



JENN

Training and Consultancy

The path to enlightened education

SUBJECT: MATHEMATICAL LITERACY

GRADE 12

2026 WINTER CLASSES

TEACHER AND LEARNER CONTENT MANUAL

FINANCE

**Interests,
Loans & Investment, Hire**

DATA HANDLING

**Summarising & Representing Data
Using Box & Whisker Plot/Quartiles**

MEASUREMENT

**Conversion, Time, Perimeter, Area,
Surface Area, and Volume**

MAPS AND SCALE

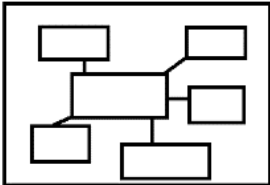
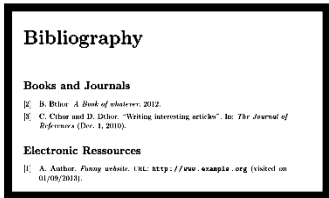
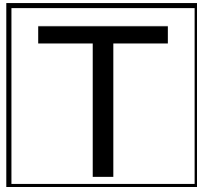
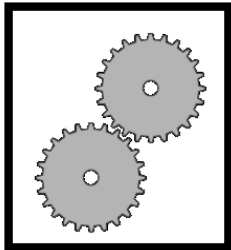
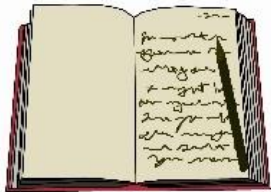
Scales and Maps

MATHEMATICAL LITERACY PROGRAMME FOR 2026 WINTER CLASSES

STRUCTURE OF EXAMINATION			
PAPER	TOPICS	TOTAL MARKS	WEIGHTING
PAPER 1: (FINANCE)	Finance	±90	± 60 %
	Data Handling	±53	± 35 %
TOTAL		± 4	± 32%
PAPER 2: (MEASUREMENT, MAPS, PLANS & SCALES)	Measurement	± 83	± 55%
	Maps, Plans and Scale	± 60	± 40%
	Probability	±7	± 5%
TOTAL		150	±100%
Pre-test and Post-test to be administered focuses only on Finance & Probability			



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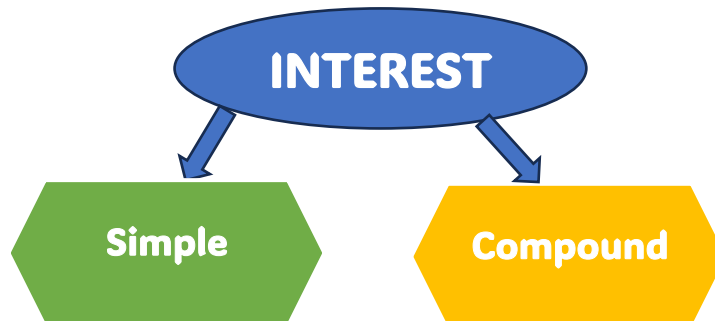
ICON DESCRIPTION			
MIND MAP 	EXAMINATION GUIDELINE 	BIBLIOGRAPHY 	TERMINOLOGY 
WORKED EXAMPLES 	STEPS 	CONTENTS 	ACTIVITIES 

SECTION 1: INTERESTS

LESSON OBJECTIVES

Learners must know how to:

- The difference between **simple** and **compound** interest.



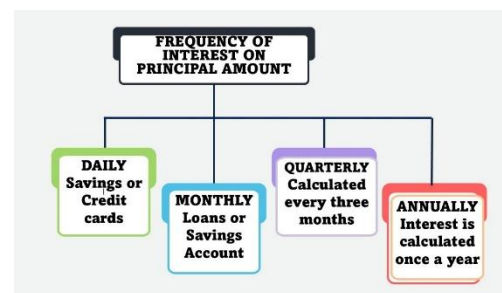
Simple Interest:

- Calculated only on the principal amount and is the same each time it is paid.
- If we know what the interest rate is, we can calculate the amount of interest quite simply.
- The amount of interest payable depends on the interest rate.
- The lower the interest rate, the lesser the payment and,
- The higher the interest rate, the more the payment.

Principal
the original amount
of money invested or
borrowed.

Compound Interest:

- Unlike simple interest, Compound interest is
- Calculated on the total/accumulated amount.
- Interest increases constantly.
- It yields more interest over time than simple interest.



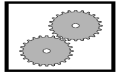
Key concepts of simple and compound interest:

- Principal Amount
- Interest Rate
- Time Period
- Compounding Frequency

Compounding Frequency
How often interest is
calculated and added
to the principal

IMPORTANT TERMS AND DEFINITIONS	
INTEREST	
Interest	The actual rand amount of interest that will be added to your loan or investment.
Interest rate	This is the % rate of interest that will be charged on your loan amount, i.e. a percentage value of the original loan amount.
Fixed Deposit	A single deposit invested for a fixed period at a fixed interest rate.
Investment	Something in which you have invested money. Money invested for specific period.
Loan	A sum of money borrowed from a lender, typically a bank or financial institution, with the agreement to pay it back in instalments, usually with interest, within a set timeframe.
Simple Interest	Interest earned only on the principal amount.
Compound interest	Interest earned on both principal and accrued interest.
Compounding Frequency	How often interest is calculated and added to the principal
Secured Loans	Backed by collateral, such as a house or car, which can be seized by the lender if repayments aren't met. Examples include mortgages and auto loans.
Unsecured Loans	Don't require collateral but often have higher interest rates. Examples include personal loans, credit card debt, and student loans.
Effective rate	Actual interest rate paid or earned, considering compounding.
APR	(Annual Percentage Rate): Total interest rate charged on a loan over a year.

Worked Example 1



- 1.1 Miss Matsheka wants to invest R12 000,00 into her saving account for 5 years. She will earn 10% simple interest per annum.

Use the information above and answer the questions that follow.

- 1.1.1 Identify the interest rate for the investment. (2)

Possible solution
10%

- 1.1.2 How much will Miss Matsheka have in total after 5 years? (5)

Possible solution

$$\frac{10}{100} \times R12\,000,00$$

$$= R\,1\,200,00$$

$$R\,1\,200 \times 5 \text{ years}$$

$$= R\,6\,000,00$$

$$\text{Total amount} = R\,6\,000,00 + R\,12\,000,00$$

$$= R18\,000,00$$

- 1.2 Mr. Mbhele will not be able to pay his society fee R3 000 in November due to his financial commitments. The society charges 10% interest rate for any member who fail to pay his/her contribution.

NOTE: A society is like a stokvel to which people belong to save money for future use

- 1.2.1 What is the difference between interest and interest rate? (2)

Possible solution

- **Interest** – extra money you earn from the savings.
- **Interest rate** - the amount of interest due per period, as a proportion of the amount, lent, deposited, or borrowed

- 1.2.2 Mr Mbhele claims he could have saved R300,00 if he did pay for his Society. Verify with calculation whether his claim is valid or not. (3)

Possible solution

$$R3000 \times \frac{10}{100}$$

$$= R300$$

Statement is valid

- 1.3 Namhla and Grace do not have money to fund their “Thanksgiving” ceremony. They approached their uncle who owns a registered cash loan shop to lend them a total amount of R9000, 00. Their uncle agreed to offer them the loan on conditions that they pay it back in 3 years at a rate of 3% simple interest per annum

1.3.1 Explain the difference between “interest rate” and “interest” values. (4)

Possible solution

Interest rate – the rate at which interest is calculated. OR: Accept also: The percentage at which interest is paid.

Interest – money paid at a particular (interest) rate for the use of money lent/borrowed

1.3.2 Calculate the total amount Namhla and Grace will have to pay to their uncle at the end of the 3 year term, if the interest payable per year is R270 (4)

Possible solution

$$\text{R}270 \times 3 = \text{R}810$$

$$\text{R}9\,000 + \text{R}810 = \text{R}9\,810$$

- 1.4 Miss De Waal decided to take a personal loan in order to buy the dining room suite in cash.
She went to two Banks and was offered the following:

Bank A: R20 000 at 10% p.a. Simple interest for 3 years.

Bank B: R20 000 at 11,5% p.a. Compound interest for 2 years.

Determine, showing ALL calculations, which option will be cheaper for Miss De Waal.

(8)

Possible solution

Simple interest - Bank A

$$\begin{aligned}\text{Interest} &= \text{R}20\,000 \times \frac{10}{100} \\ &= \text{R}2\,000\end{aligned}$$

$$\text{Total interest} = \text{R}2\,000 \times 3 = \text{R}6\,000$$

$$\begin{aligned}\text{Total amount} &= \text{R}20\,000 + \text{R}6\,000 \\ &= \text{R}26\,000\end{aligned}$$

Compound interest – Bank B

$$\begin{aligned}1^{\text{st}} \text{ year} &= \text{R}20\,000 \times \frac{11,5}{100} = \text{R}2\,300 \\ &= \text{R}20\,000 + \text{R}2\,300 = \text{R}22\,300\end{aligned}$$

$$\begin{aligned}2^{\text{nd}} \text{ year} &= \text{R}22\,300 \times \frac{11,5}{100} = \text{R}2\,564,50 \\ &= \text{R}22\,300 + \text{R}2\,564,50 \\ &= \text{R}24\,864,50\end{aligned}$$

Bank B is cheaper.



ACTIVITY 1: Interest & Hire Purchases

(10 marks: 10 minutes)

1. Debbie wants to buy a water purifying system for her drinking water. The following options are available for her.

PAYMENT OPTIONS	PICTURE OF A WATER PURIFYING SYSTEM
Option 1: The cash price is R2 299 Option 2: • R216 per month • The amount includes insurance and service fee • 24 months to pay • Interest 17,25% p.a. Option 3: • R211 per month • Amount excludes insurance and service fee • 12 months • Interest 17,5% p.a.	

Use the information above to answer the questions that follow.

- 1.1 Write the acronym *p.a.* in full. (2)
- 1.2 Calculate the amount of interest p.a. charged in option 3. (3)
- 1.3 Debbie told her domestic worker that she would pay more than double the cash price if she chose to buy using option 2. (5)
- Verify, showing all calculations, if Debbie's statement is correct.

ACTIVITY 2: Interest

(14 marks: 15 minutes)



- 1.1 Mr Lambert is planning to buy a house and he realizes that the 105% home loan from the bank will not be enough to cover all the costs. His friend is willing to give him a loan of R7 000 to be paid back in full after 2 years with the following conditions:

- Simple interest at 11,75% p.a for the first year.
- 12% p.a compounded half yearly for the second year.

Use the information above to answer the following questions

- 1.1.1 Calculate the compounded half yearly interest rate for 6 months (2)

- 1.1.2 Manually calculate the total amount Lambert will have to pay his friend at the end of 2 years (6)

- 1.2 Niel owns a panel beating business. He specialises in buying accident-damaged cars which he refurbishes (repairs, repaints, valets) for resale.

He invests R15 000 of his total profit in a bank which offers him the following interest rates:

6,25% interest compounded yearly for the first year and an interest rate of 6,95% compounded yearly for the second year.

- 1.2.1 Calculate the total interest that Niel's investment would earn at the end of the second year. (6)

ACTIVITY 3: Loans

(17 marks: 20 minutes)



3.1.1	Mrs Smith would like to buy a car but does not have the full cash amount. She invested R60 000 at a bank for two years with a compound interest. In the first year she received an interest rate of 4,3% per annum while in the second year the interest was 5,1%. Mrs Smith stated that she would have enough money at the end of the second year to pay the residual value of the car she intends to buy. If the residual value is R116 759, VERIFY, showing calculations, whether her statement is CORRECT.	(8)
3.1.2	Due to the challenge of load shedding in South Africa, Katiso intends on buying a generator for her household. He decided to pay cash for the generator. He plans to borrow money from FBN Bank. The bank agreed to lend her R13 000 at an interest rate of 10,5%, compounded annually, for 2 years and 6 months. The total cost for the generator was R15 600 and Katiso stated that the total amount that he will pay to the bank will be less than the total cost of the generator. Verify, showing ALL calculations, whether Katiso's statement is valid.	(9)

SECTION 2: DATA HANDLING

SUMMARISING AND REPRESENTING DATA

USING BOX AND WHISKER PLOT/QUARTILES

Stage 4: Summarising Data

Learners must be able to:

- Summarize multiple sets of data using the mean, median, mode and range (central tendency and spread).
- Determine Quartile and inter-quartile range values.
- Analyse calculated measures of central tendency.
- Work with Percentiles (interpretation only).
- Understand the function /purpose of values above.
- Understand the role and impact of outliers.

Stage 5: Representing Data

Learners must be able to:

- Represent multiple sets of collected data using pie charts, histograms, single bar graph, line, and broken line graphs.
- Work with Multiple bar graphs and compound/vertical stack graphs
- Draw Scatter plot graphs.
- Interpret and analyse Box and whisker plot.
- Understand suitability of the types of graphs for different situations
- Understand the effect of the scale of the axes on the impression.
- Read/estimate information from graphs.

Stage 6: Analysing and Interpreting Data

NB: Analysing and Interpretation of data must be done whilst dealing with all other five (5) stages, i.e., it is integrated.

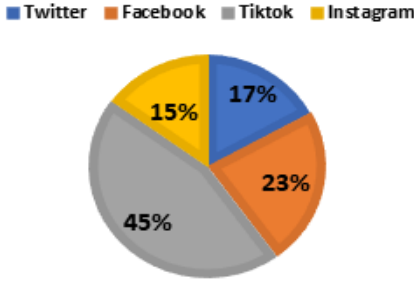
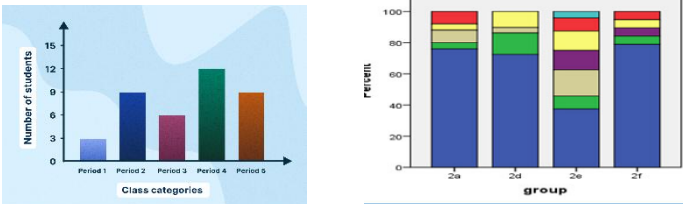
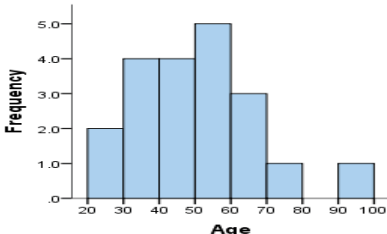
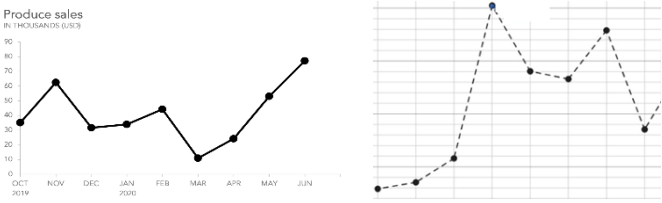
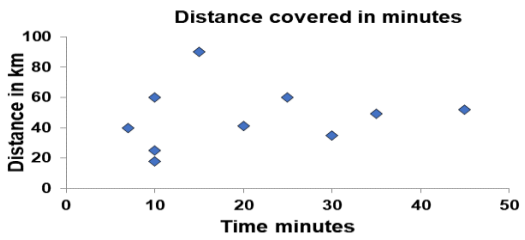
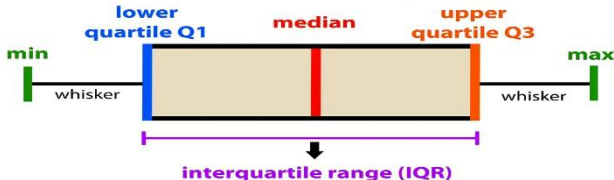
Learners must be able to:

- Identify/describe the trends (increase, decrease, stay the same and time)
- Ask questions about the way in which data was collected, organized, summarized, and presented to reveal possible sources of errors/bias. Indemnify & describe any misleading representations/summaries.
- Compare different representation of multiple sets of data and explain the differences.
- Investigate situations in which summarized/represented data is interpreted in different ways.
- Develop opposing arguments using the same summarized/represented data.

IMPORTANT TERMS AND DEFINITIONS

DEVELOPING QUESTIONS AND COLLECTING DATA

Inter-quartile range	The difference between quartile 3 and quartile 1 or the difference between largest quartile and the smallest quartile.
Population	The entire source of data involved in an investigation
Sample	The small group chosen from the population
Mean	Average of the values in a data set; sum of all the observed values divided by the number of observations.
Mode	Value or values appearing most often in a data set.
Median	Middle value in an ordered data set.
Range	Difference between the highest and lowest values in a data set.
Inter-Quartile Range (IQR)	The difference between largest quartile (Q3) and the smallest quartile (Q1).
Box-and-Whisker Plot	Diagram used to show the distribution of data along a number line divided into the quartiles.
Bias	To favour or oppose something or someone in a way which is considered unfair
Ascending Order	Arranging data from smallest to the biggest value.
Descending Order	Arranging data from biggest to the smallest value.

Pie Charts - Each sector/slice represents data value. - Commonly used for categorical data NB: You are not required to draw it, just read, and interpret values.	 Twitter Facebook Tiktok Instagram
Single bar graphs and compound bar graphs (stacked and multiple) - Show frequency of each data - Used for discrete categorical data. - Spaces between the bars indicate discrete nature of the data	
Histograms - Represents continuous data. - Data grouped into intervals. - Class intervals on the horizontal axis - Bars on the same width.	
Line and Broken line graphs - Show the trend between plotted points of continuous data. - Broken line shows the trend between plotted points of discrete data. - Points are joined to show discrete nature of data.	
Scatter plots - Increasing straight line pattern gives positive correlation. - Decreasing straight line pattern gives negative correlation. - Scattered random points without pattern gives no correlation.	
Box-and-whisker plots - Only expected to interpret, not to draw.	

Measures of Spread

There are four (4) measures of spread namely:

- **Range**
- **Quartiles**
- **Inter-quartile Range**
- **Box and Whisker Plot**
- **Percentiles**

Range

- The difference between highest (maximum) value and lowest (minimum) value:

$$\text{Range} = \text{Highest value} - \text{Lowest value}$$

- If the range is small, the data is clustered together, and if the range is large, the data is more spread apart.

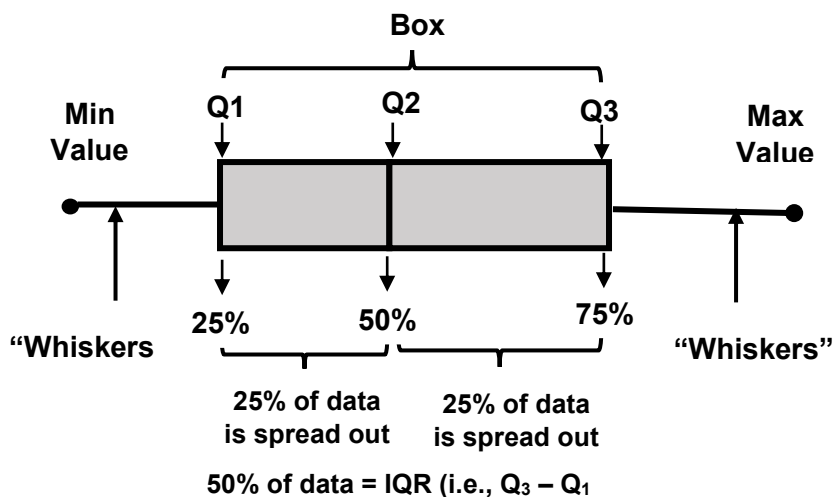
Interquartile Range (IQR)

- This is a measure of spread of the middle 50% of the data.

$$\text{IQR} = \text{Quartile 3 (Q3)} - \text{Quartile 1 (Q1)}$$

Box and Whisker Plot

- Also known as Box Plots
- The box-and-whisker plot is a visual representation of the “5-Number Summary” of a data set.

