

MATHEMATICAL LITERACY

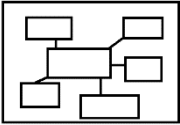



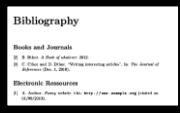

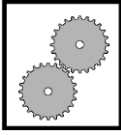

2025 SPRING SCHOOL AND LAST PUSH

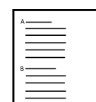
GRADE 12

**GUIDE FOR TEACHERS
AND LEARNERS**



ICON DESCRIPTION

 <p>MIND MAP</p>	 <p>EXAMINATION GUIDELINE</p>	 <p>CONTENTS</p>	 <p>ACTIVITIES</p>
 <p>BIBLIOGRAPHY</p>	 <p>TERMINOLOGY</p>	 <p>WORKED EXAMPLES</p>	 <p>STEPS</p>



SECTION 1: Measurement <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	5 - 17
SECTION 2: BMI <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	18 - 21
SECTION 3: Scale and Maps <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	22 - 42
SECTION 4: Scale and Plans <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	43 - 61
SECTION 5: Assembly Diagrams <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	62 - 73
SECTION 6: Models <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	74 - 82
SECTION 7: Finance <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	83 - 120
SECTION 8: Data Handling <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	119 - 133
SECTION 9: Probability <ul style="list-style-type: none"> ○ Outlining the key concepts ○ Worked examples. ○ Activities 	134 - 143
BIBLIOGRAPHY	144

STRUCTURE OF EXAMINATION			
PAPER	TOPICS	TOTAL MARKS	WEIGHTING
PAPER 1: (FINANCE & DATA HANDLING)	Finance	±90	± 60 %
	Data Handling	±53	± 35 %
	Probability	±7	± 5%
TOTAL		150	100%
PAPER 2: (MEASUREMENT, MAPS, PLANS & SCALES)	Measurement	± 83	± 55%
	Maps, Plans and Scale	± 60	± 40%
	Probability	±7	± 5%
TOTAL		150	±100%

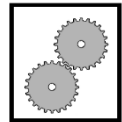
TAXONOMY LEVELS PER PAPER		
	Paper 1	Paper 2
Level 1: Knowing	30% (±45 marks)	30% (±45 marks)
Level 2: Applying routine procedures in familiar contexts	30% (±45 marks)	30% (±45 marks)
Level 3: Applying multi-step procedures in a variety of context	20% (±30 marks)	20% (±30 marks)
Level 4: Reasoning and reflecting	20% (±30 marks)	20% (±30 marks)

Measurement

Terminology	
Perimeter	The total length/distance around a shape or around the boundary
Area	The amount of space inside the boundary of a flat 2-dimensional object
Surface Area	The total area of all the faces of a 3-dimensional shape.
Volume	The 3-dimensional space occupied by a gas, liquid, or a solid substance.
Capacity	The amount an object can hold.

Mathematical Literacy Formulas		
Perimeter	Square	Perimeter = $4 \times \text{sides}$
	Rectangle	Perimeter = $2 \times (\text{length} + \text{breadth})$
Circumference	Circle	Circumference of the circle = $2 \times 3,142 \times \text{radius}$
Area	Square	Area of the circle = $\text{side} \times \text{side}$
	Rectangle	Area of a rectangle = $\text{length} \times \text{breadth}$
	Triangle	Area of the triangle = $\frac{1}{2} \times \text{base} \times \text{perpendicular height}$
	Circle	Area of a circle = $3,142 \times \text{radius}^2$
Surface area	Rectangular prism	SA = $(2 \times \text{length} \times \text{breadth}) + (2 \times \text{length} \times \text{height}) + (2 \times \text{breadth} \times \text{height})$
	Cylinder	SA = $2 \times 3,142 \times \text{radius}^2 + 2 \times 3,142 \times \text{radius} \times \text{height}$
Volume	Rectangular Prism	Volume = $\text{length} \times \text{breadth} \times \text{height}$
	Triangular Prism	Volume = $\frac{1}{2} \times b \times h \times H$
	Cylinder	Volume = $\pi \times \text{radius}^2 \times \text{height}$

Worked Example: Measurement



- 1.1 TABLE 1 below contains a list of explanations and definitions of concepts used in Mathematical Literacy.

