basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P1

NOVEMBER 2013

MARKS: 150

TIME: 3 hours

This question paper consists of 16 pages and 2 annexures.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of SIX questions. Answer ALL the questions.

2.   Answer QUESTION 5.1.3 on ANNEXURE A and QUESTION 6.3.2 on ANNEXURE B. Write your centre number and examination number in the spaces on the ANNEXURES and hand in the ANNEXURES 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.   You may use an approved calculator (non-programmable and non-graphical), unless stated otherwise.

6.   Show ALL calculations clearly.

7.   Round off ALL final answers to TWO decimal places, 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.
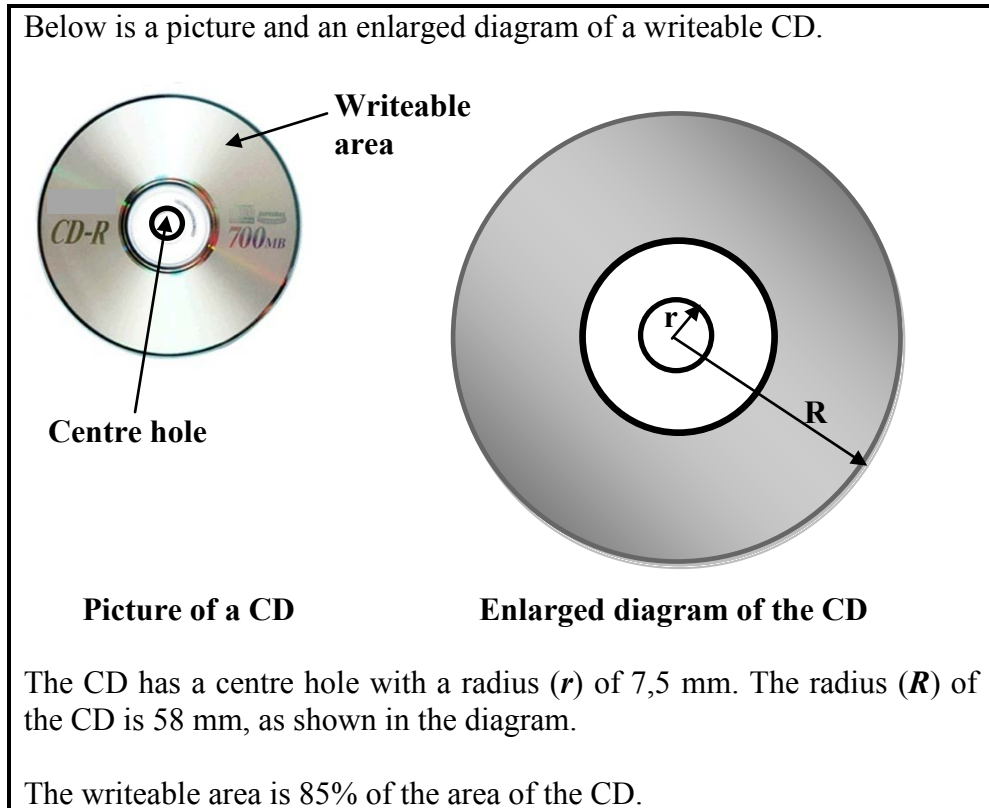
10.   Write neatly and legibly.

QUESTION 1

1.1   1.1.1   Simplify: $\sqrt{\dfrac{1\ 225,51}{4}} - 27\% \times 1,514$ (2)

        1.1.2   Simplify: 1,02 million $-$ 950 000   (1)

        1.1.3   10 mℓ of sugar weighs 8 g.

                    Calculate the weight of 245 mℓ of sugar.   (2)

        1.1.4   The time (in seconds) taken by a moving object to cover a distance of 50 m is given by:

                    Time (in seconds) $= \dfrac{d}{s}$

                    Where s = average speed in metres per second
                           d = distance in metres

                    Calculate the time taken if the object is moving at an average speed of 8 metres per second.   (2)

        1.1.5   Diasha can consistently pack 9 450 apples in 170 minutes.

                    (a)   Determine the time at which Diasha would finish packing the 9 450 apples if she started at 07:50.   (3)

                    (b)   Calculate the average rate, rounded off to the nearest whole number, (in apples per minute) at which Diasha packed the 9 450 apples.   (2)

        1.1.6   A bag contains nine red balls and one white ball.

                    Determine the probability of randomly selecting a white ball from the bag.   (2)

        1.1.7   The only animals on Nico's farm are sheep and cattle. The ratio of sheep to cattle is 35 **:** 1.

                    Calculate the number of sheep on the farm if there is a total of 288 animals.   (2)

1.2   Janice bought a pack of 50 writeable compact discs (CDs). Each CD can store a maximum of 700 megabytes of data.

      1.2.1   Calculate the cost per CD if she paid R64,50 for the pack.   (2)

      1.2.2   Determine the minimum number of CDs she would require in order to store 2 940 megabytes of data.   (3)

      1.2.3   Below is a picture and an enlarged diagram of a writeable CD.

Picture of a CD   **Enlarged diagram of the CD**

The CD has a centre hole with a radius (*r*) of 7,5 mm. The radius (*R*) of the CD is 58 mm, as shown in the diagram.