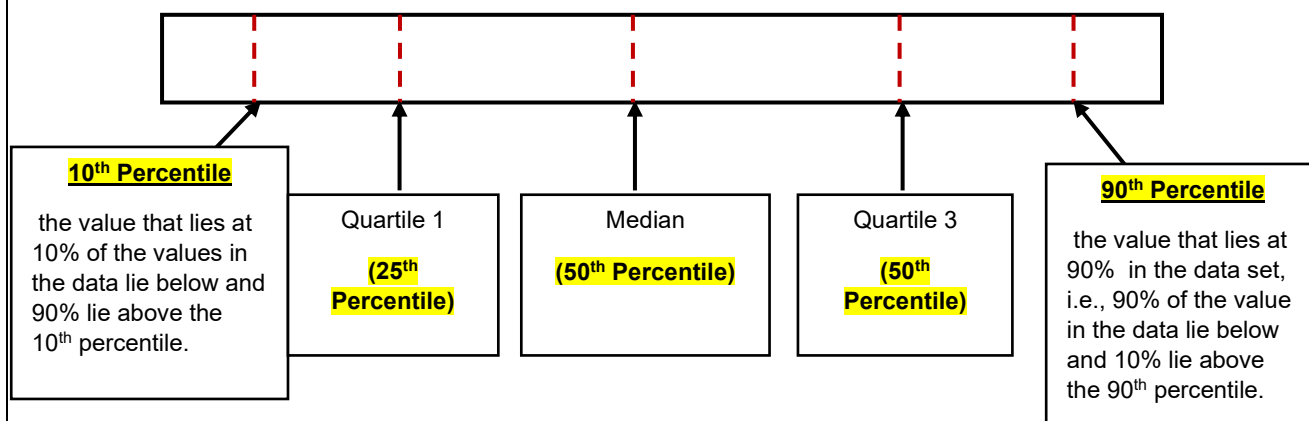


The 5-Number Summary	
No.	Value
1	Minimum Value
2	Lower Quartile (Q_1)
3	Median (Q_2)
4	Upper Quartile (Q_3)
5	Maximum Value

Percentiles

- The word “**percentile**” is derived from the word *percent* or *percentage*. Percentile divides the data into one hundred equal parts/segments, i.e., The 20th percentile is the value on or below which 20 percent of the data set lies.
- The 25th percentile is **equivalent to the first quartile (Q_1)**; the 50th percentile is **equivalent to the median or second quartile (Q_2)**; and the 75th percentile is **equivalent to the third quartile (Q_3)**.

Important: You are *ONLY* expected to *INTERPRET* percentiles. You will *NOT* be expected to calculate them from a data set.



Advantages and Disadvantages of the Measures of Spread

	Advantages	Disadvantages
Range	Quick and easy to calculate	Affected by outliers
Interquartile range	Gives you an indication of the spread of 50% of the data values. Not affected by outliers.	The data must be first arranged in ascending order. Time consuming to calculate, as you first need to determine Q ₁ and Q ₃ .

Analysis of the data:

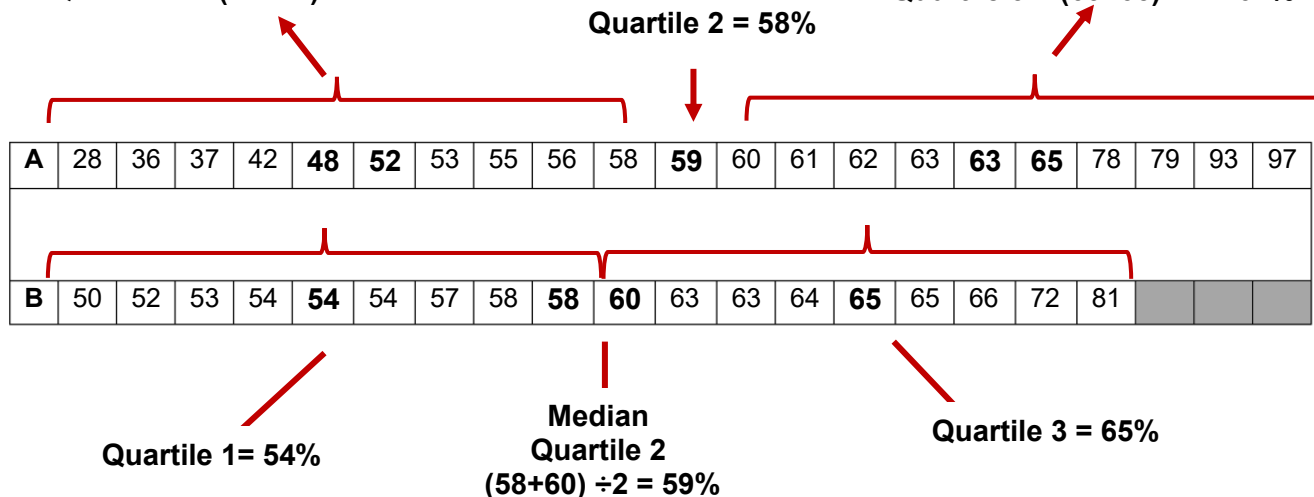
	Class A	Class B	Analysis
Bottom 25% of the data	28% to 50%	50% to 54%	The bottom quarter of Class A scored at most 50% , while the bottom quarter of Class B scored at least 50% , but at most 54% . The top quarter of Class A scored at least 64% which is almost the same as Class B at 65% , but Class A results were as high as 97% while Class B 's results peaked at 81% .
Top 25% of the data	64% to 97%	65% to 81%	

Find Quartiles for both **Class A** and **Class B** and interpret the two data set.

$$\text{Quartile 1} = (48+52) \div 2 = 50\%$$

$$\begin{aligned} \text{Median} \\ \text{Quartile 2} &= 58\% \end{aligned}$$

$$\text{Quartile 3} = (63+65) \div 2 = 64\%$$



Use the performance of **Class A** and **Class B** to determine the following:

A	28	36	37	42	48	52	53	55	56	58	59	60	61	62	63	63	65	78	79	93	97
B	50	52	53	54	54	54	57	58	58	60	63	63	64	65	65	66	72	81			

Possible Answer:

1. Range of **Class A** = **Maximum Value – Minimum Value**

$$= 97 - 28$$

$$= 69$$

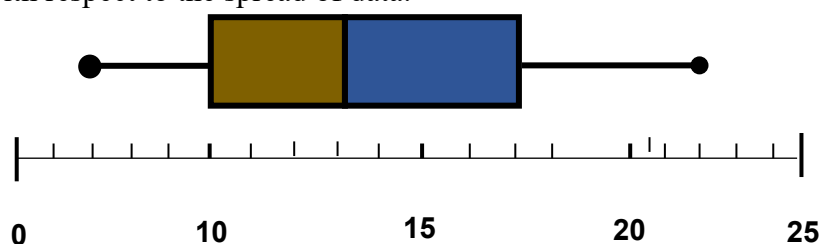
Range of **Class B** = **Maximum Value – Minimum Value**

$$= 81 - 50$$

$$= 31$$

1. Worked Example (Range, Interquartile range, box and whisker plot and percentiles)

- 1.1 Study the box-and-whisker plot below and interpret all the key “5-Number Summary” values with respect to the spread of data.



Possible Answer:

- “Five (5) Number Summary” values:

1. Minimum value = 2

2. Q_1 (lower quartile) = 10

3. Q_2 (median) = 13

4. Q_3 (upper quartile) = 17

5. Maximum value = 22

- **Range** = $22 - 2 = 20$

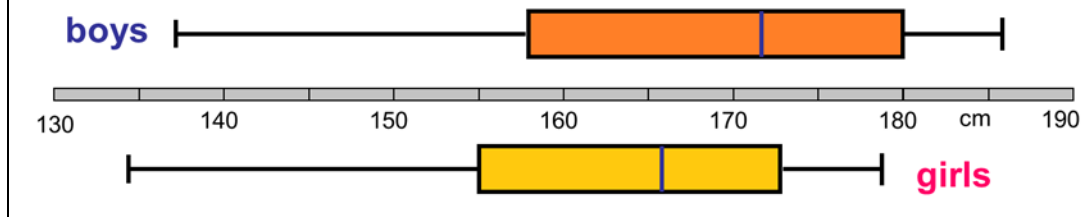
- **Interquartile Range (IQR)** = $Q_3 - Q_1 = 17 - 10 = 7$ (IQR is the lower, it means the data values are clustered/close together)

- 1.2 A student earned a mark of 73% for an exam and it is in the 92nd percentile of the grade.

Possible Answer:

This means that 92% of the grade obtained a mark of 73% or less for the exam and only 8% of the grade achieved a mark that was higher than (or equal) to 73%.

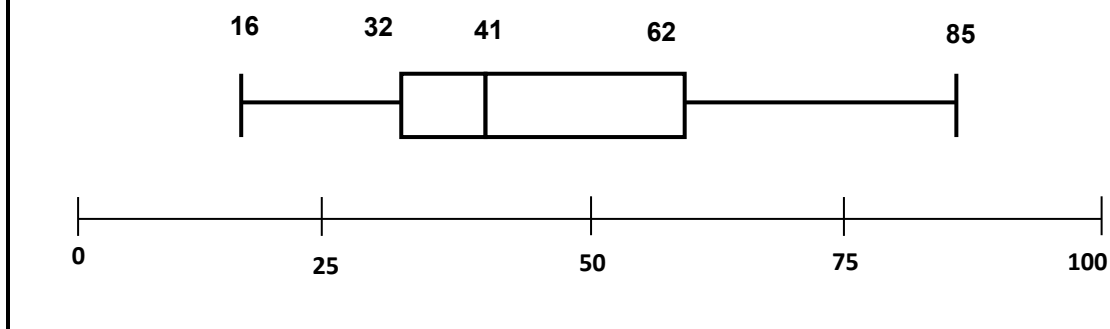
- 1.2 The box and whisker plots below represent the heights of boys and girls in Grade 12 class. Interpret the box and whisker to answer the following questions:



State whether the following statements are True or False

- 1.2.1 The tallest person is a boy. (2)
- 1.2.2 The shortest person is a girl. (2)
- 1.2.3 The girls show less spread in height. (2)
- 1.2.4 Half the boys are over 172 cm tall. (2)
- 1.2.5 The girls are taller on average. (2)

- 1.3 Below is a box-and-whisker diagram of the results (in %) of a Mathematical Literacy test written by 96 Grade 12 learners in a school. Use the diagram to answer the questions that follow:



- 1.3.1 What is the highest mark obtained? (2)
- 1.3.2 What percentage of learners obtained more than 41%? (2)
- 1.3.3 How many learners obtained more than 62%? (2)
- 1.3.4 Determine the inter-quartile range. (2)
- 1.3.5 The lower quartile is 32%. Say in your own words what does this mean. (2)

STAGE 5: REPRESENTING DATA

Once the data has been summarised, it is important to represent it visually.

- The following representations of data can be drawn:

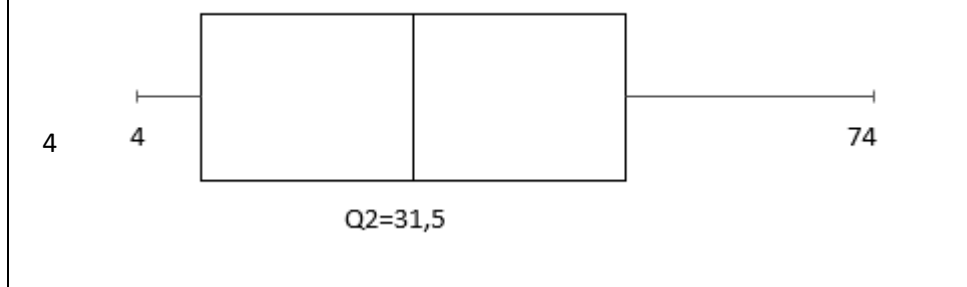
Activity 1: Data Handling

- 1.1 A municipality collected data about the number of solar geysers per suburb. The data that has been collected for the 14 suburbs is arranged as follows in ascending order:

4; 6; 8; 12; 14; 22; **D**; 35 ;42; 42; 44; 72; 73;74

- 1.1.1 Is the data discrete or continuous? Give a reason for your answer (3)

- 1.1.2 The following is a box and whisker plot of the data represented. Some values are omitted.



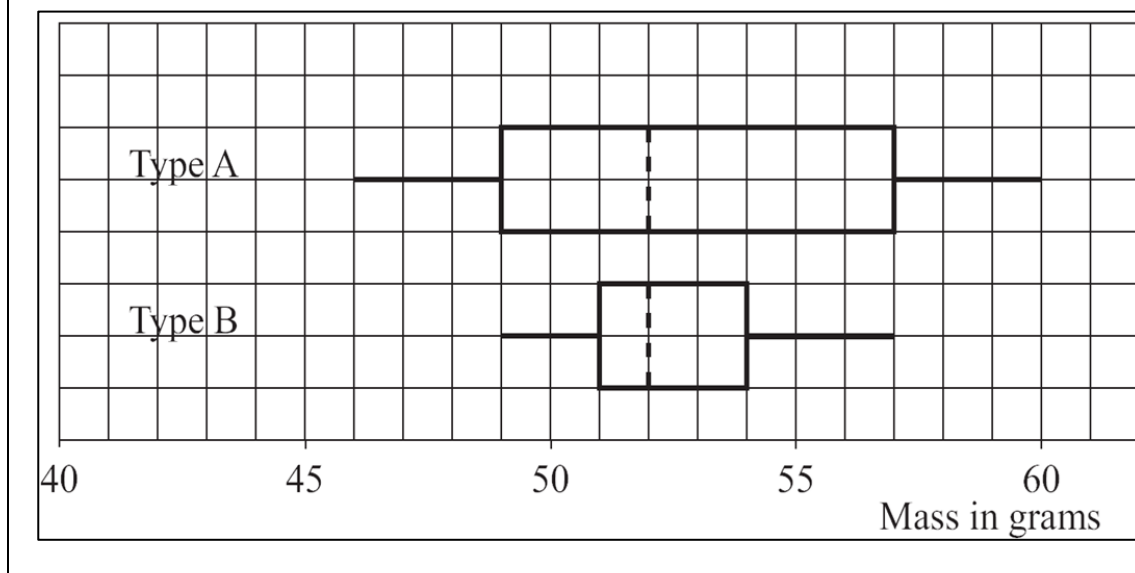
- Use this box-and-whisker plot to determine the value of **D** in the given data set. (4)

- 1.1.3 Determine the interquartile range (IQR) of the set of data. (2)

[09]

Activity 2: Data Handling

- 2.1 Mr Kert, a prominent farmer in KZN collected data on two types of tomatoes (Type A and Type B) and presented it in the form of a box-and-whisker plot as shown below.



Use the diagram above to answer the questions that follow.

- 2.1.1 Write down the 25th percentile for Type B tomato. (2)
- 2.1.2 Identify the median mass for the two types of tomatoes. (2)
- 2.1.3 Calculate the difference between the Range and Interquartile Range (IQR) for Type A tomato. (5)
- 2.1.4 Based on the box and whisker plot shown above for both types of tomatoes, advise Mr Kert which type of tomato he should grow in future. (3)

[30]

SECTION 3:

BODY MASS INDEX (BMI) AND GROWTH CHARTS

Introduction:

Body Mass Index (BMI):

- *Is a measure of body weight, based on a person's weight and height.*
- *The BMI can then be used to classify a person's weight status, as underweight, normal, overweight or obese.*
- *Percentiles are used to categorize BMI in children and adolescents, while adults are categorized based on BMI ranges.*

The following table is based on the BMI classification table. The following table is based on the BMI classification table.

BMI-for-Age Percentiles for Children and Adolescents			
Underweight	Normal Weight	Overweight	Obese
• BMI < 5th percentile	• BMI = 5th-84th percentile	• BMI = 85th-94th percentile	• Obese: BMI $\geq$ 95th percentile

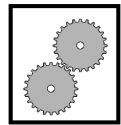
BMI Categories for Adults			
Underweight	Normal Weight	Overweight	Obese
• BMI < 18.5	• BMI = 18,5-24,9	• BMI = 25-29,9	• Obese: BMI $\geq$ 30

Importance of monitoring BMI:

1. Health risks: BMI can indicate potential health risks associated with weight.
2. Monitoring growth: BMI-for-age percentiles help track growth and development in children and adolescents.
3. Public health: BMI data inform public health initiatives and policies.

NB: *Keep in mind that BMI has limitations, such as not accounting for muscle mass or body composition.*

Worked Example 1



- 1.1 A young rugby player is concerned about his weight. He weighs himself before joining a gymnasium and calculates that his BMI (Body Mass Index) is $25,1 \text{ kg/m}^2$. He has a height of 175 cm. The table below shows the weight status versus the BMI ranges.

TABLE 1: WEIGHT STATUS ACCORDING TO BMI

BMI Range (Kg/m^2)	WEIGHT STATUS
Less than 18,5	Underweight
From 18,5–24,9	Normal weight
From 25–30	Overweight
More than 30	Obese

Refer to the table provided above and answer the questions that follow.

- 1.1.1 Use the information above to calculate his current weight (mass).

You may use the formula below:

$$\text{BMI} = \frac{\text{Mass in kg}}{(\text{Height} \times \text{Height}) \text{ in metres}} \quad (4)$$

Possible Solution

Convert: $175 \div 100 = 1,75 \text{ m}$

$$\text{BMI} = \frac{\text{Mass in kg}}{(\text{Height in m})^2}$$

$$25,2 = \frac{\text{Mass in kg}}{1,75\text{m} \times 1,75\text{m}}$$

$$\text{Mass} = \text{BMI} \times (\text{height})^2$$
$$= 25,1 \times (1,75)^2$$

$$\text{Mass in (kg)} = 76,86875 \text{ kg}$$
$$= 76.87 \text{ kg}$$

- 1.1.2 Write down the young player's current weight status. (2)

Possible solution

Overweight

- 1.1.3 Provide advice to him on how to improve his BMI status. (2)

Possible solution

The young promising rugby player can eat healthier.

- 1.2 The doctor has examined Lethabo and Tumi to get their status and compare it to the health status of John's son. Study the weight status table below to answer the following questions.

Weight status classifications	
Weight status	BMI for age Percentile range
Underweight	Less than the 5th percentile
Healthy	≥5th percentile and < 85th percentile
At risk of overweight	≥ 85th percentile and < 95th percentile
Overweight	≥95th percentile

- 1.2.1 Write down the acronym BMI in full (2)

Possible Solution

Body Mass Index

- 1.2.2 14-year-old Lethabo has a BMI that places him between the 85th and the 95th percentile curve. What is Lethabo's weight status? Suggest the advice that the doctor should give to Muzi?

Possible Solution

Risk of being overweight

Exercise or

Eat balanced diet

- 1.2.3 John claimed that his 17-year-old son who is 1,5 m tall and weighs 55 000g falls between the 75th and 85th percentile and has a healthier status than Muzi's sons. Verify his claim.

