats SA, *Community Survey 2007*]

- 5.1.1 How many houses did Mr Khan survey? (2)
- 5.1.2 (a) What is the probability of randomly choosing a house in the area that has two or fewer people living in it? (3)
- (b) Is there a greater probability of randomly choosing a house that has two or less people living in it, or randomly choosing a house that has more than two people living in it? Show ALL your workings. (4)

5.2

Based on his survey, Mr Khan decides to build identical one-bedroom houses on his piece of land. Each of these houses will consist of a living room, a bedroom, a bathroom and a kitchen.

The layout of each house is given in the scale diagram below.

The inside measurements are:

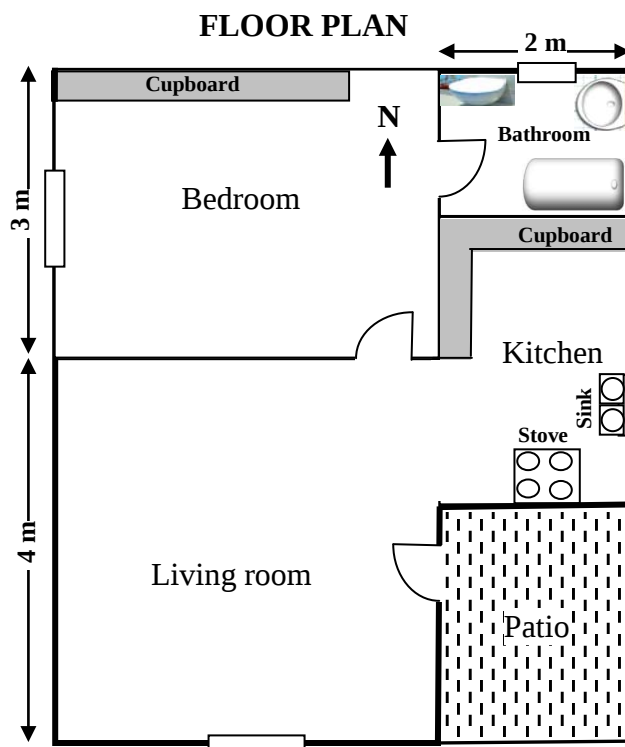
- Living room $4\text{ m} \times 4\text{ m}$
- Bedroom $4\text{ m} \times 3\text{ m}$
- Kitchen $3\text{ m} \times 2\text{ m}$
- Bathroom $2\text{ m} \times 1,5\text{ m}$

Fitted cupboard in the bedroom: $3,5\text{ m} \times 450\text{ mm}$.

Fitted L-shaped cupboard in kitchen that ends in line with the bedroom wall: width of 450 mm .

Fitted stove in the kitchen: covers a floor area of $0,45\text{ m}^2$.

Fitted sink in the kitchen: length of 1 m and width of 450 mm .



The outside patio completes the house so that the house is rectangular in shape.

The patio has a concrete floor with a uniform thickness.

The bathroom, living room and kitchen are tiled, while the bedroom is carpeted.

Calculate:

- 5.2.1 The uniform thickness (in mm) of the concrete floor of the patio if the volume of concrete used is $0,375\text{ m}^3$

Given the formula:

$$\text{Volume of a rectangular prism} = \text{area of base} \times \text{height} \quad (6)$$

- 5.2.2 The floor area (in m^2) to be tiled in the kitchen and living room (taking into consideration that no tiles are to be placed under the cupboards, sink and stove) (11)
[26]