The writeable area is 85% of the area of the CD.

Determine the writeable area (in mm^2) of the CD.

Use the following formula:

Writeable area = 85% × $\pi\,(R^2 - r^2)$, where π = 3,14   (3)

1.3   Xolani's mother saw an advertisement showing specials for the week at her local store. The advertised prices included value added tax (VAT) of 14%.

SPECIALS FOR THE WEEK
(Promotion valid until Sunday)

PAMPERS NAPPIES 120'S   CHOC-KITS WHITE 200 g   SPARLETTA 2ℓ

Old: R304,99   Old: R14,99   Old: R12,99
New: R269,99   New: R12,49   New: R10,99

1.3.1   If Xolani's baby sister requires 6 to 8 disposable nappies per day, determine the maximum number of days a complete pack of 120 nappies will last.   (2)

1.3.2   Calculate the percentage discount that was offered on the Pampers nappies.   (3)

1.3.3   Calculate the new price, excluding VAT, of the Choc-Kits biscuits.   (2)

1.3.4   Xolani's mother sent him to buy one pack of nappies, four boxes of biscuits and three bottles of cool drink.

Calculate the total cost of the goods.   (2)

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QUESTION 2

2.1　Sharheem made a herb garden that has a square centre section surrounded by identical semicircles on each side of the square as shown in the layout plan below. The diameter of each semicircle is 250 cm.

250 cm
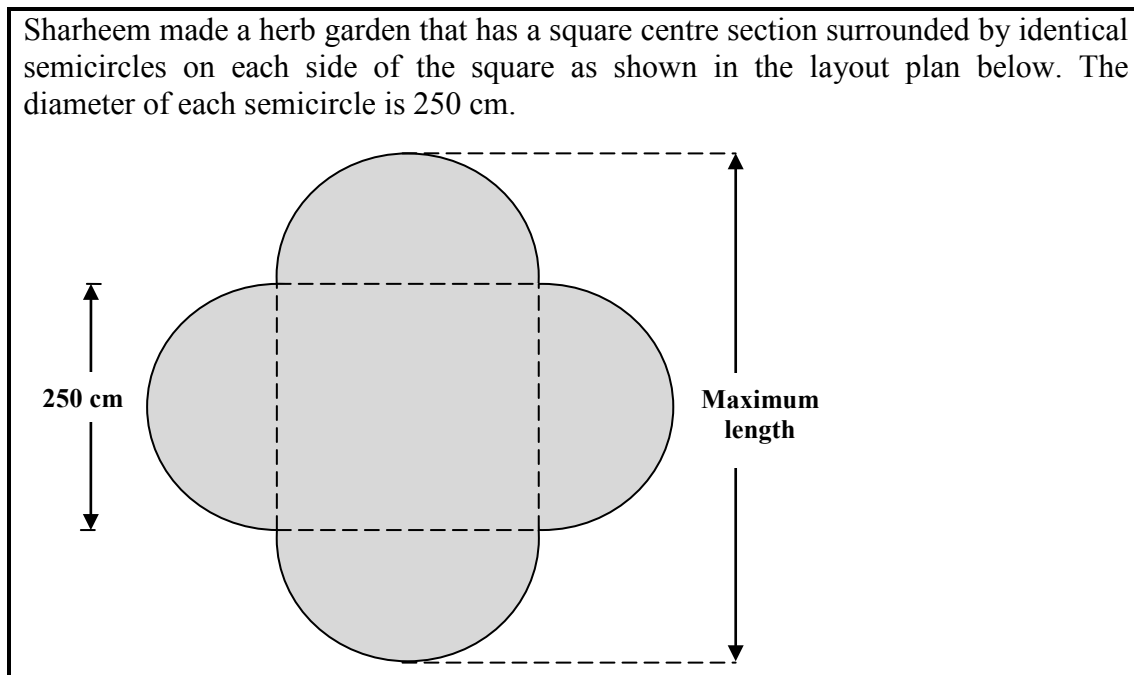
Maximum length

2.1.1　Determine the maximum length (in centimetres) of the herb garden.　(2)

2.1.2　Calculate the total area of the semicircular sections of the herb garden.

Use the following formula:

Area of a circle $= \boldsymbol{\pi} \times \left(\dfrac{\boldsymbol{d}}{\boldsymbol{2}}\right)^2$

where　$\boldsymbol{\pi} = 3{,}14$
　　　　$\boldsymbol{d} =$ the diameter of the semicircle　(4)

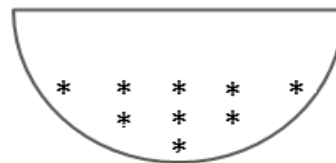2.1.3　Calculate the perimeter of the herb garden.

Use the following formula:

Perimeter of the herb garden $= 2 \times \boldsymbol{\pi} \times \boldsymbol{d}$

where　$\boldsymbol{\pi} = 3{,}14$
　　　　$\boldsymbol{d} =$ the diameter of the semicircle　(2)

2.1.4　Sharheem wanted to plant thyme in one of the semicircular sections of the herb garden as shown in the diagram alongside.