You may use the formula:

$$\text{BMI} = \frac{\text{Mass in kg}}{(\text{Height in m})^2}$$

Possible Solution

$$\text{BMI} = \frac{55}{1,5^2}$$

$$= \frac{55}{2,25}$$
$$= 24,4 \text{ kg/m}^2$$

- His weight places him between 75th and 85th percentile curve
- He is healthy

The claim is valid

ACTIVITY 1: Body Mass Index

(12 marks: 15 minutes)



- 1 BMI charts or tables with BMI intervals can be used to classify a person's weight status as either underweight, normal, overweight, or obese. Below is a BMI chart and a corresponding BMI classification table.

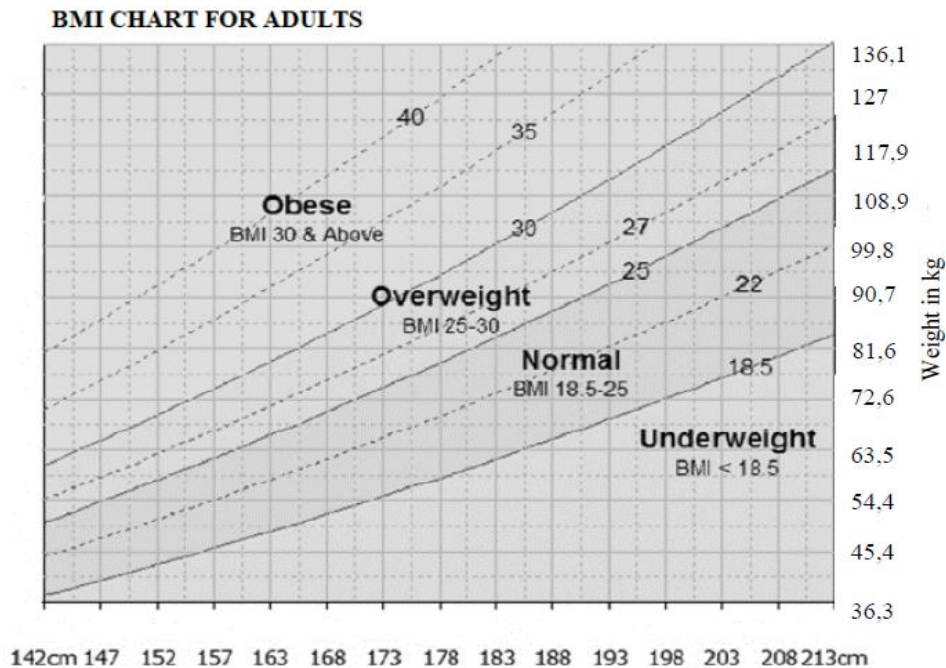


TABLE: BMI CATEGORIES FOR ADULTS

BMI	CLASSIFICATION
30 and above	Obese
25 - 30	Overweight
18,5 – 25	Normal weight
Less than 18,5	Under weight

Use the information above to answer the following questions.

- 1.1 Write down the acronym *BMI* in full. (2)
- 1.2 Ruth states that a person who weighs 75kg and has a height of 175 cm, is underweight. Is Ruth correct? Do calculations to verify your answer.

You may use the following formula:
$$\text{BMI} = \frac{\text{Mass in kg}}{(\text{Height in m})^2}$$
 (6)

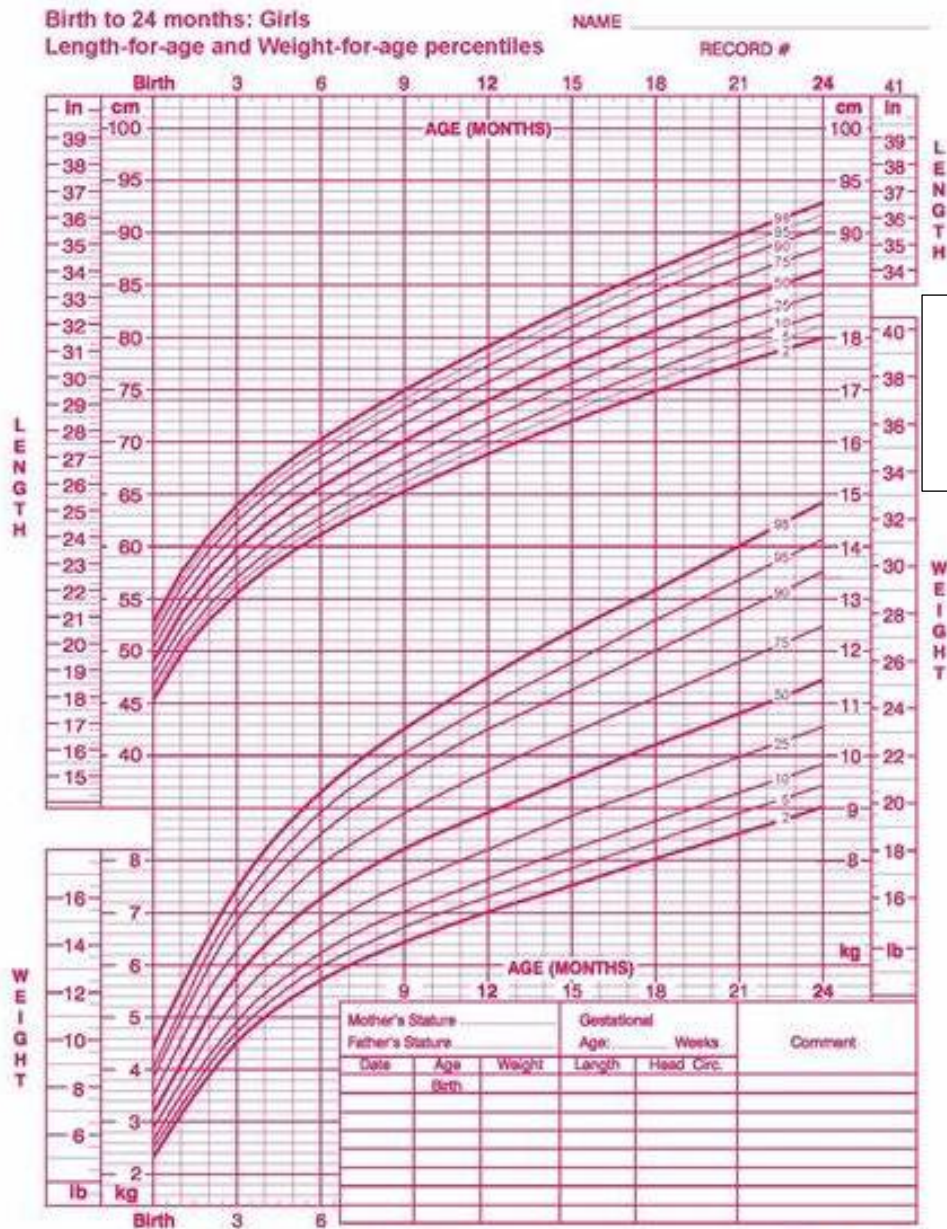
- 1.3 Give TWO health risks of being overweight or obese. (4)

ACTIVITY 2: Body Mass Index

(18 marks: 20 minutes)



- 1.1 The growth chart below shows the length-for-age and weight-for-age percentiles for girls 0 – 36 months.



GIRLS

Use the information above to answer the questions that follow.

- 1.1.1 Determine the normal height of a 6-month-old girl on the 50th percentile. (2)
- 1.1.2 Between which two percentiles will a 24-month-old girl be if her weight is 11 kg? (2)
- 1.1.3 Calculate the BMI in (kg/m²) of a girl who weighs 16kg and has a height of 75cm.

(3)

You may use the formula: $BMI = \frac{\text{weight}}{\text{height}^2}$

- 1.2 Mr Kasongo is a soccer player is concerned about his weight. He weighs himself before joining a gymnasium and calculated his BMI. He has a height of 170 cm. The table below shows the weight status versus the BMI range.

Table 1: WEIGHT STATUS ACCORDING TO BMI

BMI Range (Kg/m ²)	WEIGHT STATUS
Less than 18,5	Underweight
From 18,5 – 24,9	Normal weight
From 25 - 30	Overweight
More than 30	Obese

Refer to the table provided above and answer the questions that follow.

- 1.2.1 Write the acronym **BMI** in full. (2)

- 1.2.2 Use the information above to calculate his current weight (mass) if his BMI is 28,1 kg/m²

You may use the formula below:

$$BMI = \frac{\text{Mass in kg}}{(\text{Height in m})^2} \quad (5)$$

- 1.2.3 Write down Mr Kasongo's current weight status. (2)

- 1.2.4 Provide advice to him on how to improve his BMI status. (2)

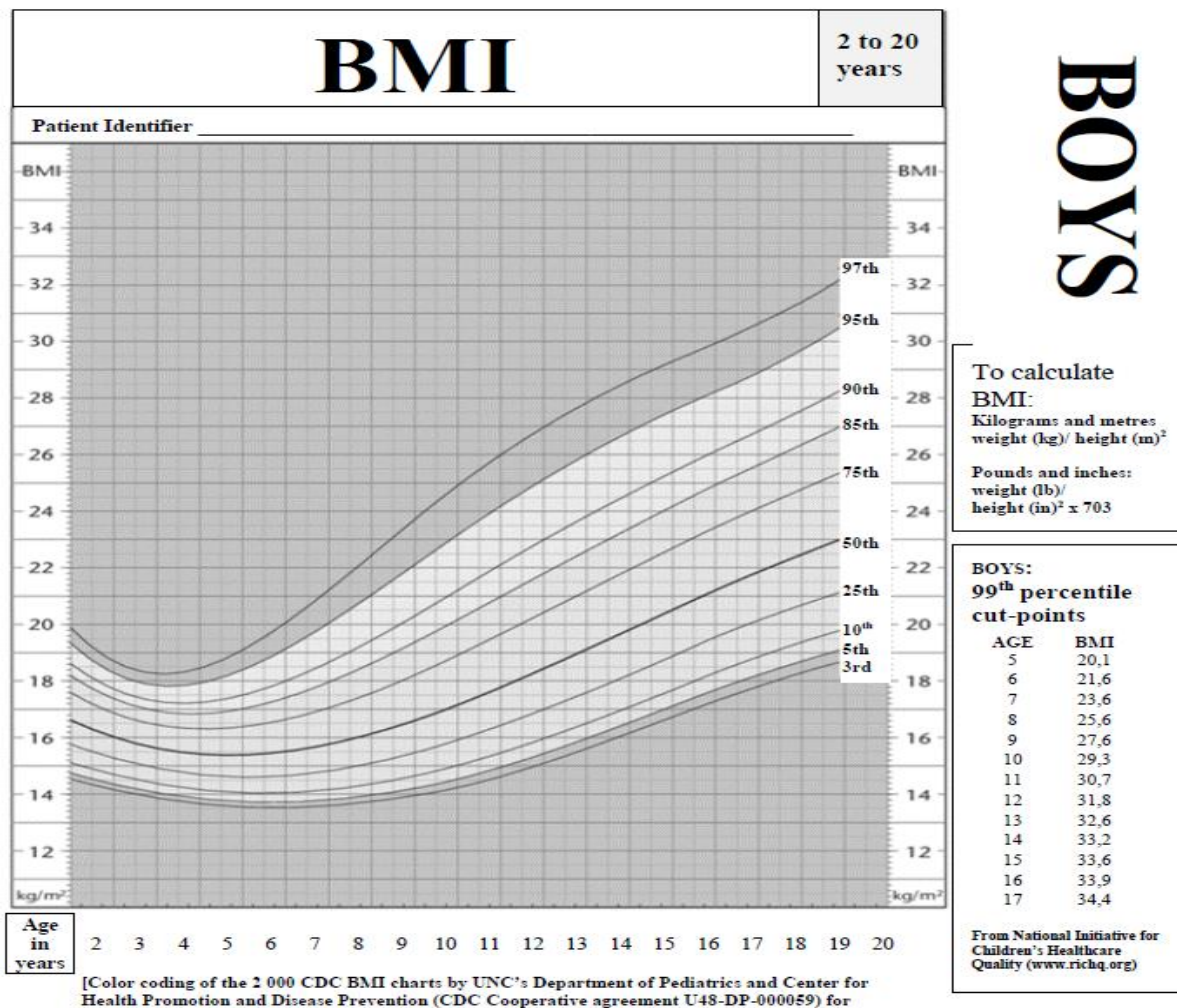
ACTIVITY 3: Body Mass Index

(10 marks: 15 minutes)



Coach Maxwell, the trainer at a local athletics club uses percentile charts to determine the health status of athletes who are joining the club in order to determine the best exercise for them. Coach Maxwell allows athletes whose BMIs are between the 5th and the 85th percentile to join the club.

Study the percentile chart below and answer the questions that follow.



- 1.1 What does the abbreviation BMI represent? (2)
- 1.2 Determine the maximum BMI that a boy should have to be able to join the club. (2)
- 1.3 Hence, determine the maximum weight of a boy who is 1,8 m tall and whose BMI is considered healthy for a boy athlete.

You may use the following formula:

$$\text{BMI} = \frac{\text{Mass in kg}}{(\text{Height in m})^2} \quad (4)$$

- 1.4 A 14-year-old boy who weighs 48 kg and whose height is 1,3 m, claims that he qualifies to be admitted to the club. Calculate the BMI of the boy. (2)

SECTION 4: MEASUREMENT

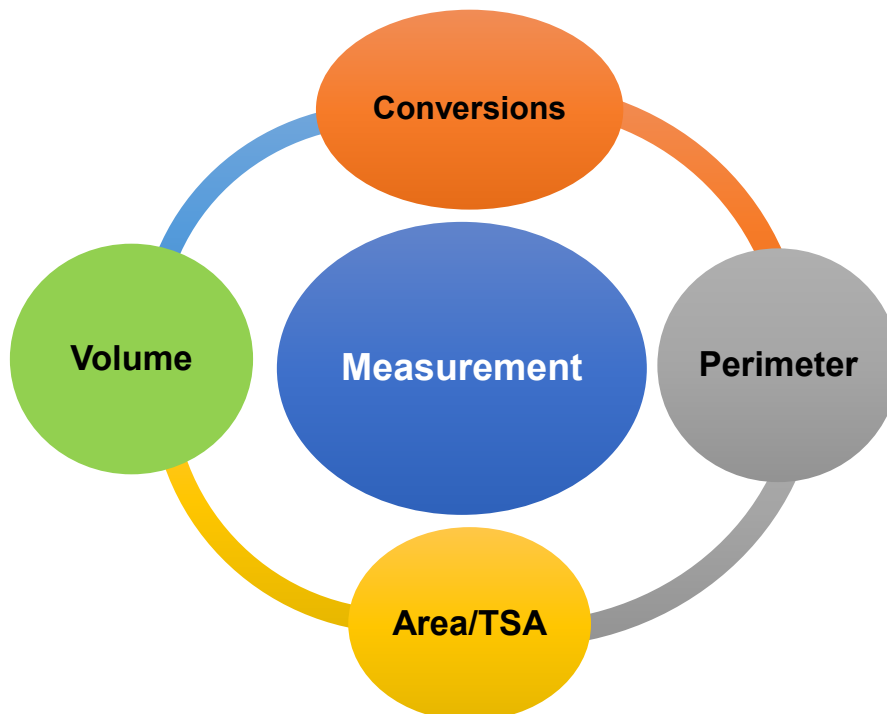
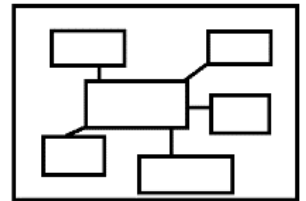
LESSON OBJECTIVES

Measurement

Learners must be able to:

- | | |
|----|--|
| 1. | Use the correct terminology when working with Measurements. |
| 2. | Estimate and measure using the correct units. |
| 3. | Convert between various units of measurement. |
| 4. | Calculate Perimeter / Circumference, Area, TSA, Volume and Capacity. |
| 5. | Substitute correctly into the given formulae. |
| 6. | Apply the knowledge of measurement to calculate cost of products be able to draw conclusions based on previous calculations. |

MEASUREMENT: LIST OF SECTIONS



IMPORTANT TERMINOLOGY

T

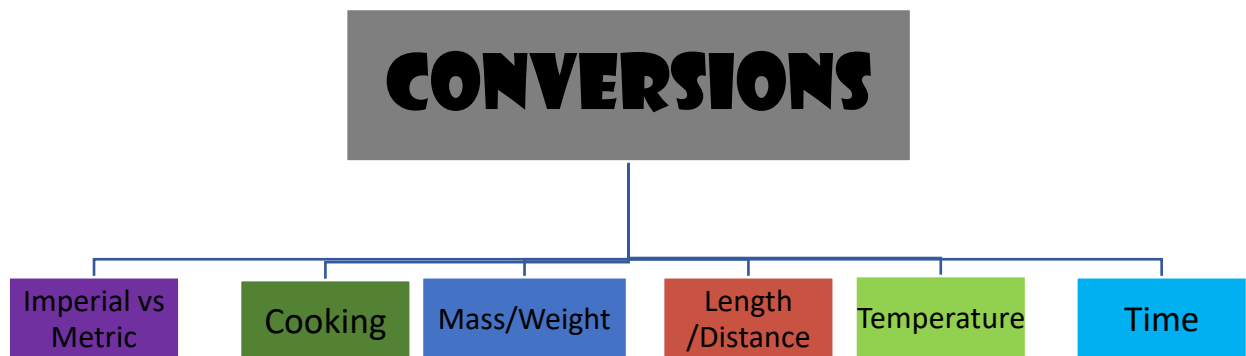
Measurement	
Distance	Length of a line joining any two points.
Actual/true/real distance	Real distance between any two points.
Radius	A straight line from the centre to the circumference of a circle or sphere
Diameter	A straight line passing from side to side through the centre of a body or figure, especially a circle or sphere.
Circumference	The distance around the edge of a circle (or any curvy shape).
Two-dimensional shape	It is a shape with length and width (breadth), without the height. Examples of such shapes are, <i>a page of a book or ordinary page, a floor of a room, a circle.</i>
Area	The amount of space inside the boundary of a flat (2-dimensional) object (It is measured in square units e.g., m ² , cm ² , etc.)
Perimeter	is the total length/distance around a shape or around the boundary. Perimeter of a circle is called the circumference.
Prism	A 3-dimesional shape that has the same shape (and size) on both ends an the same thickness along the entire shape.
Surface Area	It is the sum of the areas of all faces of the shape. By calculating the surface area you can be able to know the amount of material needed to build or make the particular shape or object.
Volume	is the amount of space that an object or substance occupies.