TABLE 1: EXPLANATIONS AND DEFINITIONS OF CONCEPTS

A	The amount of 2-Dimensional space occupied by a 2-D shape
B	The distance around a circle
C	A straight line passing through the centre of a circle and touching the circle at both ends
D	The distance from the centre of a circle to any point on the circumference of the circle

Use TABLE 1 above and match an explanation or a definition with EACH of the concepts below. Write only the letter (A - D) next to (a, b, c and d)) e.g. (c) E.

- 1.1.1 Radius (2)

D

- 1.1.2 Circumference (2)

B


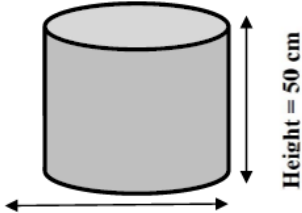
- 1.1.3 Area (2)

A

- 1.1.4 Diameter (2)

C

- 1.2 Lehlohonolo needs a coffee table that he can use as a table and as a storage. He went shopping and found a fluted marble storage coffee table

PICTURE OF THE TABLE	DIMENSIONS OF THE COFFEE TABLE
	 Height = 50 cm Diameter = 40 cm

Use the information above to answer the questions that follow.

- 1.2.1 Calculate the radius of the coffee table. (2)

$$\begin{aligned}\text{Radius} &= 40 \div 2) \\ &= 20 \text{ cm}\end{aligned}$$

- 1.2.2 Write down the ratio (rounded to one decimal place) of the diameter to the height in the form:
1: (3)

$$\begin{aligned}40 : 50 \\ 1 : 1,3\end{aligned}$$

- 1.2.3 Calculate the area of the bottom part of the table.

You may use the formula: $\text{Area} = 3,142 \times \text{radius}^2$ (2)

$$\begin{aligned}\text{Area} &= 3,142 \times 20^2 \\ &= 1256,8 \text{ cm}^2\end{aligned}$$

- 1.2.4 Lehlohonolo decides to use spray paint to cover the top of the table using 3 coats. He claims that he will need 2 cans of spray paint.

Verify showing all calculations, if he is correct.

Note:

- 1 can of spray paint = 400 mℓ
 - 400 mℓ can cover an area of 0,2 m²
- (5)

$$\begin{aligned}1256,8 \div 10\,000 \\ = 0,12568\end{aligned}$$

$$\begin{aligned}&= 3 \times 0,12568 \\ &= 0,37704 \text{ m}^2\end{aligned}$$

1 can covers 400mℓ
400mℓ covers 0,2 m²

$$\begin{aligned}\text{Number of cans} &= 0,37704 \text{ m}^2 \div 0,2 \\ &= 1,8852 \\ &\approx 2 \text{ cans}\end{aligned}$$

The statement is correct

- 1.2.5 Give two reasons why it is important to paint the top of the table. (4)

To protect wood from scratches/Moisture damage/Decoration/To prolong its life span

- 1.2.6 Lehlohonolo is going to use the storage to store canned food that has a diameter of 6 cm. Calculate the circumference of one can in cm.