He worked out that the number of thyme plants he can plant in a row is given by the following formula:

Number of thyme plants $= 2 \times$ (the number of the row) $- 1$

Calculate the number of thyme plants Sharheem can plant in the 5th row.　(2)

2.2 | Thandeka has a shop with a scrapbooking department and a toy department. She kept a record of the ages of the customers who visited the two departments on a particular day.

Scrapbooking is a hobby which involves cutting and pasting photos, pictures and other decorative items into a book.

Ages of customers who visited the scrapbooking department

35	60	46	57	54
34	60	54	56	46
47	67	65	54	45

Ages of customers who visited the toy department

5	15	25	7	36	21	70
20	17	6	15	65	9	15

2.2.1 Arrange the ages of the customers who visited the toy department in ascending order. (2)

2.2.2 Calculate the range of the ages of the customers who visited the toy department. (2)

2.2.3 Determine the modus of the ages of customers who visited the scrapbooking department. (2)

2.2.4 Calculate the mean (average) age of the customers who visited the scrapbooking department. (3)

2.2.5 The upper quartile of the ages of customers who visited the toy department is 25.

List the ages of the customers who visited the toy department that are greater than the upper quartile. (2)

2.2.6 The total value of the demo toys that children can play with is currently R15 000 and the depreciation rate is 17,5% per annum. Thandeka uses the straight-line depreciation method to determine the value of the demo toys.

Calculate the depreciated value of the demo toys at the end of 4 years.

Use the formula $A = P(1 - i \times n)$

where A = the depreciated value P = the present value
     i = the annual depreciation rate n = the number of years (3)

2.3 | Leslie travels to work in a minibus. His monthly petrol cost for this vehicle is R2 400 if he travels alone. He decides to let some of his colleagues travel with him so that they may share the petrol costs equally.

The graph below shows the relationship between the monthly petrol cost and the number of people sharing the cost.

PETROL COSTS SHARED

Cost in rand (y-axis): 0, 500, 1 000, 1 500, 2 000, 2 500

Number of people sharing the cost (x-axis): 0 to 11
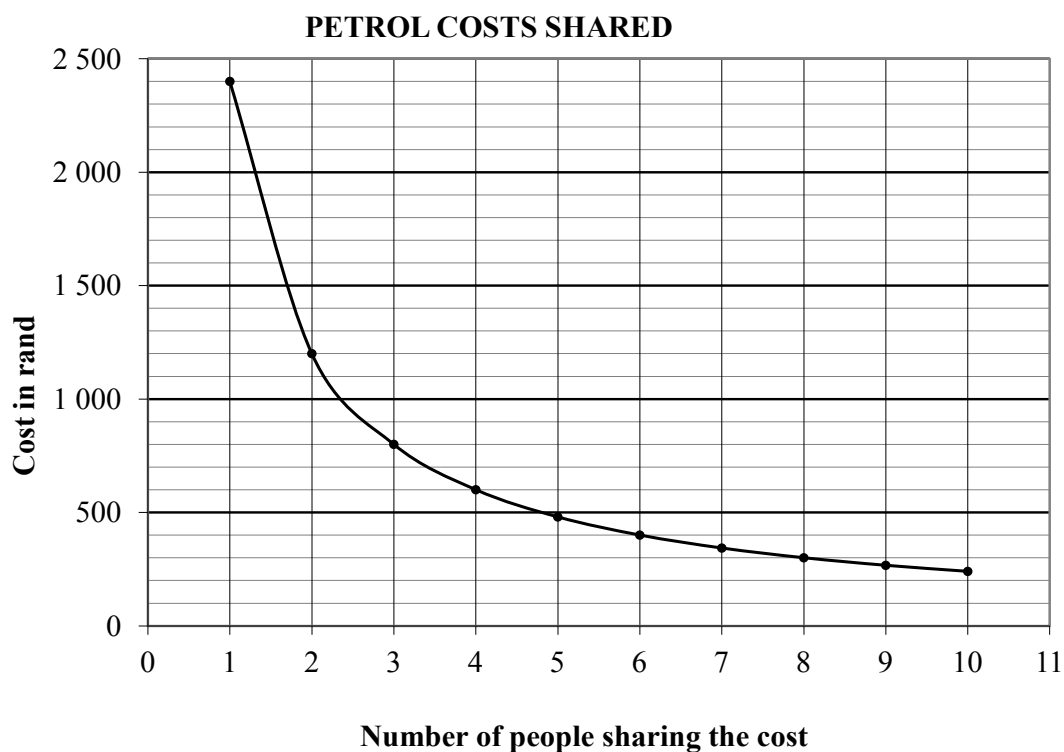
2.3.1   What type of proportion is represented by the graph above?   (1)

2.3.2   Determine the monthly petrol cost per person if Leslie shares the petrol costs with SEVEN colleagues.   (2)

2.3.3   Determine the number of people sharing the cost if the monthly cost per person is R800.   (2)

2.3.4   Write down a formula that Leslie can use to calculate the monthly petrol costs per person sharing with him, in the form:

Monthly petrol cost per person = ...   (2)

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QUESTION 3

ACE swimming club wants to raise funds to improve their facilities. They decide to have a swimming competition for which spectators will be charged an entrance fee.