Conversion

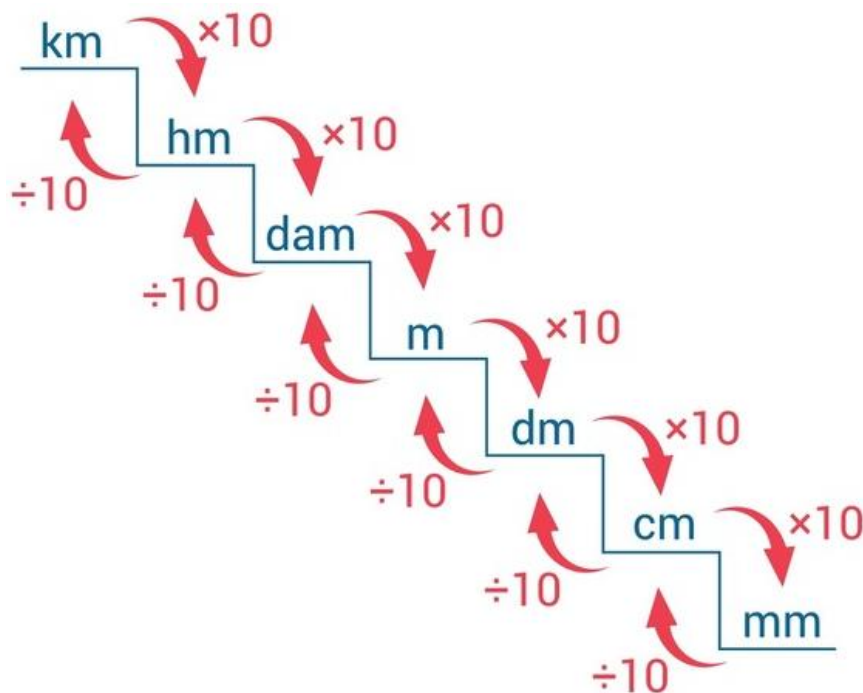
- Being able to convert measurements is important for many household tasks including cooking and baking.
- You need to understand why and when we use different measurement units in different contexts.

For exam purpose, as a learner you must be able to

- convert metric units of length, volume and weight from memory.
- convert cooking units using a given table.
- read, calculate and convert different time units and formats.
- use timetables and calendars for personal planning and time management



Basic Conversions (Not given in the exam, learners must know)



Imperial to Metric (Always given in the exam)

1 inch (in) = 2,54 cm
 1 yard (yd.) = 0,9144 m
 1 mile (mi) = 1,6093 km
 1 foot (ft.) = 0,3048 m
 1 ounce(mass) = 28,35g
 1 fluid ounce = 29,57ml
 1 gallon= 3,8 litres

Cooking conversions

- 1 cup = 250 ml
- 1 tablespoon (tbsp.) = 15 ml
- 1 teaspoon (tsp) = 5 ml
- 1 dozen = 12 units



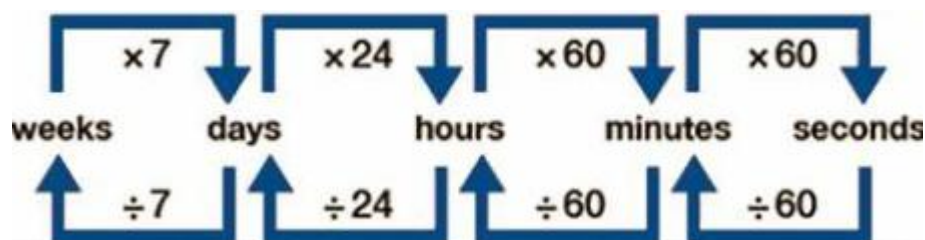
Conversions with time

Equivalent units:

60 mins = 1 hour (hr)
 24 hrs = 1 day
 7 days = 1 week
 52 weeks = 1 year
 12 months = 1 year
 365,25 days = 1 year
 366 days = 1 leap year (a leap year occurs after 4 years, the 4 quarters make up an extra day)



Conversions with time



General method for conversions

Write the conversion as a fraction (that equals one)

Multiply it out (leaving all units in the answer)

Cancel any units that are both top and bottom



Worked Example

T

- 1.1 Mrs Smith has a small business where she sells cakes. For her to make one cake she needs 0,8 kg of flour, 650 g of sugar and 900 000 mg of butter.

- 1.1.1 Determine the total mass of these ingredients. Give your answer in kilograms

(3)

Possible answer

Flour = 0,8 kg

Sugar = $650 \text{ g} \div 1\,000 = 0,65 \text{ kg}$

Butter = $900\,000 \text{ mg} \div 1\,000 = 900 \text{ g}$

$900 \div 1\,000 = 0,9 \text{ kg}$

Total mass = $0,8 + 0,65 + 0,9$
 $= 2,35 \text{ kg}$

- 1.1.2 If you have 0,5 kg block of butter, will you have enough butter for the recipe? Show all your calculations to justify your answer.

(2)

Possible answer

0,5 kg

Butter needed **0,9 kg**

You won't have enough butter

- 1.1.3 If sugar comes in 150 g bags at a cost of R5,95 per 150g bag, determine the total cost of the sugar needed for this recipe.

(5)

Possible answer

Number of bags of sugar = $650 \text{ g} \div 150 \text{ g}$
 $= 4,33$

$\approx 5 \text{ bags}$

Total cost = $5 \text{ bags} \times R5,95$
 $= R29,75$

- 1.2 Neilisha makes fudge and sells it for pocket money. Below is the recipe that she uses to prepare fudge. The selling price for a block of fudge is R2,50.

NOTE: 1 Batch of fudge = 54 Blocks

Recipe for making 1 Batch	PICTURE OF FUDGE BLOCK
1 tin of condensed milk 250 g of butter 250 ml of milk 5 ml of vanilla essence 1 kg of sugar	

- 1.2.1 Write the ratio of the mass of the butter to the mass of the tin of condensed milk in the simplest form if the mass of one tin of condensed milk is 385 g. (2)

Possible answer

$$\begin{aligned} 250 \text{ g} : 385 \text{ g} \\ 50 : 77 \end{aligned}$$

- 1.2.2 Neilisha buys 1 litre of milk at a shop. She calculates that she can make four batches of fudge with the 1 litre. Do calculations to show if she is correct or not. (4)

Possible answer

$$\begin{aligned} 1 \text{ litre} &= 1000 \text{ ml} \\ \frac{1000 \text{ ml}}{250 \text{ ml}} &= 4 \text{ batches} \\ \text{Yes, she is correct} \end{aligned}$$

- 1.2.3 Neilisha buys 2,5 kg bag of sugar at a cost of R38,95. She calculates that the sugar for two batches of fudge will cost her R32,80. Do calculations to verify whether she is correct or not (5)

Possible answer

$$\begin{aligned} \text{For 1 batch you need 1 kg of sugar} \\ \text{For 2 batches you need 2 kg of sugar} \\ 2,5 \text{ kg of sugar costs R } 38,95 \\ 2 \text{ kg costs } \frac{2 \times 38,95}{2,5} = \text{R}31,16 \\ \text{No, she is not correct} \end{aligned}$$

- 1.2.4 The price of a bottle of Vanilla essence is R25,99 with 15% VAT already included. What is the VAT payable on a bottle of Vanilla essence? (5)

Possible answer

$$\begin{aligned} \frac{\text{R}25,99}{1,15} &= \text{R}22,60 \\ \text{R}25,99 - \text{R}22,60 &= \text{R}3,39 \end{aligned}$$

ACTIVITY: Conversion

(22 marks: 25 minutes)



- 1.1 Hope is hosting a stokvel meeting and she plans on serving tea and muffins to the members during the meeting. The stokvel consists of twenty other members and Hope.
The ingredients for tea are given below.

Ingredients for making tea in a 3 litre teapot:

2,5 l boiling water

10 tea bags

30 tea-spoons sugar

500ml fresh milk

NOTE:

*Boiling water is at 212°F

*A 3-litre teapot serves 10 people

*1 cup per person

- 1.1.1 Write down the number of members belonging to this stokvel. (2)

- 1.1.2 Write down (in the simplest form) the ratio of the number of tea bags to the number of tea-spoons of sugar. (3)

- 1.1.3 Convert 212 °F to degrees Celsius.

The following formula may be used:

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32^{\circ}) \div 1,8 \quad (3)$$

- 1.1.4 If one tea bag weighs 40g, determine the number of kilograms of teabags that will be in one teapot. (4)

1.2

Thabo is a grade 9 learner at Vele Secondary school who intends to sell toffee apples during the school's market day. He decided to use the recipe below to prepare the toffee apples.



Ingredients:

25 Granny Smith Apples (small size)
1 000 mℓ Sugar
1 cup Boiling water
2 tsp Red food colouring
1½ tsp Cream of tartar
Spray and Cook

It takes $\frac{1}{3}$ hours to prepare the recipe.
Mixture's boiling temperature: **150 °C.**

Note: 1 cup = 250 mℓ
1 tsp = 5 mℓ
1 tbsp = 15 mℓ

Adapted from {[www. Millerinthecity.co.za](http://www.Millerinthecity.co.za)}

1.2.1 Identify the number of apples needed for this recipe (2)

1.2.2 Determine, in minutes, the time it takes to prepare toffee apples (2)

1.2.3 Write down the cream of tartar in m ℓ (2)

1.2.4 Determine the number of cups of sugar needed for this recipe. (2)

1.2.5 Convert the boiling temperature of the mixture to °F.

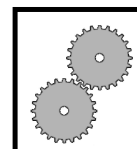
You may use the following formula: $^{\circ}\text{F} = (^{\circ}\text{C} \times \frac{9}{5}) + 32$ (2)

Time

- We have two types of time formats, namely **12-hour format** and **24-hour format**.

12-hour format	24-hour format
09:00 am or 09:00 pm are examples of reading time using 12-hour format. The format is seen of the analogue clocks.  When we use the 12-hour clock, we use the letters “a.m.” to show that the time is before midday (12 o'clock or noon) and “p.m.” to show that it is after midday. For example, school may start at 7:30 a.m. (in the morning) and finish at 2 p.m. (in the afternoon)	21:00 is an example of the 24-hour time format. This format is seen on the digital watches  On digital clocks, the number on the left shows the hour and the number of the right shows the minutes. Some digital watches have a third, smaller number on the far right which shows us seconds.

Worked Example



- 1.1 The clock shown below is on the wall of Bongzi's kitchen:



[Source: adapted from american-time.com/product/clock-ssiq-15-round]

- 1.1.1 Identify the type of clock. (2)

Possible answer

Analogue clock

- 1.1.2 Write the time displayed in words. (2)

Possible answer

Ten minutes before two o'clock

- 1.1.3 Bongi started baking at the time displayed on the clock. She would like to bake two dozen Brownies, determine the finishing time if she includes the preparation and baking time. (4)

Possible answer

Time to bake one batch

$$= 10\text{min} + 20\text{min}$$

$$= 30\text{min}$$

Two batches

$$= 30\text{min} \times 2$$

$$= 60\text{min}$$

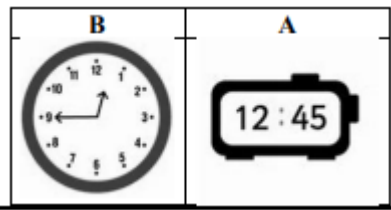
Finishing time

$$= 13:50 + 60\text{min}$$

$$= 14:50$$

- 1.2 Below are two watches representing time differently as they are commonly found in circulation or real life.

TIME REPRESENTATION BY TWO TYPES OF WATCHES (B and A)



- 1.2.1 State in words the time displayed in both watches. (2)

Possible answer

Quarter to one o'clock/ Fifteen minutes to One in the afternoon

- 1.2.2 State the type of watch in the way time is displayed or read from each. (2)

Possible answer

A = digital watch and B = analogue watch

- 1.2.3 How many minutes past after noon? (2)

Possible answer

45 minutes after noon /45 minutes after 12 o'clock

- 1.2.4 Convert minutes shown on B into hours (2)

Possible answer

$$45 \div 60 = 0,75 \text{ hour}$$

$$(12 \times 60 + 45) \div 60 = 765 \text{ minutes} \div 60 = 12,75 \text{ hrs}$$

- 1.3 Thandi planned a travelling trip to visit her friend in Pretoria by a Greyhound bus during the Easter Holidays.

Below is a bus time-table for Durban - Johannesburg - Pretoria.

TABLE 3: Travel route between Cities, Durban - Johannesburg – Pretoria in order

Route: Durban – Johannesburg – Pretoria					
STATIONS		GDJ0806 DAILY DREAMLINER	GDJ1106 DAILY BUDGET SERVICE	GDJ2204 DAILY DREAMLINER	GDJ2306 DAILY BUDGET SERVICE
Durban	Dep	08h00	11h00	22h00	23h00
Pinetown	Dep	-	11h25	-	-
Pietermaritzburg	Dep	09h15	12h30	23h00	23h55
Howick	Dep	09h45	-	-	-
Escourt	Dep	-	-	-	-
Swinburne	Arr	11h45	15h00	01h30	02h30
Swinburne	Dep	12h15	15h30	02h00	03h00
Harrismith	Arr	12h34	-	-	-
Harrismith	Dep	12h38	15h50	02h20	03h20
Vereeniging	Dep	-	18h25	-	-
Johannesburg	Dep	15h45	19h30	05h00	06h00
Midrand	Dep	16h05	19h50	05h20	06h20
Pretoria	Arr	16h30	20h10	05h45	06h45

Source: www.greyhound.co.za

Key: Dep. = Departure
Arr. = Arrival

- 1.1.1 From which station does the bus depart? (2)

Possible answer

Durban Station

- 1.1.2 What is the name of the bus company that Thandi will be using for travelling? (2)

Possible answer

Greyhound

- 1.1.3 For how long will the Daily Budget Service **GDJ2306** bus wait at Swinburne? (2)

Possible answer

Time at Swinburne = 03h00 – 02h30
= 30minutes

- 1.1.4 At what time does the Daily Budget Service **GDJ1106** depart from Harrismith? (2)

Possible answer

15h50

- 1.1.5 Calculate the difference time taken from Durban to Pretoria station by **GDJ0806** and **GDJ2204**. Give a possible reason for the difference. (5)

Possible answer

GDJ0806 = 16H30 – 08H00 = 8 hours 30min

GDJ2204 = 05H45 – 22H00 = 2hrs to midnight + 5H45 = 7 hours 45min

8hrs 30 min – 7hrs 45 min = 45 minutes

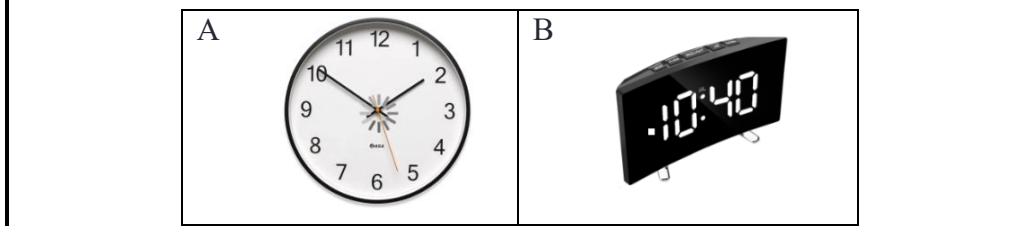
Traffic might be lesser at night (any relevant answer)

ACTIVITY: Time

(20 marks: 20 minutes)



- 1.1 During the check-up visit, the doctor advised Eunice that having a regular schedule during the **day** can help her **child's sleep** stay on track. Eunice uses the two types of clocks below to monitor the time.



- 1.1.1 Write down the time displayed on clock B in words if the time format for the clock is 24-hour time. (2)
- 1.1.2 The child slept at the time displayed on clock A in the afternoon. Write down the time in 24-hour format. (2)
- 1.1.3 Eunice went to Heilbron with the child to visit her mom. She left her home at the time displayed on clock B and arrived in Heilbron at 14:10. Determine the time, in hours, taken to reach her home (2)

1.2 Study the figures above to answer the following questions:

Figure 1	Figure 2
	
NOTE: 12:59 a.m.	

1.2.1 Identify the type of clock represented by figure 1 and figure 2. (2)

1.2.2 Write the time indicated by the clock in figure 1 in words. (2)

1.2.3 What does **a.m.** in figure 2 mean? (2)

1.3 Mr Soetmelk's wife bakes homemade all-bran rusks for her family. The recipe that she uses is shown below.

INGREDIENTS

Makes 30 rusks

Baking time: 55 minutes

- 500 g butter
- 370 g sugar
- 500 ml buttermilk
- 1 ml lemon juice
- 3 large free-range eggs
- 1 kg flour
- 2 t baking powder
- 1 t salt
- 240 g all-bran wheat flakes
- 100 g oats (uncooked)
- 100 g pecan nuts or almonds

The oven should be heated to 180 °C.



1.3.1 How many grams of all-bran wheat flakes are needed for this recipe? (2)

- 1.3.2 Each batch of rusks needs to be baked for 55 minutes. The last batch was taken out at the time indicated on the watch alongside.



Convert 55 minutes to hours.

(2)

- 1.3.3 Write down the type of time format displayed on the watch.

(2)

- 1.3.4 Write down the time indicated on the watch in 24-hour format.

(2)

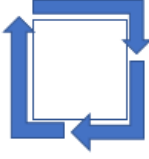
SECTION 5: Perimeter

What is Perimeter?

- Is the total length/distance around a shape or around the boundary.

Understanding Perimeter

- It is a distance around a shape.
- Measured units are mm, cm, m and km.
- Perimeter of a circle is called the circumference.
- Shapes are one dimensional.

Square	Rectangle	Triangle	Circle
			

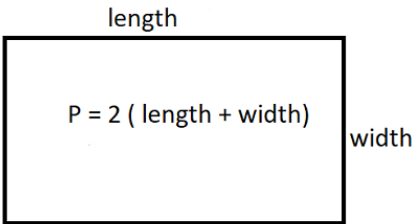
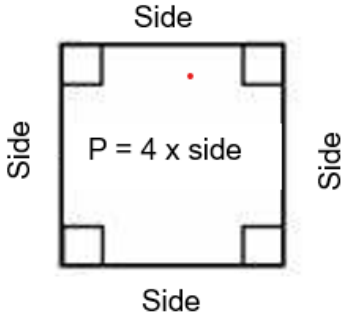
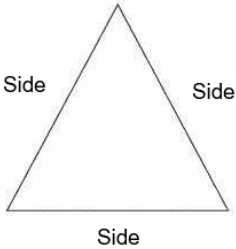
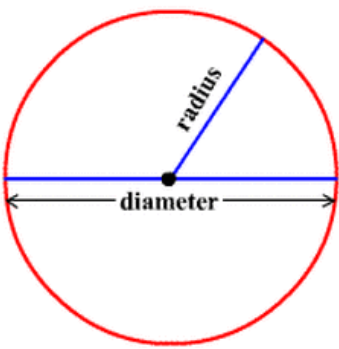
How to calculate Perimeter

- For any shape with straight lines: Add the lengths of all the sides.
- For specific shapes like, square, rectangle and circle: A formula will always be provided.

Note: Make sure that all units are the same before you start with your calculations.