TOTAL: 150

CENTRE NUMBER								
----------------------	--	--	--	--	--	--	--	--

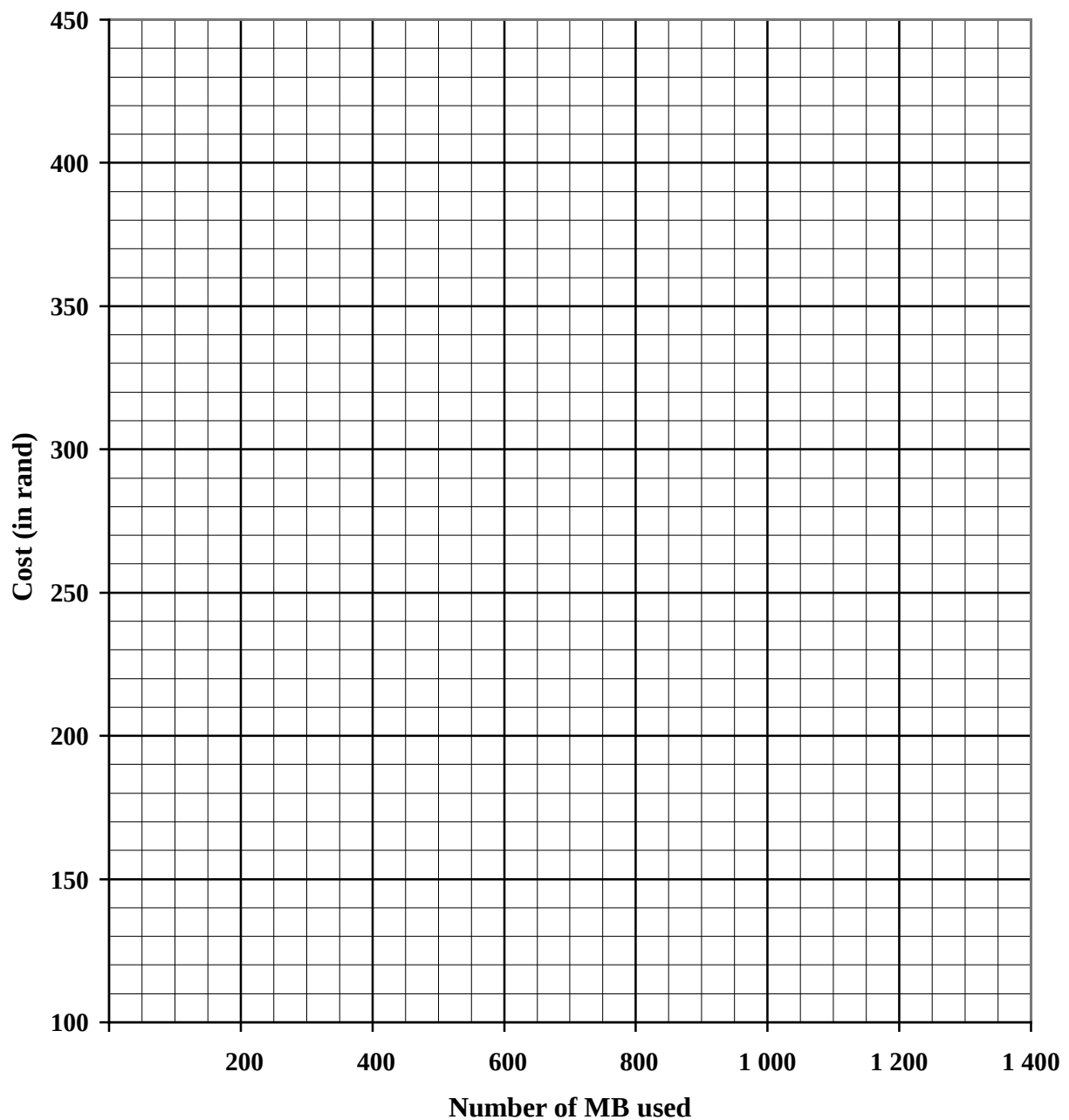
EXAMINATION NUMBER													
---------------------------	--	--	--	--	--	--	--	--	--	--	--	--	--

ANNEXURE A**QUESTION 1.1****TABLE 1: High Five's format for calculating the selling price of their gloves**

COLUMN 1		COLUMN 2	COLUMN 3
	Item	Working details	Cost in rand
Cost of manufacturing the required number of boxes of gloves	A		
Profit of 25% on the cost price	B		
Subtotal	$C = A + B$		
20% for transport and administration costs	D		
Subtotal	$E = C + D$		
14% VAT	F		
TOTAL SELLING PRICE OF THE GLOVES (Also called P_t , the value of the tender under consideration)	$G = E + F$		

CENTRE NUMBER								
---------------	--	--	--	--	--	--	--	--

EXAMINATION NUMBER													
--------------------	--	--	--	--	--	--	--	--	--	--	--	--	--

ANNEXURE B**QUESTION 2.2.3****MONTHLY COSTS FOR INTERNET USAGE**

CENTRE NUMBER								
---------------	--	--	--	--	--	--	--	--

EXAMINATION NUMBER													
--------------------	--	--	--	--	--	--	--	--	--	--	--	--	--

ANNEXURE C**QUESTION 3.4.1**

**TEMPERATURES RECORDED FOR TEN SOUTH AFRICAN
TOWNS AND CITIES ON 2009-05-13**