The swimming pool at the club is in the form of a rectangular prism as shown in the picture below.

3.1   The inside measurements of the walls of the pool are as follows:

Length = 50 m, breadth = 25 m and height = 1,5 m

3.1.1   The inside walls and the floor of the pool need to be repainted. Determine the total area of the pool that will be repainted.

Use the following formula:

Area to be repainted $= \ell \times b + 2h(\ell + b)$

where ℓ = length
b = breadth
h = height   (3)

3.1.2   Calculate the height of the water in the pool if the volume of water in the pool is 1 500 m^3.

Use the following formula:

Height of a rectangular prism $= \dfrac{\text{volume}}{\text{length} \times \text{breadth}}$ (2)

3.2   The temperature of the water in the pool needs to be maintained at 22 $^{\circ}$C. The temperature gauge used shows the temperature in degrees Fahrenheit ($^{\circ}$F).

Convert (rounded off to the nearest degree) 22 $^{\circ}$C to degrees Fahrenheit.

Use the following formula:

Temperature (in $^{\circ}$F) $= 32 + 1,8 \times$ (Temperature in $^{\circ}$C)   (3)

3.3 | The spectators at the swimming competition will be charged an entrance fee as indicated in TABLE 1 below.

TABLE 1: Entrance fee for spectators attending the swimming competition

Children 3 years and younger	No Fee
Children between 3 years and 12 years	R7,50
Children 12 years and older	R10,50
Adults	R10,50
Pensioners	R7,50

The following is a record of the number of spectators who attended the swimming competition:

- 50 children between 3 years and 12 years old
- 45 children 12 years and older
- 50 adults
- 15 pensioners

3.3.1   Determine the number of children 3 years and younger who attended the swimming competition if there was a total of 177 spectators. (2)

3.3.2   Calculate the total income the club received from entrance fees.

Use the following formula:

Total income from entrance fees = a × R7,50 + b × R10,50

Where a = the number of people paying R7,50
         b = the number of people paying R10,50 (4)

3.4   The ACE swimming club also sold branded sports bags at the competition. Each bag cost the club R65,00 and was sold for R87,00.

Calculate the number of branded sports bags that was sold if a profit of R594,00 was made. (3)

3.5   The funds generated will contribute to the purchase of a new pump for the swimming pool. A new pump costs R4 999,00. The club receives a 12% discount.

Calculate the discounted price the club has to pay for a new pump. (3)
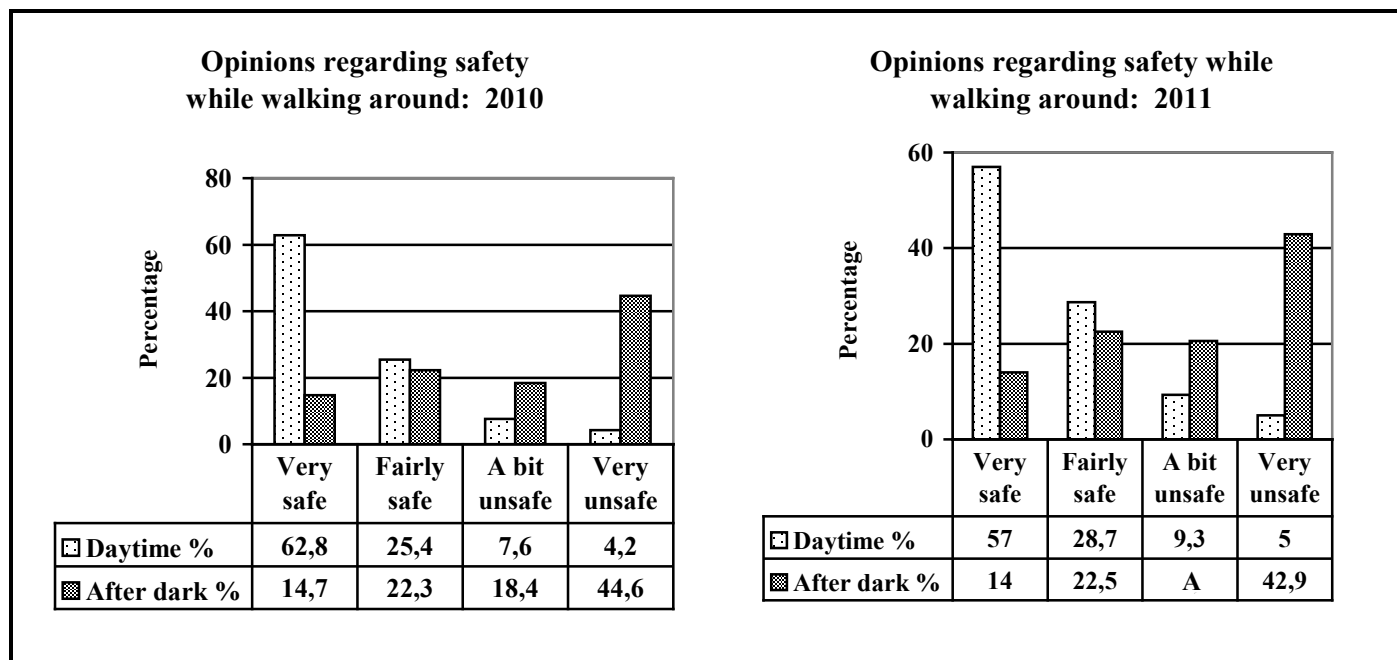
3.6   A few weeks after the swimming competition, an Australian tourist who had been a spectator at the competition deposited 1 500 Australian dollars (AUD$) into the club's bank account as a donation. The bank converted this amount to rand as R14 595,00.