Rectangle	
	
162 cm	
800 mm	
$\begin{aligned} \text{Perimeter} &= 2 \times (\text{length} + \text{width}) \\ &= 2 \times (162 \text{ cm} + 800 \text{ mm}) \\ &= 1924 \text{ mm} \end{aligned}$ 	$\begin{aligned} \text{Perimeter} &= 2 \times (\text{length} + \text{width}) \\ &= 2 \times (1620 \text{ mm} + 800 \text{ mm}) \\ &= 4840 \text{ mm} \end{aligned}$ 

Shapes involved when calculating Perimeter:

Shape	Perimeter Formula	
Rectangle	Perimeter $= 2 \times \text{length} + 2 \times \text{width}$	
Square	Perimeter = $4 \times \text{length}$ OR Perimeter = $4 \times \text{sides}$	
Triangle	Perimeter = Length 1 + length 2 + length 3	
Circle	Perimeter (Circumference) $= \pi \times (2 \times \text{radius})$ OR Perimeter (Circumference) $= \pi \times \text{diameter}$ Note $\pi = 3,142$	

Area

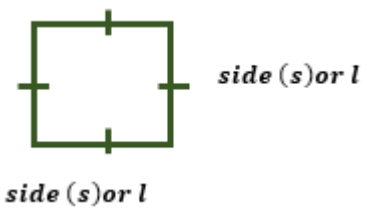
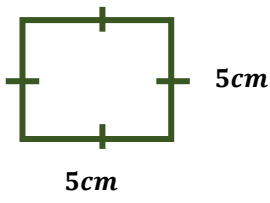
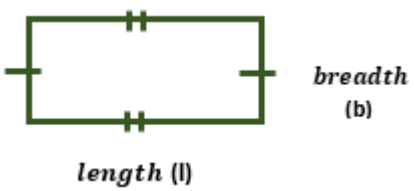
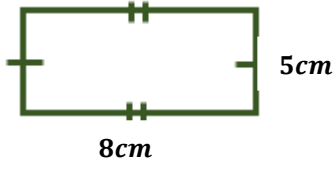
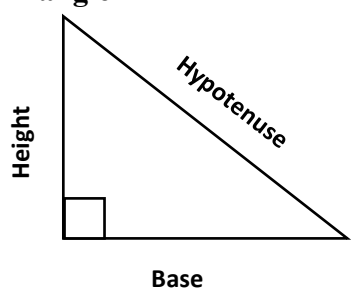
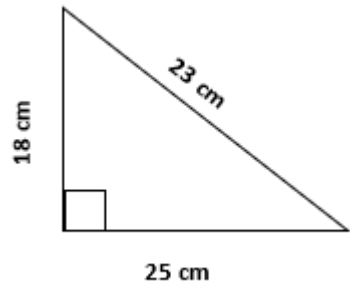
What is an area?

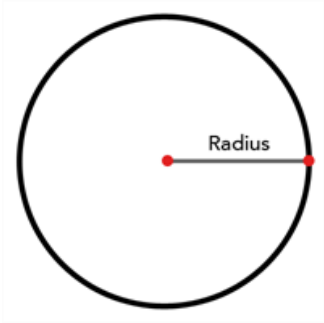
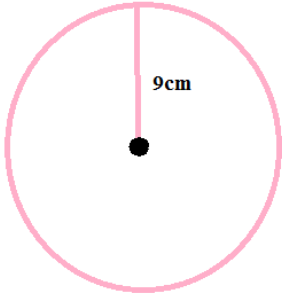
- The amount of space inside the boundary of a flat (2-dimensional) object

Understanding Area

- Shapes are two dimensional (2D).
- It is measured in square units, e.g., cm^2 , m^2 , mm^2 , etc)

Area of a square, rectangle, triangle, and circle.

Shape	Area (A)	Worked Examples
Square 	$\text{Area} = \text{side} \times \text{side}$ $= (\text{side})^2$	 $\begin{aligned} \text{Area} &= \text{side} \times \text{side} \\ &= 5\text{cm} \times 5\text{cm} \\ &= 25\text{cm}^2 \end{aligned}$
Rectangle 	$\text{Area} = \text{length} \times \text{breadth}$	 $\begin{aligned} \text{Area} &= \text{length} \times \text{breadth} \\ &= 8\text{cm} \times 5\text{cm} \\ &= 40\text{cm}^2 \end{aligned}$
Triangle 	$\text{Area} = \frac{1}{2} \times \text{base} \times \text{perpendicular height}$	 $\begin{aligned} \text{Area} &= \frac{1}{2} \times \text{base} \times \text{perpendicular height} \\ &= \frac{1}{2} \times 25\text{cm} \times 18\text{cm} \\ &= 225\text{cm}^2 \end{aligned}$

Circle 	$\text{Area} = \pi \times \text{radius}^2$ $= \pi \times r^2$	 $\begin{aligned}\text{Area} &= \pi \times \text{radius}^2 \\ &= \pi \times r^2 \\ &= 3,142 \times 9^2 \\ &= 254,5 \text{ cm}^2\end{aligned}$
---	---	--

Working with Area

- When working with complex shape, break it down into smaller (basic) shapes.
- Add all the areas of the smaller (basic) shapes to get the area of the complex shape.
- Make sure that all the units are the same.
- Rounding must only be done at the end of the calculations.
- Rounding must always be done according to the context.

SECTION 6: Surface Area

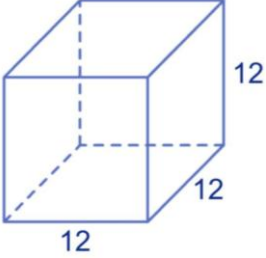
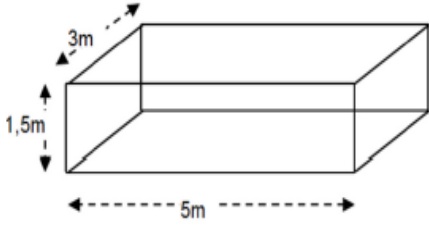
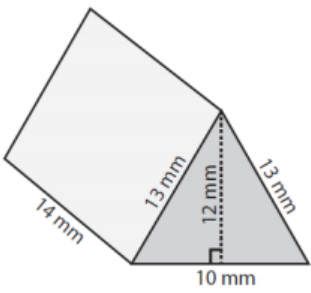
What is Surface Area?

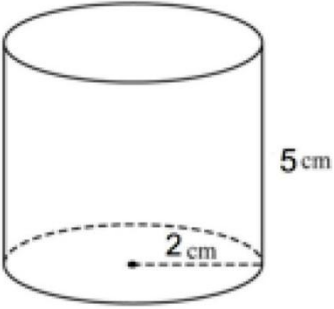
- The total exterior area of all the exposed surface area a 3D object.

Understanding Area

- Shapes are three dimensional (3D).
- The difference between the total surface area (TSA) and area is that the total surface area refers to 3D objects and the area refers to 2D objects.
- It is measured in square units, e.g., cm^2 , m^2 , mm^2 , etc)

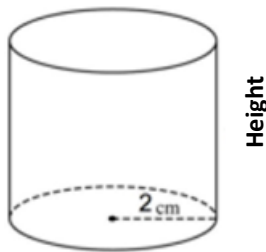
Total Surface Area of a rectangular prism and cylinder.

Shape	Total Surface Area (TSA)	Worked Examples
Cube 	Total Surface Area (TSA) = 6 x side	Total Surface Area (TSA) = 6 x side = 6 x 12 = 72 units²
Rectangular Prism  Length = 5m Breadth = 3m Height = 1,5m	Total Surface Area (TSA) = (2 x length x breadth) + (2 x length x height) + (2 x breadth x height)	Total Surface Area (TSA) = (2 x 5m x 3m) + (2 x 5m x 1,5m) + (2 x 3m x 1,5m) = 54 m²
Triangular Prism  Breadth = 10 mm height = 12 mm side = 13 mm Height = 14 mm	Total Surface Area = 2 x ($\frac{1}{2}$ x breadth x height) + (side + side + side) x Height	Total Surface Area = 2 x ($\frac{1}{2}$ x 10 x 12) + (13 + 13 + 10) x 14 = 624 mm²

Cylinder 	Total Surface Area = $2 \times (\pi \times \text{radius}^2) + (2 \times \pi \times \text{radius}) \times \text{height}$ Where $\pi = 3,142$	Total Surface Area = $2 \times (3,142 \times 2^2) + (2 \times 3,142 \times 2) \times 5$ $= 87,976\text{cm}^2$
---	--	--

A case where the Total Surface Area is given and there is a missing value.

Total surface area = $87,976\text{cm}^2$



$$\begin{aligned} \text{T.S.A} &= 2 \times (\pi \times \text{radius}^2) + (2 \times \pi \times \text{radius}) \times \text{height} \\ 87,976 \text{ cm}^2 &= 2 \times (3,142 \times 2^2) + (2 \times 3,142 \times 2) \times \text{Height} \\ 87,976 \text{ cm}^2 &= 17,5952 \times \text{Height} \\ \frac{87,976 \text{ cm}^2}{17,5952\text{cm}} &= \text{Height} \\ \therefore \text{Height} &= 5 \text{ cm} \end{aligned}$$

Volume

What is a Volume?

- The 3-dimensional space occupied by a gas, liquid, or a solid substance.

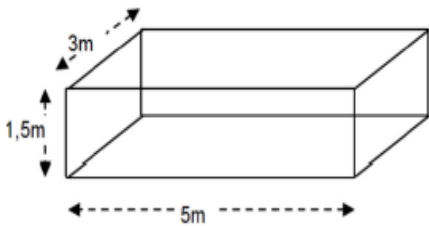
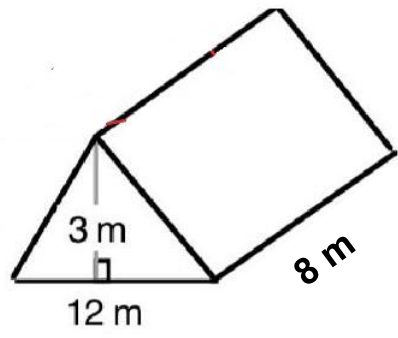
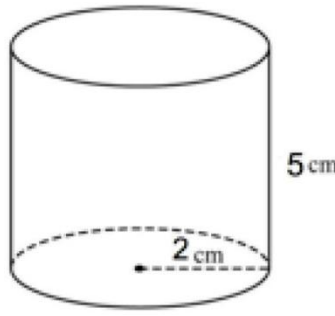
What is Capacity?

- The amount an object can hold.
- E.g., the capacity of the stadium is how many spectators it can hold, whereas the volume is the space they occupy.

Understanding Volume

- It is also known as Capacity.
- Shapes are three dimensional (3D).
- Units of a volume include m^3 , l and kl
- Units of a solid volume include: mm^3 , cm^3 , m^3 , km^3

Total Surface Area of a rectangular prism and cylinder.

Shape	Volume (V)	Worked Examples
Rectangular Prism  Length = 5m Breadth = 3m Height = 1,5m	Volume = length x breadth x height	$V = 5\text{m} \times 3\text{m} \times 1,5\text{m}$ $= 22,2 \text{ m}^3$
Triangular Prism  Base = 12m height = 3m Height = 8m	Volume = $\frac{1}{2} \times b \times h \times H$	$V = \frac{1}{2} \times b \times h \times H$ $= \frac{1}{2} \times 12\text{m} \times 3\text{m} \times 8\text{m}$ $= 144\text{m}^3$
Cylinder  Radius = 2cm Height = 5 cm	Volume = $\pi \times \text{radius}^2 \times \text{height}$ Where $\pi = 3,142$	$V = 3,142 \times (2 \text{ cm})^2 \times 5\text{cm}$ $= 62,84 \text{ cm}^3$

Calculating Volume

- Make sure that units are the same before substituting into the given formula.
- When the diameter is given, divide it by two to get the radius before substituting into the formula.

- (radius)² does not mean “multiply by 2”.

e.g. $5^2 = 5 \times 5 = 25$



$5^2 \neq 5 \times 2$

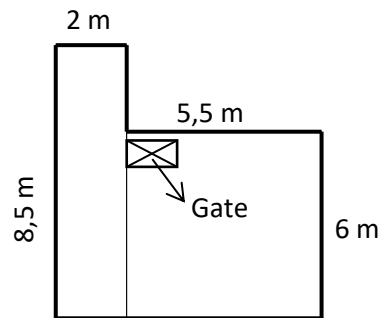


ACTIVITY: Perimeter, Area, Surface Area and Volume

(125 marks:1 hour 45 minutes)



- 1.1 Sam would like to design a vegetable garden. The measurements (dimensions) of Sam's vegetable garden are given below:

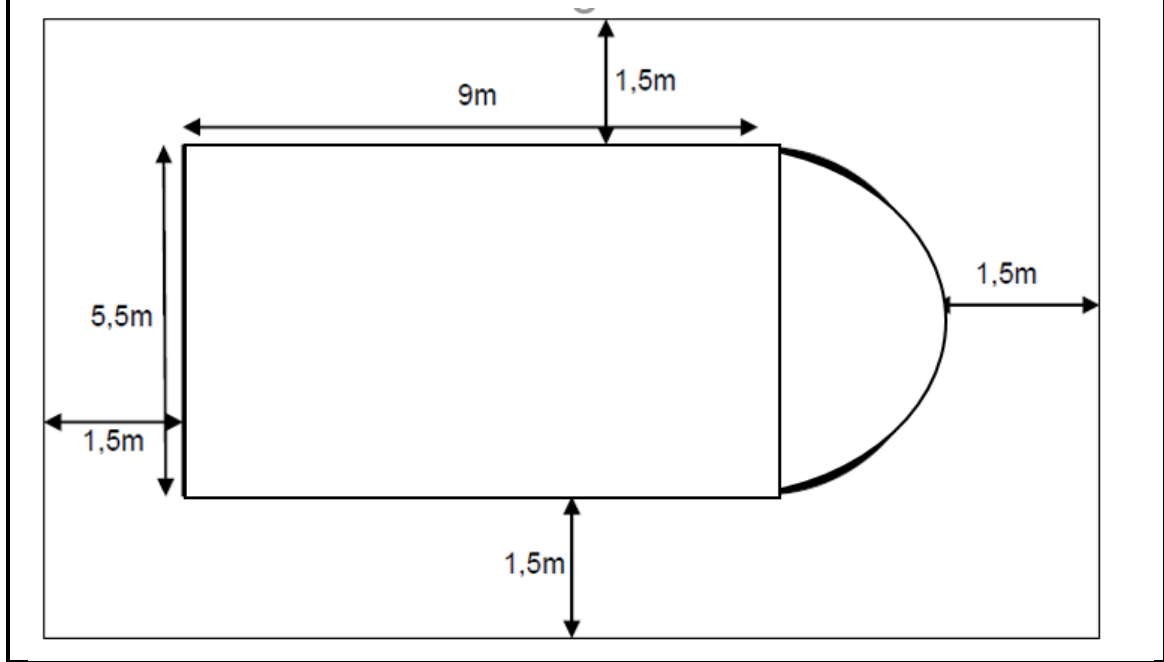


Width of the gate = 1 m

Use the information above to answer the questions that follow.

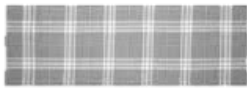
- 1.1.1 Define the term *perimeter* according to the given context. (2)
- 1.1.2 Calculate the perimeter of the garden (3)
- 1.1.3 Sam would like to put a fence around his vegetable garden. Each panel is 1,5 m wide and can be cut up into smaller pieces. How many panels does he need? Show all your calculations. (4)

- 1.2 Consider the fence surrounding the fishpond is placed about 1,5m away from the pond. As indicated below:



- 1.2.1 Explain the term *perimeter* according to the context given above. (2)
- 1.2.2 Determine the perimeter of the fence. (4)
- 1.2.3 Determine the cost if the fencing is sold in 5m rolls for R162,50 per roll. (4)
- 1.2.4 Determine how many poles are required to hold the fence if the poles are to be spaced with a maximum space of 1,8 m and if there is to be a pole on every corner. (3)
- 1.2.5 Calculate how much will all the poles cost if they sold in groups of 6 for R500 (3)

- 1.3 Hope makes rectangular scarfs, as shown in the picture below, and sells them at a local flea market.

Rectangular scarf	Folded scarf	Dimensions of one scarf:
		Length = 450 mm = A Width = 300 mm = 0,30 m

- 1.3.1 Convert the length (A) of the scarf to metres. (2)
- 1.3.2 Explain the meaning of the term *perimeter*. (2)
- 1.3.3 Which of the following formulae can be used to calculate the perimeter of a rectangle? (2)

- A. Perimeter = length $\times$ width
- B. Perimeter = length + length + width
- C. Perimeter = $(2 \times \text{length}) + (2 \times \text{width})$

1.4 The gate at the College has the following dimensions: height = 2,08 m and length = 3,5 m.

1.4.1 Calculate the perimeter of the gate. (2)

1.4.2 Calculate the area occupied by the gate. You may use the following formula:
Area = length $\times$ height (2)

1.5 Mr Sethole bought a swimming pool for his children to use during December holidays. The swimming pool has a diameter of 1 830 cm.



1.5.1 Define the term *diameter* according to the given context (2)

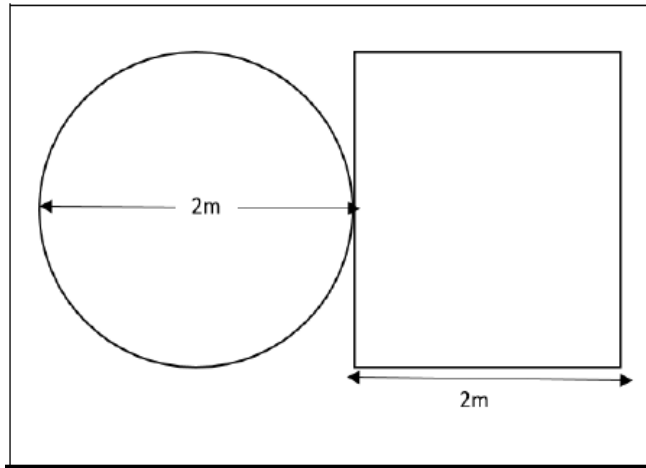
1.5.2 Calculate the radius of the swimming pool in metres. (3)

1.5.3 To calculate the circumference of the swimming pool, Mr Sethole had to choose from the list of formulae given below. Which formula is the correct one?

- A. Circumference of the circle = $3,142 \times \text{radius}$
- B. Circumference of the circle = $3,142 \times \text{diameter}$
- C. Circumference of the circle = $2 \times 3,142 \times \text{diameter}$
- D. Circumference of the circle = $3,142 \times \text{radius}^2$ (2)

- 1.6 Mr Mbhele just bought a new house and his yard is not big enough to have a space to plant vegetables. He decided to go and buy two garden pots (a circular and square pot). The two pots will form his vegetable garden. The diagram below shows the top-view and dimensions of the two pots.

DIAGRAM 1: TOP VIEW OF GARDEN POTS



- 1.6.1 Determine in (mm) the radius of the circular pot. (3)

- 1.6.2 Calculate:

- (a) The circumference of the circular pot in mm.

You may use the formula:

$$\text{Circumference of a circle} = 2 \times \pi \times r \text{ where } \pi = 3,142 \quad (2)$$

- (b) The area in (cm²) of the square.

You may use the formula:

$$\text{Area of the square} = \text{length} \times \text{width} \quad (3)$$

- (c) The total perimeter of the vegetables garden. (2)

- 1.6.3 Is it advisable for Mr Mbhele to have vegetable garden? Give a reason for your answer. (2)

- 1.7 A farmer in the United States of America uses the containers below to store and supply milk to local factories.

330 Gallon IBC Tote



55 Gallon drum



Inside dimensions

Length = 48 inches

Width = 40 inches

Height = 46 inches

[Source: IBCtanks.com]

NOTE:

1 gallon = 4,546092 litres

1 inch = 2,54 cm

1 m ℓ = 1 cm³

- 1.7.1 Convert 55 gallons to litres. Round your answer to the nearest whole number. (3)

- 1.7.2 Write down TWO dairy products that can be produced by using milk. (2)

- 1.7.3 Show, by means of calculations, that the IBC tote can hold more than 310 gallons of milk.

You may use the formula:

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

- 1.7.4 The farmer decided to paint the total external surface area of the drum to keep it away from rusting. The spread rate of the paint is 2,5m²/ℓ and the paint is sold in 1ℓ tins. Calculate how many tins of paint will be needed to paint one drum.