You may use the formula: $\text{Circumference} = 2 \times 3,142 \times \text{radius}$ (3)

$$\begin{aligned}\text{Radius} &= 6 \div 2 \\ &= 3 \text{ cm}\end{aligned}$$

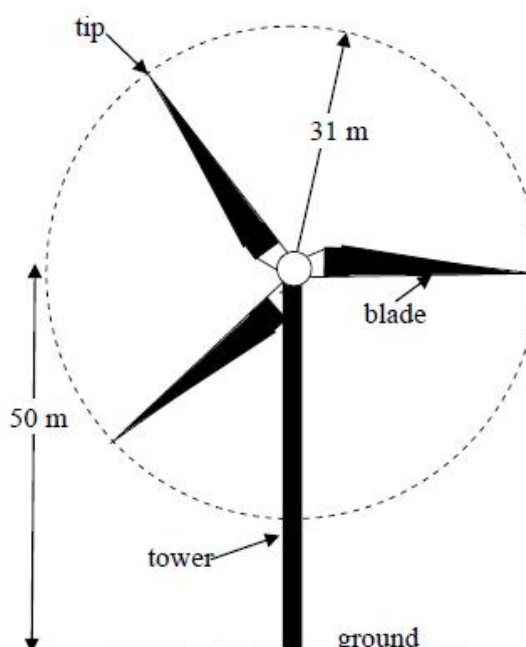
$$\begin{aligned}\text{Circumference} &= 2 \times 3,142 \times 3 \\ &= 18,852 \text{ cm}^2\end{aligned}$$

ACTIVITY 1: Measurement

(28 marks: 30 minutes)



- 1 Electricity has become a scarce resource in South Africa. As a result, the country is investigating alternative sources of generating electricity. One alternative source of generating electricity is a wind turbine using rotating blades as shown in the picture and diagram below.



The wind turbine is mounted on the top of a 50 m high tower.
The length of each blade is 31 m.

Use the information above to answer the following questions

- 1.1.1 Write down the length of the diameter of the circle that the blades create as they rotate (2)
- 1.1.2 Calculate the maximum height from the ground that the tip of a blade will be, if the turbine is rotating. (2)
- 1.1.3 Calculate the circumference of the circle made by the blades when they rotate.

You may use the formula:

$$\text{Circumference} = 2 \times \pi \times \text{radius}, \text{ using } \pi = 3,142 \quad (2)$$

1.1.4 Calculate the area of the circle made by the blades when they rotate.

You may use the formula

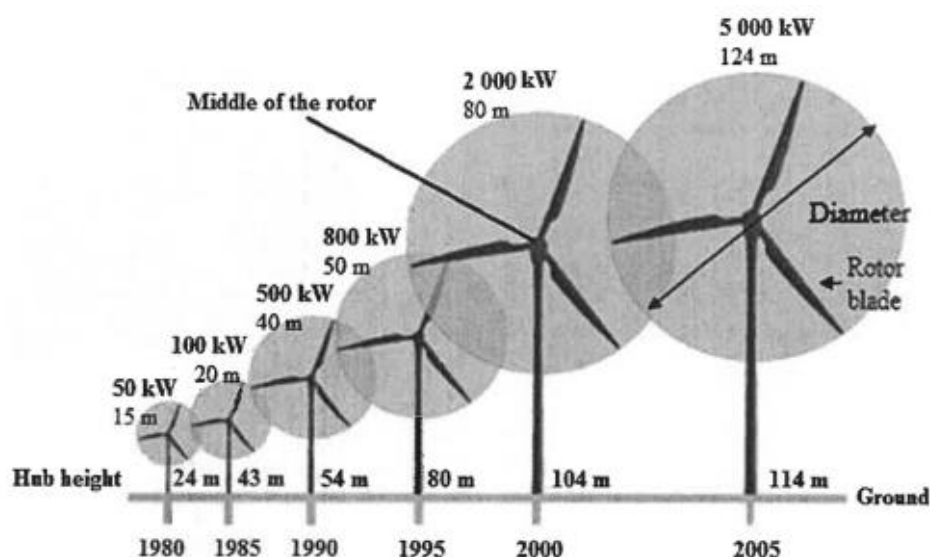
$$\text{Area} = \pi \times (\text{radius})^2, \text{ using } \pi = 3,142 \quad (3)$$

1.1.5 Suppose each household requires 25 kW of electricity daily.

If one wind turbine produces 1 750 kW of electricity daily, calculate how many households could be provided daily with electricity from one such turbine. (2)

1.2 Wind turbines are used as an alternative way to generate electricity. The picture below shows how the size of the wind turbine and the generation capacity has changed from 1980 to 2005.