Calculate the exchange rate, in rand per AUD$, used by the bank. (2)

[22]

QUESTION 4

Towards the end of each year, crime statistics of the preceding year are released. The data is collected from official police reports and questionnaires handed out to a sample of households. One of the questions in the questionnaire asked the respondents how safe they felt walking around during daytime and after dark.

4.1   Study the graphs and data below and answer the questions that follow.
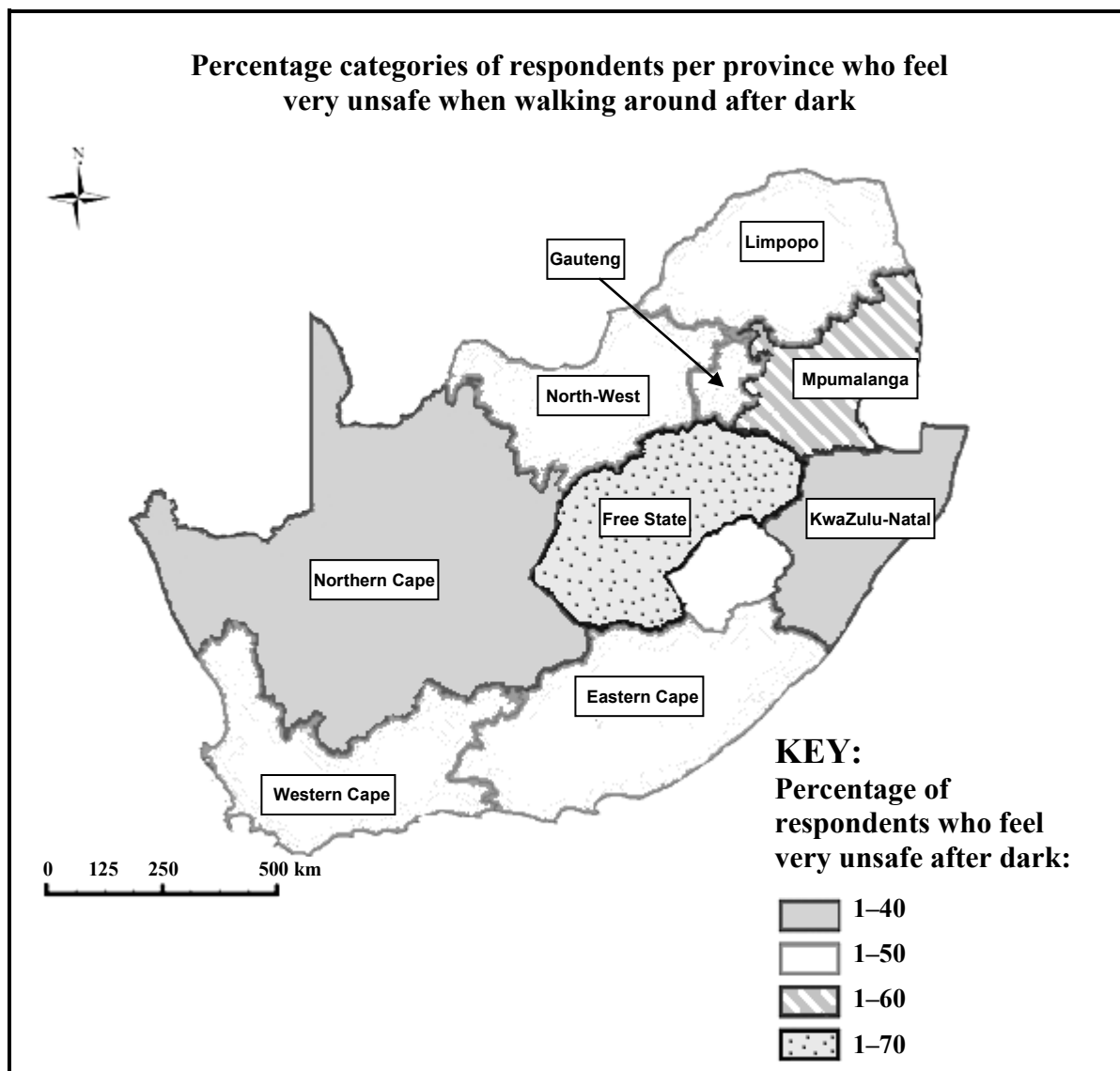
Opinions regarding safety while walking around: 2010