You may use the formula:

Surface area of a cylinder (in m²)

$$= (2 \times 3,142 \times r^2) + (2 \times 3,142 \times r \times h)$$

Where **r** = radius and **h** = height

(9)

- 1.8 The farmer checks the weight of the cows once per term to make sure that they are healthy so that they can produce enough milk. He uses a manual way of calculating the weight by measuring the cow's girth and the body length.

NB: Girth is the measurement around the middle of the cow.

- 1.8.1 Choose the most accurate tool from the ones listed in the bracket.

The farmer may use the (measuring tape/ruler) to measure the girth and the body length of the cow. (2)

- 1.8.3 Show, by means of calculations, that a cow with a girth of 70 inches and a body length of 78 inches has a weight of 577,88 kg.

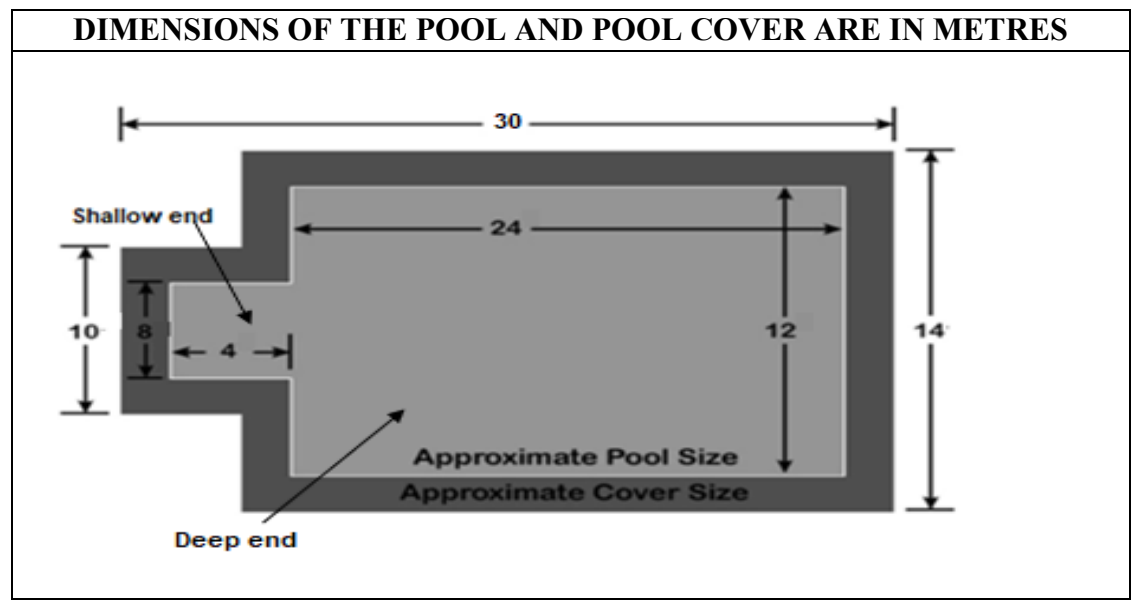
You may use the formula:

$$\text{Animal weight in pounds} = \frac{(\text{girth})^2 \times \text{body length}}{300}$$

Note: 1 kg = 2,2046 pounds (4)

- 1.9 The pool at school needs a pool cover. A pool cover prevents people falling into the pool and protects the pool. The diagram below shows the dimensions of the pool and the cover.

The pool cover overlaps the pool by 1 metre all around



- 1.9.1 Determine the perimeter of the pool cover.

You may use the formula:

$$\text{Perimeter} = 2 (L + B)$$
 (3)

- 1.9.2 Determine how many times larger the area of the pool cover is compared to the area of the pool. Show all the work.

You may use the formula:

$$\text{Area} = \text{length} \times \text{breadth} \quad (8)$$

- 1.10 The shallow end of the pool has a depth of 1m and the deep end has a depth of 2m.

- 1.10.1 Determine the total capacity of the pool.

You may use the formula:

$$\text{Volume} = \text{length} \times \text{breadth} \times \text{height} \quad (4)$$

- 1.10.2 Chlorine is a chemical that is used to prevent bacteria and algae from forming in the pool. For every 1000 litres of pool water 1,5 teaspoons of chlorine is required.

NOTE: 1 teaspoon = 5ml

Determine the number of litres of chlorine required to treat the pool. (7)

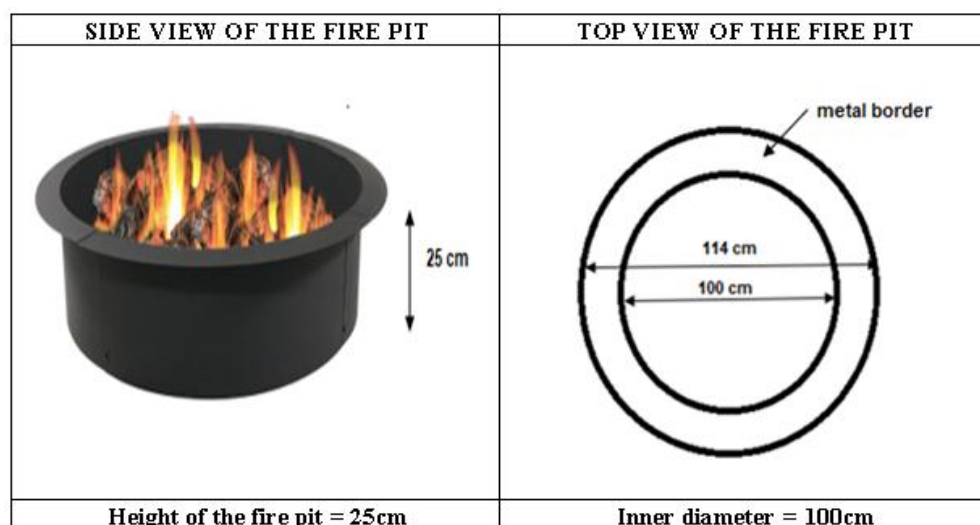
- 1.11 The pool needs to be refilled with water. An empty pool fills with water at a rate of 9 gallons per minute.

- 1.11.1 Determine the number of litres of water per minute required to refill the pool.

NOTE: 1 gallon = 3,78541 litres. (2)

- 1.11.2 Determine the time taken, in days, to fill the pool. Round up your answer to the nearest day. (6)

- 1.12 Siya makes fire pits for a living. A fire pit can be used for outdoor entertaining. The pit is made of metal.



1.12.1 Determine the area of the metal border.

You may use the formula:

$$\text{Area of a circle} = 3,142 \times r^2 \quad (4)$$

1.12.2 Siya claims he needs $1,99\text{m}^2$ of metal sheeting, including 10% for wastage, to make one fire pit.

Verify his **CLAIM** by showing all calculations.

You may use the formula:

$$\text{Surface Area of a Cylinder} = (2 \times 3,142 \times r^2) + (2 \times 3,142 \times r \times h) \quad (8)$$

1.12.3 Siya wants to apply two coats of paint to the fire pit to rust proof it. Determine the number of litres of paint he must buy if one litre of paint covers 5m^2 (4)

SECTION 7 : Scales and Maps

LESSON OBJECTIVES

SCALE

Learners must be able to:

1.	Work with two types of scales on maps, plans and in construction of models.
2.	Calculate actual length and distance when map and/or plan measurements are known.
3.	Calculate map and/or plan measurement when actual lengths and distances are known using a given scale.
4.	Determine the most appropriate scale in which to draw; construct a map, plan and /or models.
5.	Determine the scale in which a map/or plan has been drawn.

MAPS

Learners must be able to:

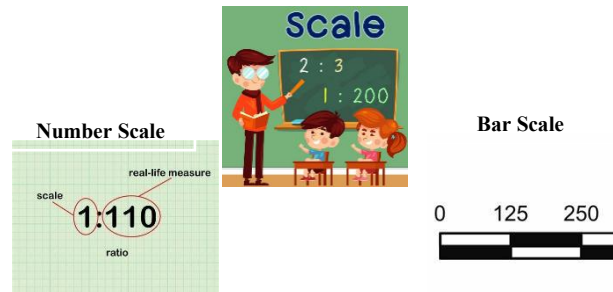
1.	Describe the position of an object in relation to the surrounding objects.
2.	Find locations, follow directions, and develop directions for travelling between two or more locations.
3.	Estimate distances using measurement given.
4.	Estimate the time it will take to travel between two or more locations.
5.	Estimate the amount and cost of fuel that will be used to travel between two or more locations.
6.	Estimate the average speed travelled during a trip.
7.	Determine appropriate stopping locations.
8.	Plan and cost trips using timetables, fare charts, distance charts and budget.
9.	Work with combination of maps showing different perspective and scale.
10.	Interpret compass directions in the context of appropriate maps and plans.
11.	Understand directions and signboards on roads and in map books.
12.	Interpret elevation plans of building

IMPORTANT TERMINOLOGY

Scale, Maps and Plans	
Dimensions	The measurements of an object which describes its size and shape, in terms of its length, width(breath) and height.
Numeric Scale/Number Scale	A scale that is written in a ratio format. E.g., 1:100
Scale factor	The factor by which each dimension of the actual object is either reduced (for very large objects) or enlarged (for very small object). e.g., 1:100..... where 100 is the scale factor
Bar Scale	Also known as Linear scale. A map element that graphically represents the scale of a map by means of a line with ruler marking and units that are proportional to the scale.
Map	Two-dimensional representation of an area of the earth's surface. E.g., map of South Africa.
Compass Direction	The four directions or cardinal points are the four main compass directions: north, east, south, and west
Grid Reference	A map that has been divided up in rows and columns, forming a grid, which is labelled alphabetically or numerically and is used to easily reference a particular area or point on the map.
Strip map/chart	A linear map, not drawn to scale, represents the approximate distances between major towns along a main road, as well s the general direction in which the major towns lie relative to the main road.
Distance table	A table which indicates the approximate distances between different towns.
Transport Map	A map which indicates the transport routes that a bus/taxi/train takes, together with its stops along the route.

LEARNER/TEACHER MANUAL

TOPIC: Scales and Maps



What is a Scale?

A scale represents the relationship between a measurement on a model and the corresponding measurement on the actual object

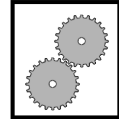
Types of Scales

Number Scale	Bar Scale
It is also known as ratio scale. Number Scales are always written in the form. $1 : 20$ Map : Reality This means that 1 unit on the map equals 100 units in reality. NB: The explanation is only correct when units are the same.	Also known as a linear scale, it is a means of visually showing the scale of the map. Example of a bar scale It also shows the relationship between distances on the map and the real world.

ADVANTAGES AND DISADVANTAGES OF EACH TYPE OF SCALE

Types of Scale	Advantages	Disadvantages
Bar Scale	- Are quick and easy to use. - You may be able to determine actual lengths and distances without doing calculations.	- Measurements (using a ruler, string or markings) obtained using bar scales tend to be less accurate. - Bar scales may still require calculation to determine the actual lengths and distances.
Number Scale	- Are more accurate than bar scales. - Are more convenient to use when working with small scales.	- Number scales require the use of calculators in determining actual distances. - With digital printing number scales become inaccurate and if there is resizing of the map or plan.

Worked Example: Bar and Number Scale



- 1.1 On a map the scale is shown as 50 cm : 100 km. Use this information to answer the questions that follow

- 1.1.1 Write down the name of the scale given in the context. (2)

Possible Answer:

Number Scale (Ratio Scale)

- 1.1.2 Express the given scale in the form of 1 : ... (3)

Possible Answer:

50 cm : 10 000 000 cm

$$\frac{50 \text{ cm}}{50} : \frac{10\,000\,000}{50}$$

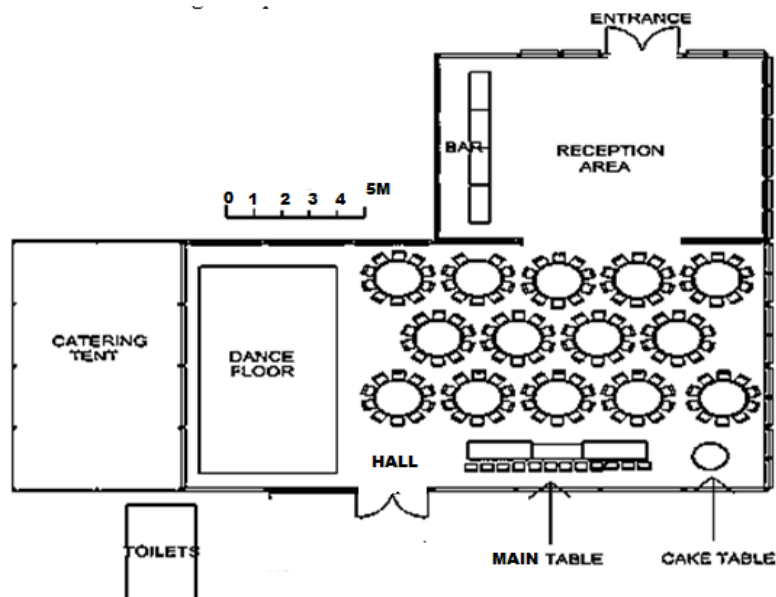
1 : 200 000

- 1.1.2 Write down the explanation of the scale above. (2)

Possible Answer:

It means 50 cm on the map represents 100 km on the ground

- 1.2 Shown below is the layout plan for a wedding venue. The venue has a reception area and a hall where the wedding takes place.



- 1.2.1 Identify the type of scale seen on the layout plan. (2)

Possible Answer:

Bar Scale (Line Scale)

- 1.2.2 Explain what this scale represents. (2)

Possible Answer:

2,5 cm on the plan represents 5m in reality / 25 mm on the plan represents 5m in reality

- 1.2.3 Measure the scale and use your answer to write the scale as a number scale. (5)

Possible Answer:

1.6 cm/16mm (Measure the final printed copy)

1,6 cm = 5 m

1,6 : 500 (both values to cm)

1 : 312,5

- 1.2.4 Determine the total number of people the hall can seat. (3)

Possible Answer:

Number of people = $(13 \times 10) + 9 + 12$
= 151

ACTIVITY 1: Bar and Number Scale

(25 marks: 20 minutes)



1.1 The scale below was shown on the map

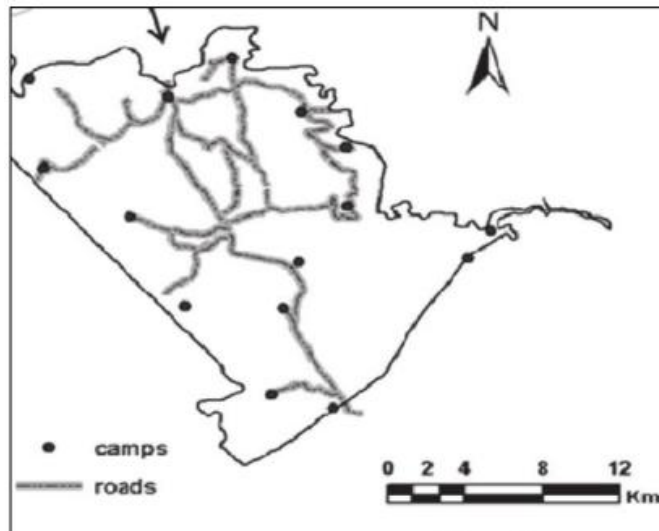
1 : 20

Choose the correct explanation for the scale above

- A. One cm on the map is equal to twenty centimetres in reality
- B. One cm on the map is equal to twenty millimetres in reality

(2)

1.2 The map of Mkhuze Game Reserve is shown below. Use the map to answer the questions that follow.



[Adapted from resource: researchgate.net]

1.2.1 Identify the type of scale used on the map.

(2)

1.2.2 Explain the meaning of the scale.

(2)

1.2.3 Complete the missing value:
... mm = 12 km

(2)

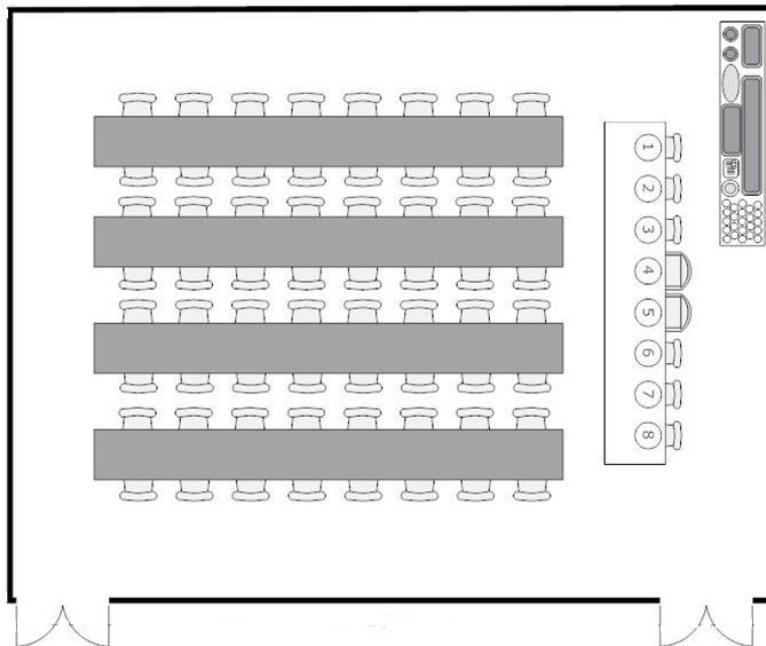
- 1.3 The three pictures below shows the same air balloon which is drawn using three different scales (A,B and C) in a random order

Picture 1	Picture 2	Picture 3
		

- A. 1: 20 000
B. 1: 100 000
C. 1: 50 000

- 1.3.1 Name the type of scale used to draw the sketches above. (2)
- 1.3.2 Write down the explanation for scale B (2)
- 1.3.3 Match each picture with the correct scale. (6)

- 1.4 Shown below is the seating plan of a boardroom.



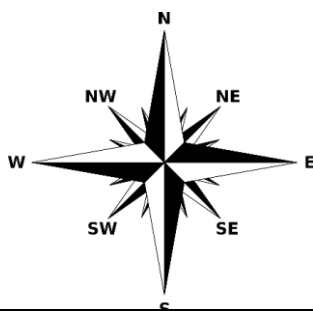
- 1.4.1 Write down the total number of people that can be seated in the boardroom. (2)
- 1.4.2 The actual outside length of the boardroom is 12m.
- (a) Measure the actual length of the boardroom on the seating plan. (2)
- (b) Hence, calculate the scale used in this seating plan. (3)

What is a Map?