PICTURES OF WIND TURBINES AND GENERATION CAPACITY USED FROM 1980 TO 2005



NOTE:

Hub height = distance from the ground to the middle of the wind turbine's rotor

5 000 kW: Power generation of 5 000 kilowatt

124 m: Diameter of the circle made by the rotor blades of the wind turbine

$$\text{Area of a circle} = 3,142 \times \text{radius}^2$$

Use the information above to answer the following questions

1.2.1 Write down the amount of power generated by the wind turbine with the second-tallest hub height. (2)

- 1.2.2 Give ONE possible reason why the rotor blade size of the wind turbine from 2005 is larger than the rotor blade size of the wind turbine from 1980. (2)
- 1.2.3 Calculate, in metres, the maximum height that the tip of the rotor blade of the tallest wind turbine can reach as it turns. (3)
- 1.2.4 Anam says that the area covered by the rotor blade of the tallest wind turbine in motion is $12\,077,748\text{ m}^2$.
Verify, with calculations, whether her statement is VALID. (4)
- 1.2.5 Determine the percentage increase in power generation from 1995 to 2005 (4)
- 1.2.6 Give ONE other possible source of generating electricity that can be used in South Africa (2)

ACTIVITY 2: Measurement

(30 marks: 35 minutes)

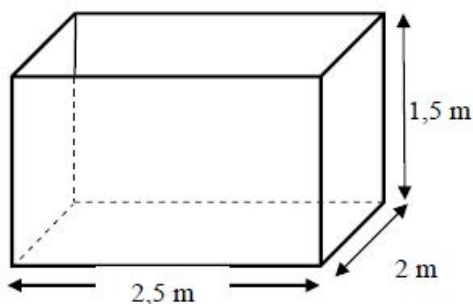


- 1.1 An aquarium is a place where collections of fish and other aquatic animals are displayed. The fish are kept in open rectangular glass tanks. A water pump is used to circulate and refresh the water in the tanks.

An open-top fish tank has the following dimensions:

length = 2,5 m; breadth = 2 m; height = 1,5 m

Sketch of a fish tank



Fish in an aquarium



Use the information above to answer the following questions

- 1.1.1 Determine the volume of the fish tank in kilolitres if $1\text{ m}^3 = 1\text{ k}\ell$

You may use the formula:

Volume = length \times breadth \times height. (3)

- 1.1.2 Determine the total surface area (in m²) of glass used for the open-top fish tank

You may use the formula:

Surface area

$$= (\text{length} \times \text{breadth}) + 2 \times (\text{length} \times \text{height}) + 2 \times (\text{height} \times \text{breadth}) \quad (4)$$

- 1.1.3 Calculate the cost of 20 m² of special glass for the fish tank @ R480,00 per m². (3)

- 1.1.4 The water pump costs R3 999,00. The suppliers gave the aquarium a 15% discount. Calculate how much the aquarium paid for the pump. (3)

- 1.1.5 The tank is filled with 6 900 ℓ of water at a rate of 2 300 ℓ of water per hour. Calculate the time taken to fill the tank. (2)