	Very safe	Fairly safe	A bit unsafe	Very unsafe
☐ Daytime %	62,8	25,4	7,6	4,2
▨ After dark %	14,7	22,3	18,4	44,6

Opinions regarding safety while walking around: 2011

	Very safe	Fairly safe	A bit unsafe	Very unsafe
☐ Daytime %	57	28,7	9,3	5
▨ After dark %	14	22,5	A	42,9

[Source: *Victims of Crime Statistics 2010*]   [Source: *Victims of Crime Statistics 2011*]

4.1.1   Calculate the missing value **A** in the second graph.   (1)

4.1.2   Identify the percentage of respondents who felt **a bit unsafe** while walking around during daytime in 2010.   (2)

4.1.3   During which year did the largest percentage of respondents feel **fairly safe** while walking around after dark?   (2)

4.1.4   At which time of the day (daytime or after dark) did most of the respondents in both years, 2010 and 2011, feel **very unsafe** while walking around?   (2)

4.1.5   Determine the difference in the percentage of respondents who felt **very safe** walking around during daytime between 2011 and 2010.   (2)

4.1.6   Write down the ratio of the percentage of respondents during 2011 who felt **very safe** walking around during daytime to those who felt **very safe** walking around after dark.

          Give the ratio in simplified form, rounded off to the nearest whole number.   (2)

4.2   The map below is included in the crime statistics for 2011.

Percentage categories of respondents per province who feel very unsafe when walking around after dark

KEY:
Percentage of respondents who feel very unsafe after dark:

1–40
1–50
1–60
1–70

4.2.1   In which province(s) did 31% to 40% of the respondents feel **very unsafe** when walking around after dark?   (2)

4.2.2   In which province did the most respondents feel **very unsafe** when walking around after dark?   (1)

4.2.3   In which percentage category do the majority of the provinces fall?   (2)

4.2.4   In which province(s) was the percentage of respondents who felt **very unsafe** when walking around after dark more than 50%?   (2)

4.2.5   Which province is south-west of the Free State and at the same time south of the Northern Cape?   (2)

4.2.6   Calculate, using measurements, the scale used on the map in the form **1 :** ...   (3)

[23]

QUESTION 5

5.1   Hloni works in a laboratory where bacteria cultures are grown. [Bacteria culture is a scientific term used for growing bacteria under controlled conditions in a laboratory.]

Bacteria cultures are used to test the effectiveness of certain medicines.

A particular bacterium grows at an increasing rate where the number of bacteria doubles every two hours.

Hloni started the culture with 50 bacteria.

TABLE 2 below shows the growth of the bacteria over a 12-hour period.

TABLE 2: Growth of bacteria over a 12-hour period

Time in hours	0	2	4	6	8	12
Number of bacteria	50	100	200	400	800	**K**

5.1.1   Determine the missing value **K**.   (2)

5.1.2   Determine the time it takes the number of bacteria in a culture to increase to 8 times the original number.   (2)

5.1.3   Use the grid on ANNEXURE A to draw a curve to represent the information in TABLE 2.   (5)

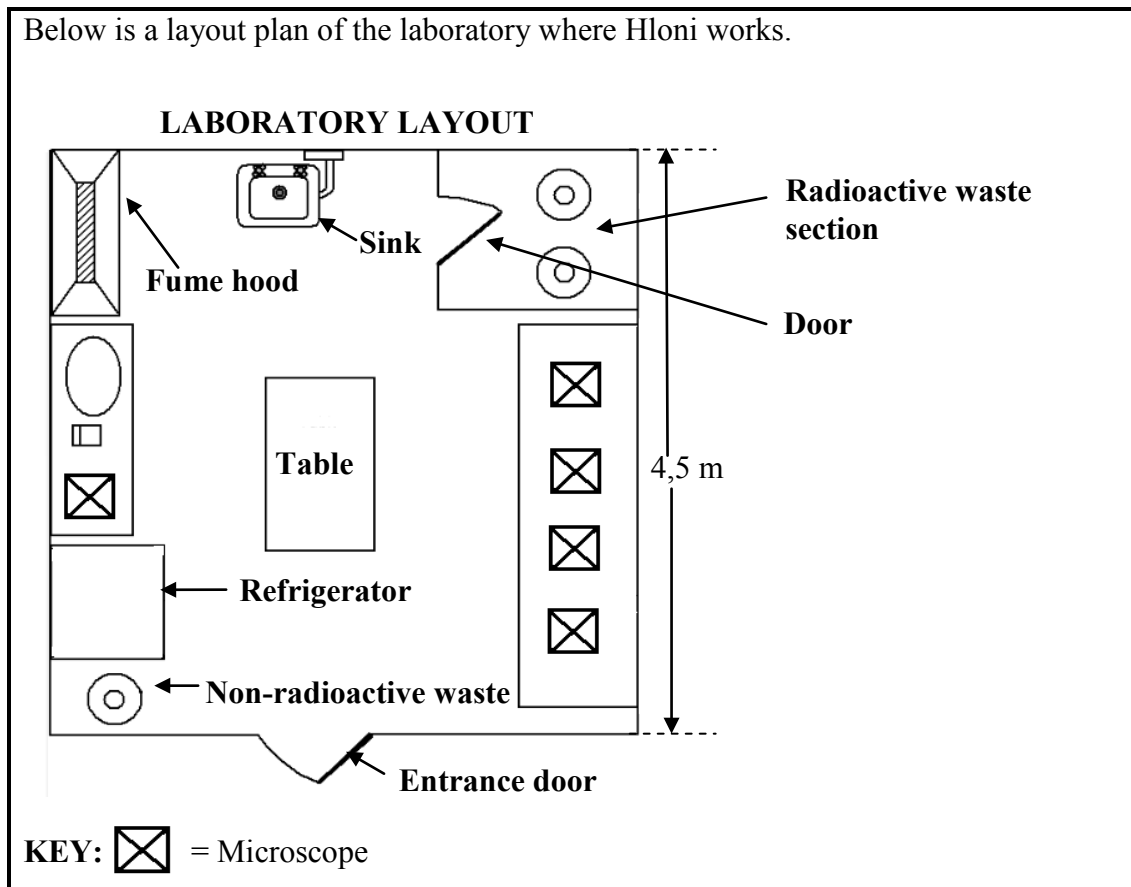5.1.4   Calculate the average growth rate between the 4th and the 8th hour.