Relative positions on a map are used when describing the position or directions to someone in relation to surrounding landmarks. Key words that must be used include; **left; right; up; down; in front of; behind;** and the compass directions which are also known as cardinal points [**i.e. North(N), South(S), East(E) and West(W)**]

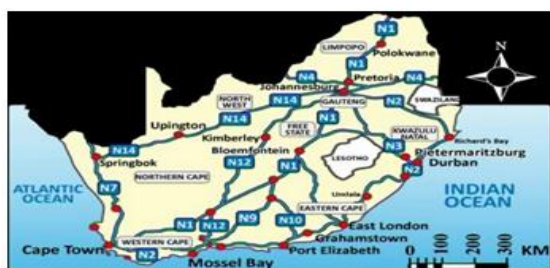
NB: Maps are often drawn to scale (**not always**) in order to allow calculations of actual lengths

Compass Directions



Different types of Maps

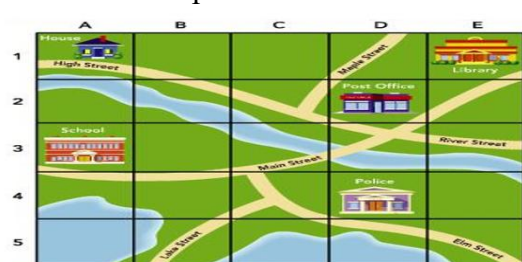
National road maps



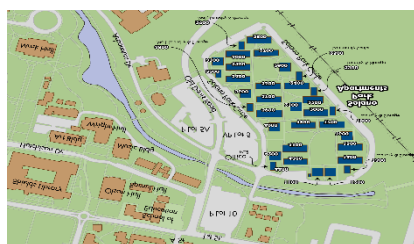
National and Provincial Road Map



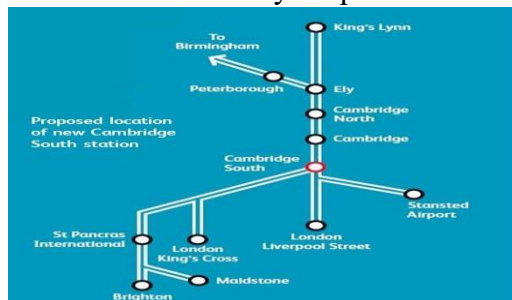
Street Map with Grid reference



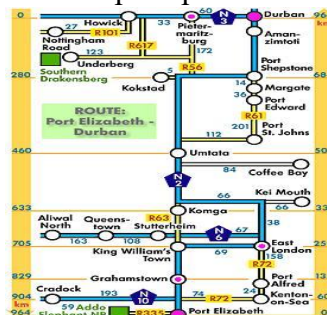
Residential or Housing maps



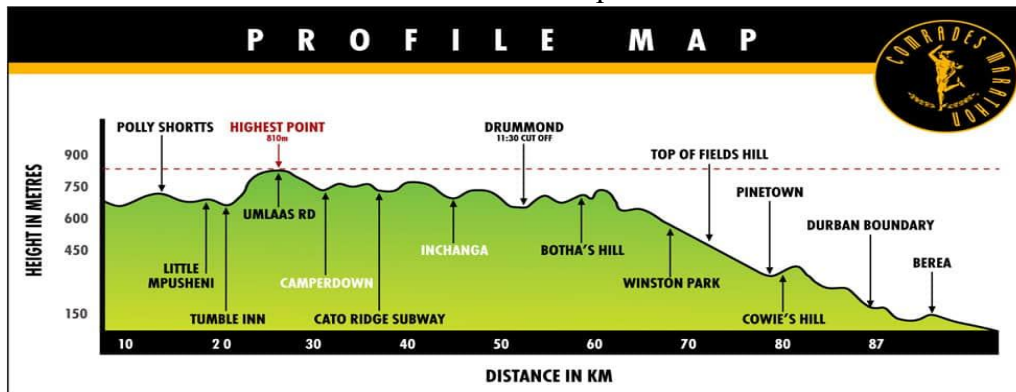
Rail Way Map



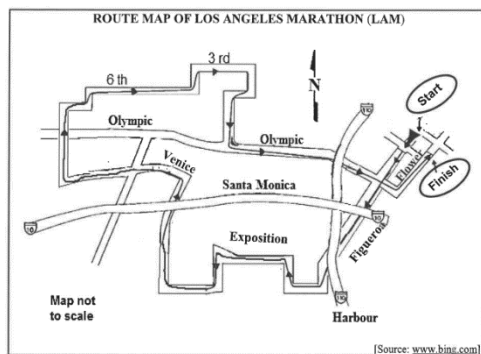
Strip Map/Chart



Elevation Map



Route Map



Regional Map

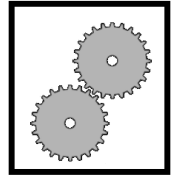
Regional map of Cyprus and the surrounding countries



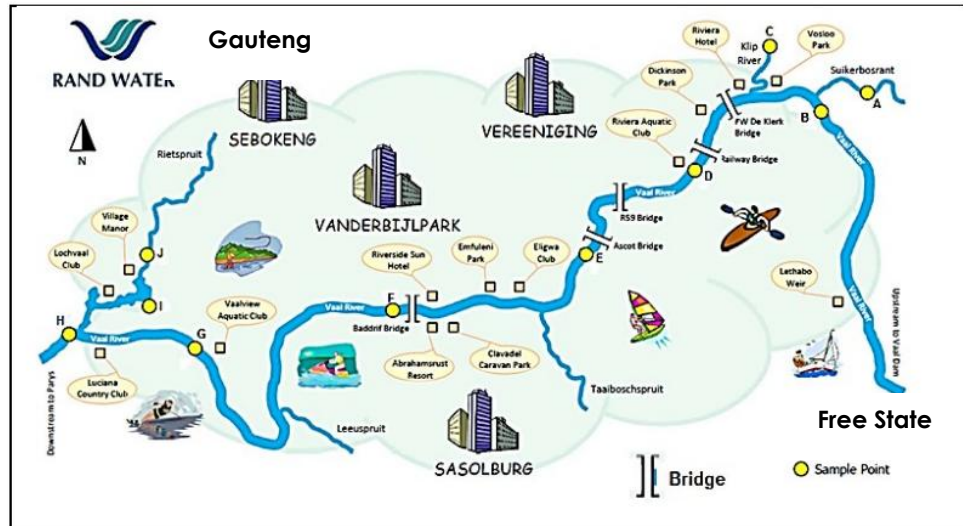
Points to consider when working with maps.

1. Type of the scale used.
2. Check the position of the compass direction (check where the North is pointing).
3. Read the key.
4. Identify labels/names of national and provincial roads.
5. Identify the names of towns on the route between two locations.
6. Interpret a given set of directions and describe what location the direction leads to.

Worked Example



- 1.1 Study the map on ANNEXURE B that shows the sample points for testing *Escherichia coli* (*E. coli*) and Blue Green Algae counts per 100 ml. Answer the questions that follow.



- 1.1.1 Give the names of the provinces appearing on the map. (2)

Possible answer:
Gauteng and Free State

- 1.1.2 Write down the total number of bridges found upstream (North East) of the R59 bridge. (2)

Possible Answer: Two

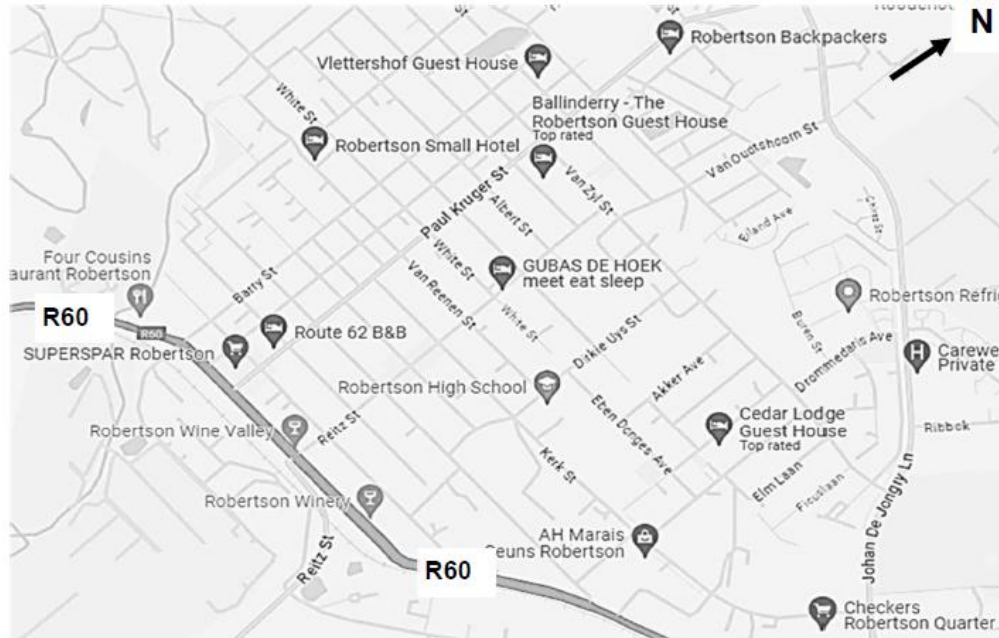
- 1.1.3 The distance between the R59 Bridge and Railway Bridge is 3 km. Calculate the distance on the map if the scale is 1 : 25 000. Give your answer in cm. (3)

Possible answer:
1 : 25 000
Scaled length = $\frac{3}{25\,000}$
= 0,00012 km
In cm = 0,00012 x 10 000
= 12 cm

- 1.1.4 Give the general direction of Sasolburg from Sebokeng. (2)

Possible answer:
South East

- 1.2 Kriel travelled to Robertson (a town in the Western Cape) during the school holidays to visit his aunt Nini. A part of the map of Robertson that Kriel used for his journey is shown below. Study the map and use it to answer the questions that follow.



[Source: <https://www.google.com/map>]

- 1.2.1 Name the road that passes through Robertson Winery and Robertson Wine Valley. (2)

Possible answer:

R60

- 1.2.2 Determine the general direction of the Robertson Small Hotel from the Cedar Lodge Guest House. (2)

Possible answer:

West/Westerly/W

- 1.2.3 Name TWO grocery stores indicated on the map. (2)

Possible answer:

Checkers Robertson

Superspar Robertson

- 1.2.4 Identify the name of the high school indicated on this map. (2)

Possible answer:

Robertson High School

- 1.2.5 Kriel arrived in Robertson at 11:03. Write down the time of Kriel's arrival in words. (2)

Possible answer:

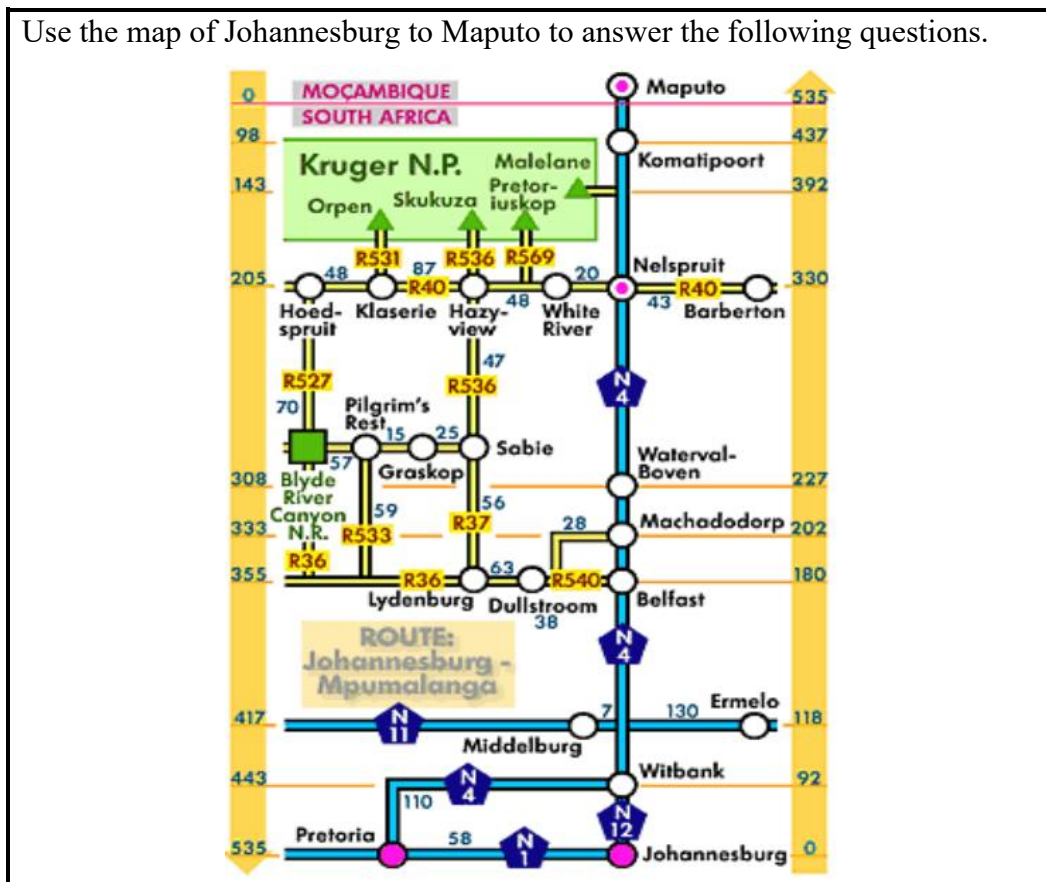
Three minutes past/after eleven

- 1.2.6 Identify the type of map shown above. (2)

Possible answer:

Street map /Road map

- 1.3 Use the map of Johannesburg to Maputo to answer the following questions.



- 1.3.1 Write down the name of the map used above. (2)

Possible answer

Strip Chart/Map

- 1.3.2 Write down all the national roads shown on the map. (2)

Possible answer

N1, N4, N12, N11

- 1.3.3 Write down the distance from Johannesburg to Nelspruit (2)

Possible Answer

330 km

- 1.3.4 Determine the distance between Maputo and Machadodorp. (2)

Possible answer

333km

OR

535 – 202

= 333km

- 1.3.5 On her way to Maputo Jolie had to go to Pilgrim's Rest to pick up her cousin. She used the following roads, N12, R540, R37, R527 and R40. Show by means of calculations that she will travel a total distance of 877km. (5)

Possible answer

Johannesburg to Belfast = 180km

Belfast to Dullstroom = 28km + 38km

Dullstroom to Lydenburg = 63km

Lydensburg to Sabie = 56km

Sabie to Pilgrim's rest = 25km + 15km

Pilgrim's rest to Hoedspruit = 57km + 70km

Hoedspruit to Nelspruit = 48km + 87km + 48km + 20 km

Nelspruit to Maputo = 205km

Total distance = 180km + 28km + 38km + 56km + 25km +
15km + 57km + 70km + 48km + 87km +
48km + 20 km + 205km
= 877 km

- 1.3.6 On her way back, she stopped at Komatipoort. She then drives on the N4 towards Johannesburg. After approximately 107 km she turns to her right. She continues for approximately 68 km she turns left. After traveling for approximately 47km she arrives at her destination. Give the name of the town she is at. (2)

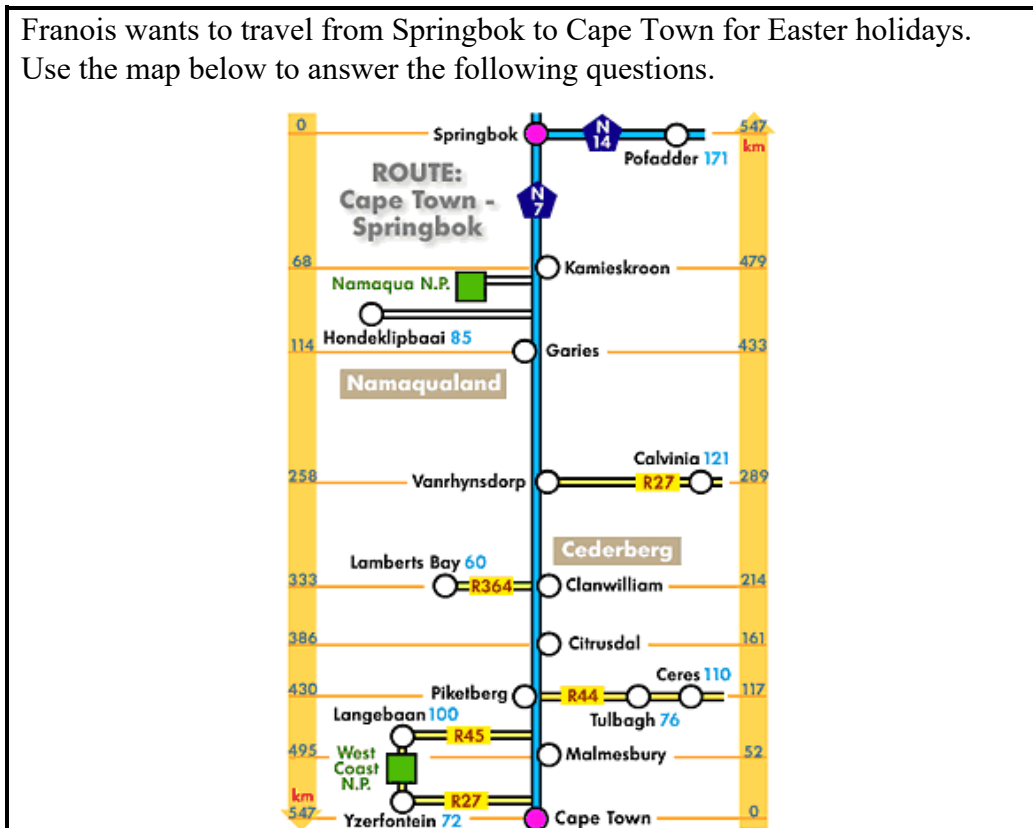
Possible answer

Sabie

ACTIVITY 2: Maps



- 1.1 Franois wants to travel from Springbok to Cape Town for Easter holidays. Use the map below to answer the following questions.



- 1.1.1 Name the type of the map above. (2)
- 1.1.2 Mention the types of the roads found on the map. (2)
- 1.1.3 Determine the distance from Springbok to Cape Town. (2)
- 1.1.4 Write down the probability of finding a national park on the map. (2)
- 1.1.5 Write down the name of the town that is exactly 186 km from the national road. (3)
- 1.2 Mr Labuschagne, a paralympic athlete (athlete with disability) staying in South Africa, travelled to Tokyo to enter the 42 km paralympic marathon.

ANNEXURE A shows a route map of the marathon from the starting to the finishing point

Use the information above and ANNEXURE A to answer the questions that follow.