Use the following formula:

$$\textbf{Average growth rate } = \frac{\textbf{\textit{s} − \textit{t}}}{\textbf{\textit{r}}}$$

where s = number of bacteria at the 8th hour
         t = number of bacteria at the 4th hour
         r = difference in time   (3)

5.2 | Below is a layout plan of the laboratory where Hloni works.

LABORATORY LAYOUT

KEY: ☒ = Microscope

5.2.1 Which item is located at the far left-hand corner of the laboratory as a person enters the laboratory? (1)

5.2.2 Hloni is in the radioactive waste section and sends a visually impaired person to fetch something from the refrigerator in the laboratory.

How would Hloni clearly direct the person to get to the refrigerator after going out of the door of the radioactive waste section? (3)

5.2.3 Calculate the width of the laboratory if the total floor area is 18,9 m^2.

Use the formula: **Width = $\dfrac{\textbf{total floor area}}{\textbf{length}}$** (3)

5.2.4 The scale used on the layout plan is 1 **:** 58.

Calculate the actual length of the table on the layout plan if its scaled length is 2,26 cm. (2)

[21]

QUESTION 6

6.1 | A Grade 7 teacher at a primary school compiled a weather chart for the 210 school days in an academic year. She recorded the number of days that were: sunny with no rain, cloudy with no rain, intermittent rain, light rain and heavy rain. She represented her data in the pie chart below.

Daily Weather

E 19%
A 33%
D 9%
C
B 10%
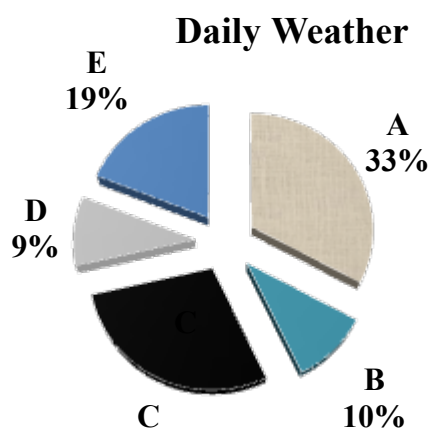
KEY

A	Sunny with no rain
B	Cloudy with no rain
C	Intermittent rain
D	Light rain
E	Heavy rain

6.1.1   Calculate the percentage of days when there was intermittent rain.   (2)

6.1.2   Determine the total number of school days when there was no rain.   (3)

6.2 | Mrs Louw intends starting a home industry making school jerseys for local primary schools. In November, she conducted a survey at her school to determine the number of learners who might buy a new school jersey in the new year. The jersey types are shown in the pictures below.

Long-sleeved jersey   Sleeveless jersey

She recorded her findings in the table below.

TABLE 3: Number of new jerseys according to type and size

TYPE OF JERSEY	SIZE								
	20	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**
Sleeveless	24	32	26	25	20	18	10	4	0
Long-sleeved	42	16	20	25	26	23	20	10	6

6.2.1   Identify the number of learners that might buy a size 30 long-sleeved jersey.   (1)

6.2.2   Calculate the total number of learners who might buy a sleeveless jersey.   (2)

6.2.3   Mrs Louw's survey showed that for a particular jersey size, the number of sleeveless jerseys is double the number of long-sleeved jerseys.

Identify the jersey size referred to.   (2)

6.3 | Mrs Louw bought a knitting machine for R5 600,00 to make the jerseys. It will cost her an average of R60,00 (including wool and electricity) to make one long-sleeved jersey (irrespective of the jersey size). The school shop buys a long-sleeved jersey for R95,00 and then sells it to the learners.

TABLE 4 below shows the relationship between the costs and income for making and selling 200 long-sleeved jerseys.

TABLE 4: Costs and income for making and selling 200 long-sleeved jerseys

	NUMBER OF JERSEYS MADE						
	0	**60**	**A**	**120**	**160**	**180**	**200**
Costs (in rand)	5 600	9 200	11 600	12 800	15 200	16 400	17 600
Income (in rand)	0	5 700	9 500	11 400	15 200	**B**	19 000

6.3.1   Determine the missing values **A** and **B**.   (4)

6.3.2   On ANNEXURE B, the line graph showing Mrs Louw's income from the sale of 200 long-sleeved jerseys is drawn.

Draw another line graph on the same grid representing the costs of making 200 long-sleeved jerseys.   (4)

6.3.3   Determine the minimum number of jerseys Mrs Louw should make and sell to start showing a profit.   (2)
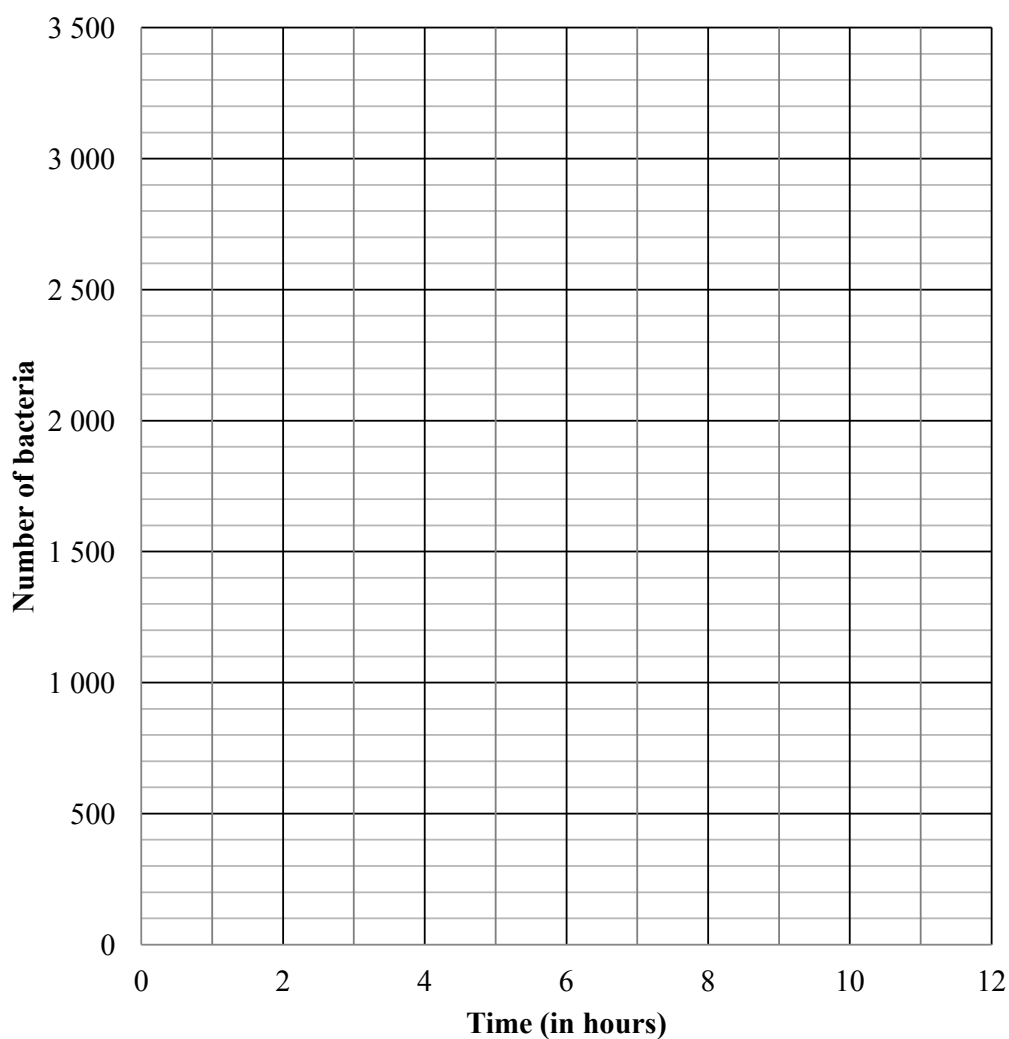
[20]

TOTAL: 150

CENTRE NUMBER:

EXAMINATION NUMBER:

ANNEXURE A

QUESTION 5.1.3

TABLE 2: Growth of bacteria over a 12-hour period

Time in hours	0	2	4	6	8	12
Number of bacteria	50	100	200	400	800	**K**

Growth of bacteria over time

Number of bacteria (vertical axis: 0, 500, 1 000, 1 500, 2 000, 2 500, 3 000, 3 500)

Time (in hours) (horizontal axis: 0, 2, 4, 6, 8, 10, 12)

CENTRE NUMBER:

EXAMINATION NUMBER:

ANNEXURE B

QUESTION 6.3.2

TABLE 4: Costs for making and selling 200 long-sleeved jerseys

Number of jerseys made	0	60	A	120	160	180	200
Costs (in rand)	5 600	9 200	11 600	12 800	15 200	16 400	17 600

COSTS AND INCOME FOR MAKING 200 LONG-SLEEVED JERSEYS