- 1.2.1 State the general direction of Tokyo Skytree from the starting point. (2)

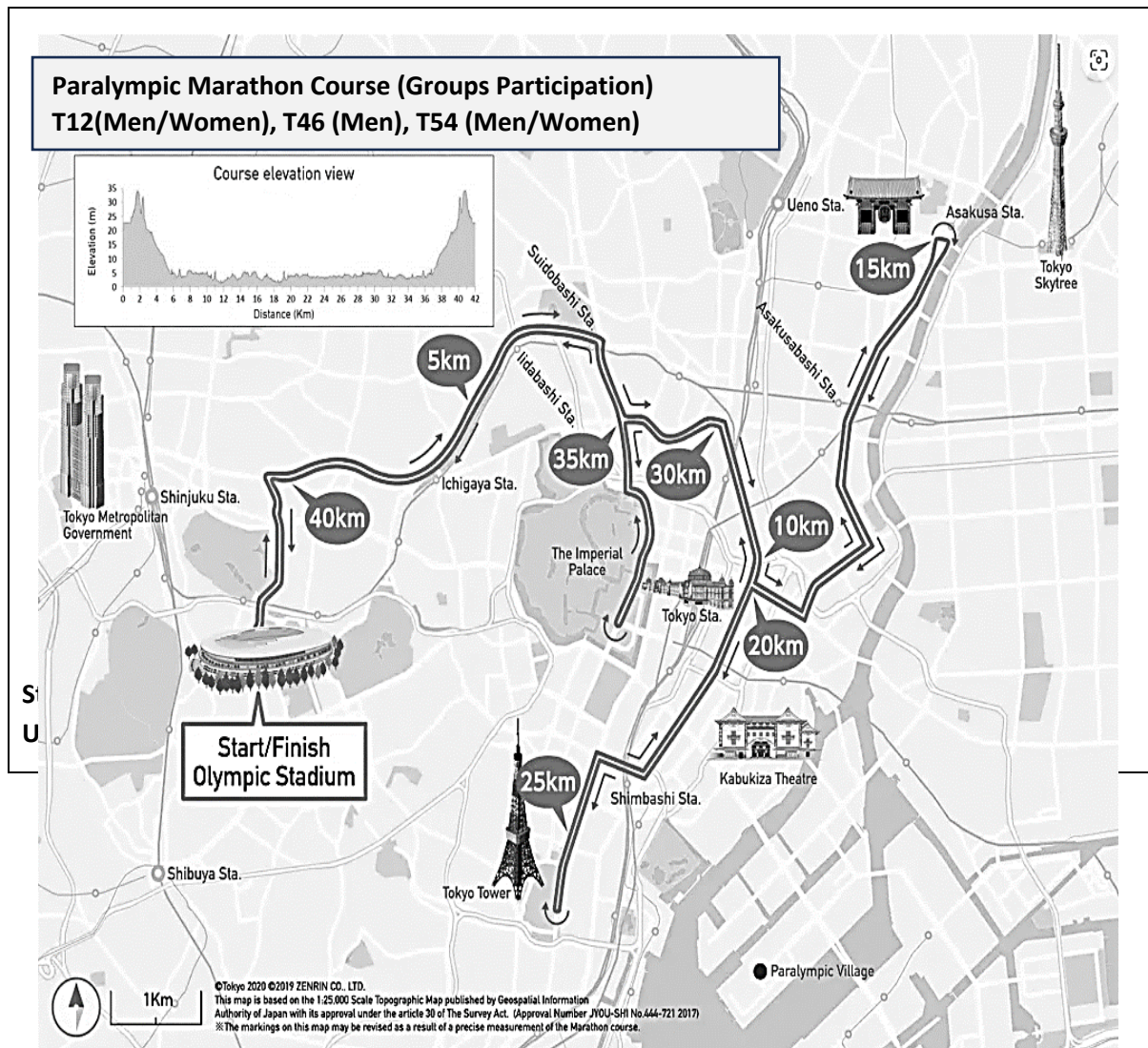
- 1.2.2 Write down the probability of selecting a group with men and women participating in the marathon. Give your answer as a fraction. (2)
- 1.2.3 After completing his training in South Africa, Mr Labuschagne stated that he will be able to complete the marathon in 2 hours 33 minutes. State two factors that may affect his running pace during the marathon. (4)
- 1.2.4 Write down the name of the station which is situated at the 15 km mark of a marathon. (2)
- 1.2.5 Calculate how many kilometres will be left before reaching the finishing point when an athlete is at the 40 km mark of the marathon. (2)
- 1.2.6 Write down the number of U-turns shown on the map. (2)
- 1.2.7 The information about different groups participating in the marathon together with the starting times was provided on the internet.

Group	Time
T12 – athletes with visual impairments	08:00 am
T46 – athletes with upper limb deficiency	07:00 am
T54 – athletes on wheelchairs	06:30 am

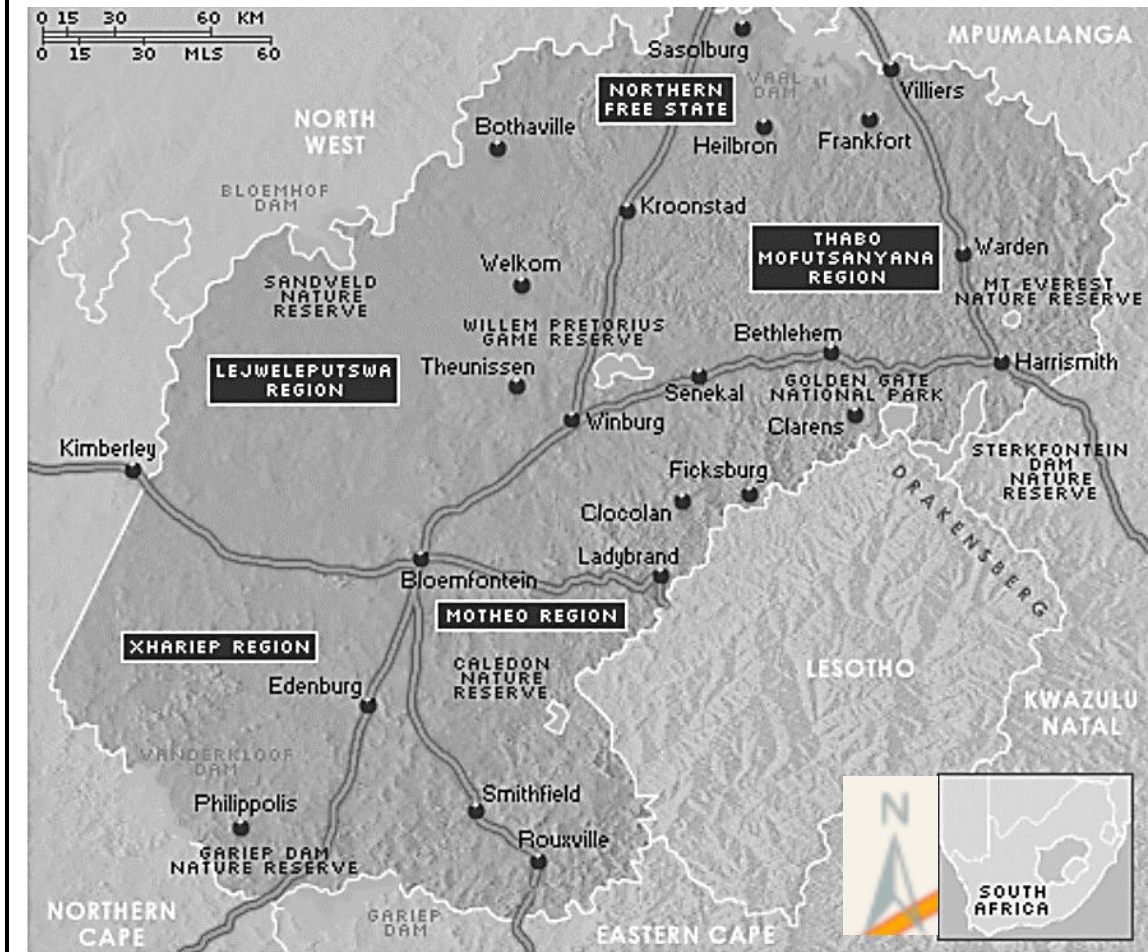
- (a) Give ONE possible reason why different groups start at different times. (2)
- (b) There were three thousand nine hundred and sixty athletes on the day of the marathon. Group T12 had 1 700 athletes and T54 had 1 580 athletes.

Write down, in a simplified form, the ratio of the three groups. (3)

ANNEXURE A



- 1.3 Mr Labuschagne stays in Edenburg and he regularly travels to Bloemfontein to visit his parents. The map below shows the location of the two places.



[Source:sa-venues.com]

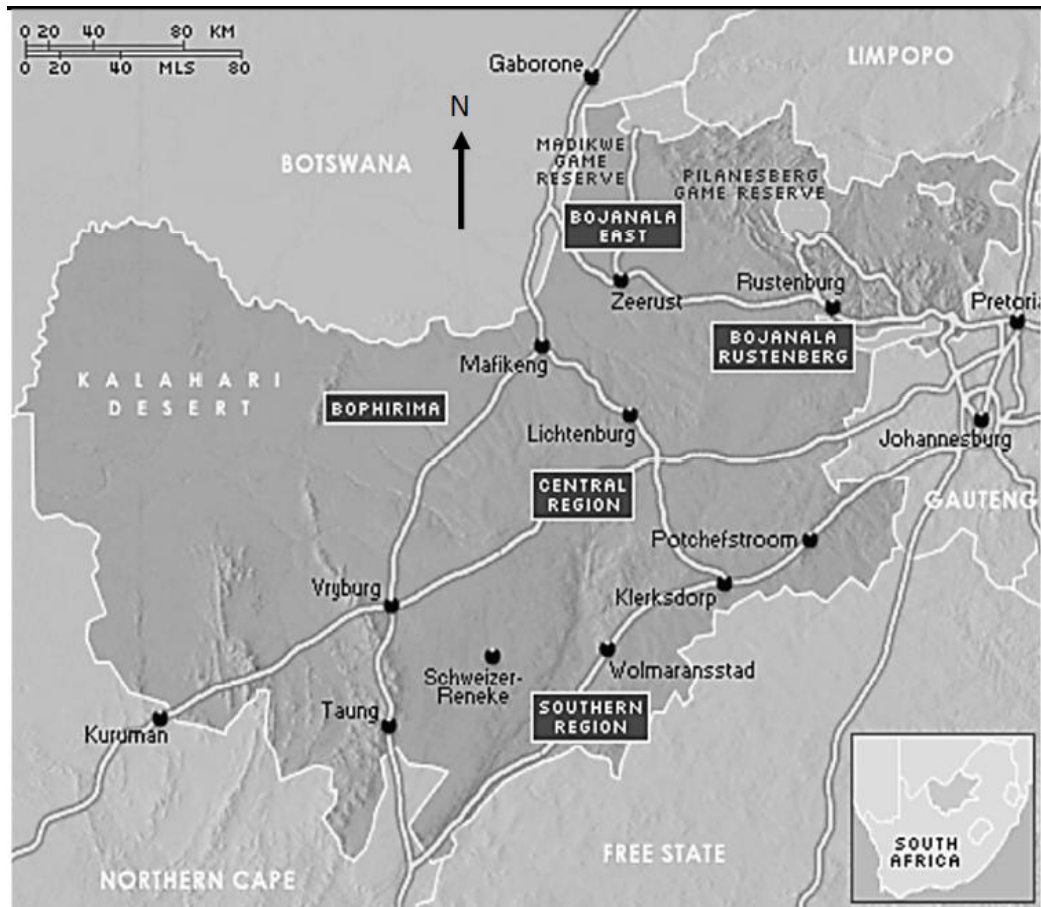
Use the information above to answer the questions that follow.

- 1.3.1 Write down the number of **nature reserves** appearing on the map (2)
- 1.3.2 Write down the name of the province that is situated in the north easterly direction from Edenburg. (2)
- 1.3.3 Mr Labuschagne wanted to check the distance from Edenburg to Bloemfontein. He used the distance calculator on the internet and found out that the distance between the two places is 77,5 km.

Calculate the distance between the two places using accurate measurement and the scale provided. Give one possible reason why the calculated distance and the one from the internet are not the same. (7)

- 1.4 North West is the sixth largest of the nine provinces in South Africa. It has an area of 40 495 square miles and a population of about 4,1 million people as of 2021. About 3,6% of the people in the North West Province live in Potchefstroom and the

surrounding areas. The rest live in rural parts of the province. The map of the province is shown below. Use the map and the given information to answer the following questions.



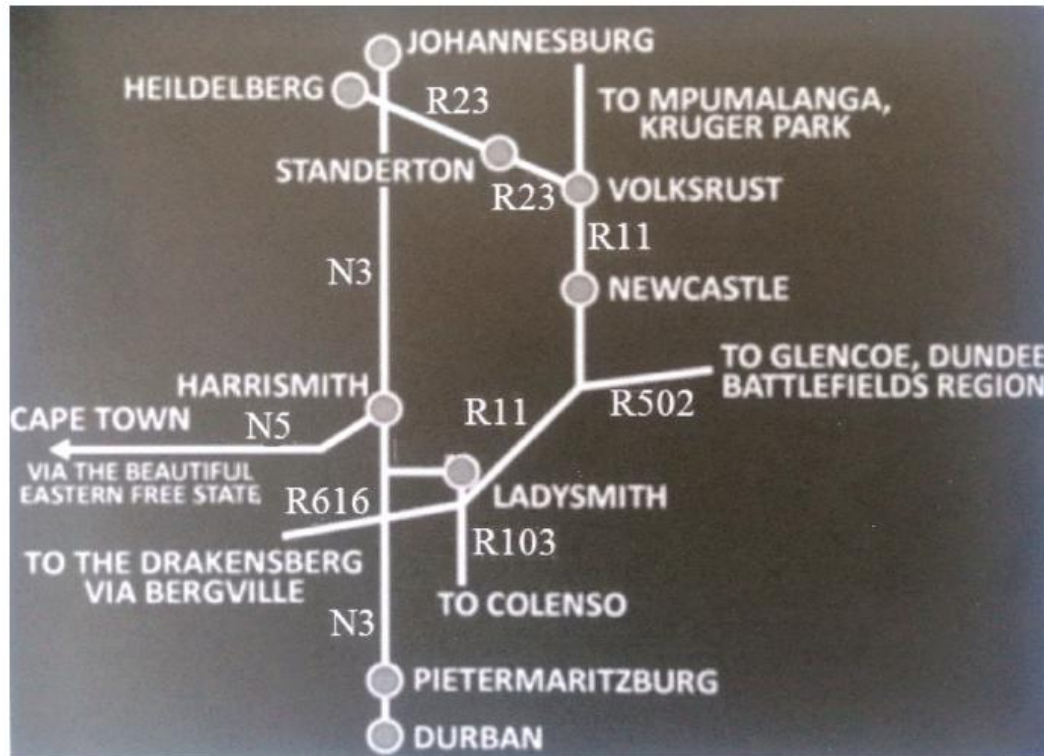
- 1.4.1 Write down the name of the town farthest to the south-west of Mafikeng as shown on the map. (2)
- 1.4.2 Use a ruler to measure the distance (as the crow flies) from Lichtenburg to Taung. Give your answer in millimetres. (2)
- 1.4.3 Use the scale on the map to calculate the actual distance in kilometres between Lichtenburg and Taung. (4)
- 1.4.4 Determine the actual number of people living in rural parts of the province. (3)
- 1.4.5 Convert the land area of the North West Province to the nearest km^2 given that $1 \text{ km} = 0,62137119 \text{ miles}$. (3)
- 1.4.6 Calculate the population density of the North West Province in $\text{people}/\text{km}^2$.

You may use the following formula

$$\text{Population density} = \frac{\text{Population}}{\text{Area}}$$

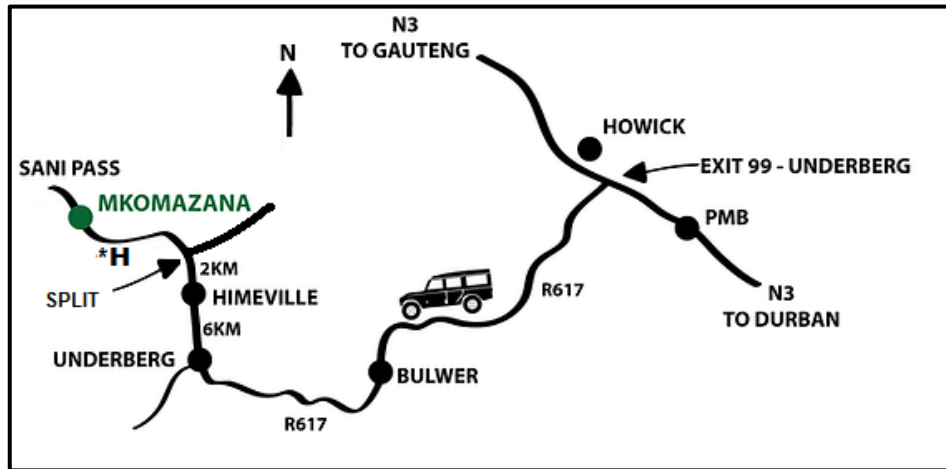
(3)

- 1.5 The route map showing the route between Johannesburg and Durban is shown below.



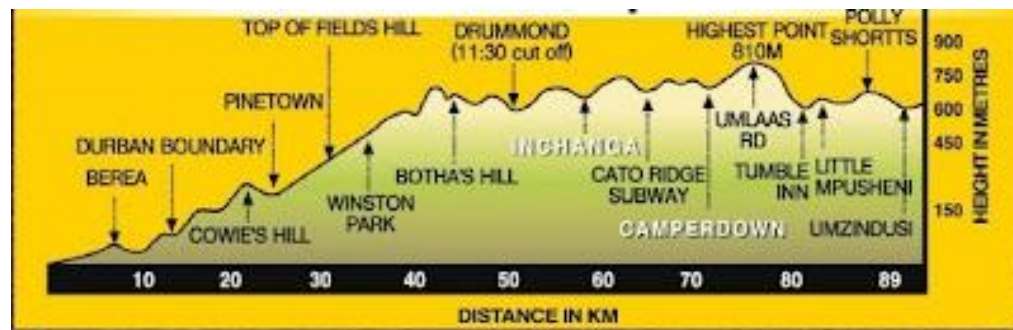
- 1.5.1 Write down the national roads shown on the map. (2)
- 1.5.2 What is the probability of finding a regional (provincial) road out of all the roads on the map? Give your answer as a decimal number rounded to three decimal places. (3)
- 1.5.3 Identify the towns on the route between Newcastle and Heidelberg when regional (provincial) roads are used. (4)
- 1.5.4 If a person travels from Harrismith to Cape Town, through which province will the person travel according to the route map? (2)
- 1.5.5 Mr. Joseph works in Johannesburg but travels regularly to Durban for business. Instead of taking the N3 directly to Durban, Mr Joseph decides to take another route. Describe the route. (4)
- 1.5.6 Give one reason why Mr. Joseph would travel the route with a longer distance than the route with the shorter distance. (2)

- 1.6 Lanri, Neo and three friends plan to drive to the Sani Pass in KwaZulu-Natal. They will travel from Johannesburg and stay at Mkomazana. The map below shows the route map to Mkomazana.



- 1.6.1 Write down the national roads found on the map. (2)
- 1.6.2 Write down the road number on which they will travel from exit 99 to Bulwer. (2)
- 1.6.3 Give the distance from Underberg to Himeville (2)
- 1.6.4 After driving 2 km from Himeville, the road splits to the left and the right. State in which direction (left or right) they must drive. (2)
- 1.6.5 It is 16 km from Himeville to Mkomazana. The distance between Mkomazana and the hotel is 4,4 km. Calculate how many kilometres after the split in the road the hotel (indicated with *H on the map) is located. (3)

- 1.7 The Comrades Marathon is an ultra-marathon run between Durban and Pietermaritzburg. The race starts at 05:30 and finishes at 17:30. The Map below shows the distance of the Marathon from Durban to Pietermaritzburg.



- 1.7.1 Write down the total distance of the Marathon. (2)
- 1.7.2 Write down the name of the map shown above. (2)
- 1.7.3 A cut off point is a certain point which point the runners must reach within a prescribed time so that they may continue their participation in the Marathon
- (a) Write down the cut-off point and time for the marathon (2)
- (b) Calculate the distance from the cut-off point to the end of the marathon (2)
- 1.7.4 Tebogo participated in the marathon, and he finished the marathon in six and half hours. Calculate his average speed in km/h.
- You may use the formula: **Average Speed** = $\frac{\text{Distance}}{\text{Time}}$ (4)
- 1.7.5 One of the runner 's best average speed for the run was his average speed of 19km/h from the highest point to the 80 km mark. Use the elevation map to explain why this was the case. (2)

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- Trial 2024 Limpopo P2
- KZN 2024 P1
- Trial 2024 FS P2
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