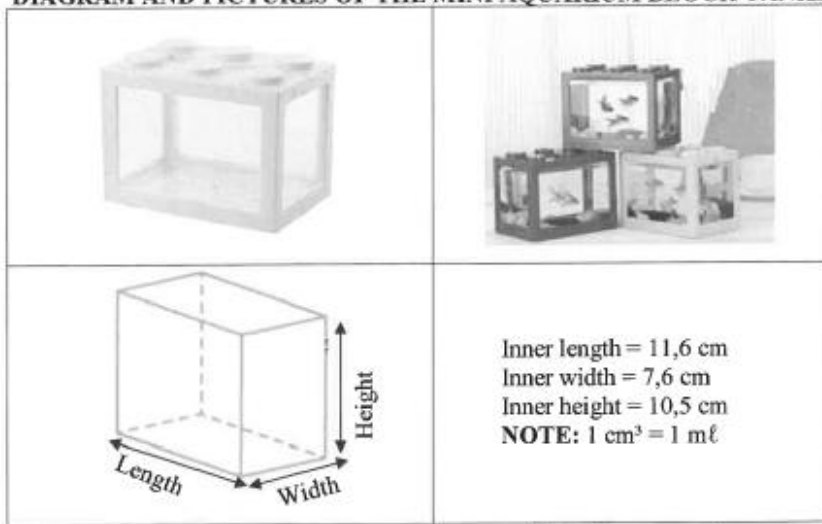
- 1.2 Jabu wants to open his own pet shop. The operating hours of the shop are given in the table below

TABLE 2: OPERATING HOURS OF THE PET SHOP

DAYS OF THE WEEK	OPERATING HOURS
Monday to Friday	07:30 to 17:00
Saturday	08:00 to 13:00
Sunday	Closed

Jabu will sell the fish tanks in the shape of mini aquarium blocks, as shown in the pictures and diagrams below.

DIAGRAM AND PICTURES OF THE MINI AQUARIUM BLOCK TANKS



Use the information above to answer the questions that follow

- 1.2.1 Determine (in simplified form) the ratio of the length to the width of the mini aquarium block tank (3)

1.2.2 Calculate the total number of hours the pet shop will be open in one operating week. (5)

1.2.3 Each mini aquarium tank will contain 75% of its capacity in water

Determine the amount of water left over in a jug (1 000 m ℓ), after filling one mini aquarium tank with water.


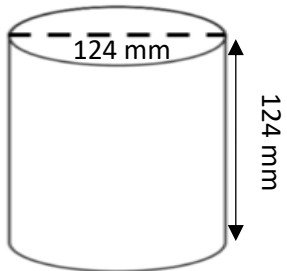
Use the formula: Volume = length × width × height (7)

ACTIVITY 3: Measurement

(31 marks: 35 minutes)



1.1 The sketches below show a pedestal and a diagram of the pedestal with its dimensions. The pedestal can be used as a table, plant stand or as extra seating.

PICTURE OF PEDESTAL	DIAGRAM OF PEDESTAL WITH DIMENSIONS
	

Use the information above to answer the questions that follow.

1.1.1 Choose a formula (A, B or C) below which can be used to calculate the total volume of the pedestal.

NOTE: In EACH formula, **r** = radius and **h** = height.

A. Volume = $(2 \times \pi \times r \times h) + (2 \times \pi \times r^2)$

B. Volume = $(2 \times \pi \times r^2) \times h$

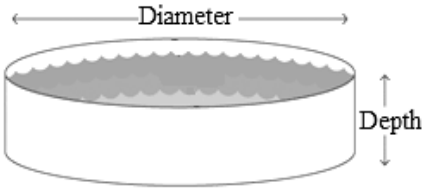
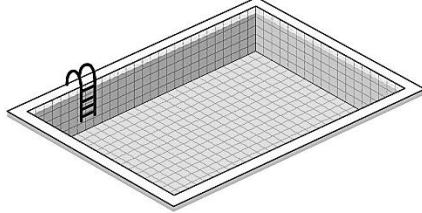
C. Volume = $\pi \times r^2 \times h$ (2)

1.1.2 Write down the unit of measurement for the volume of the pedestal using the given unit in the diagram (2)

1.1.3 Convert the height of the pedestal to metres. (2)

1.2 The owners of the holiday resort plan to build a cylindrical pool.

The pictures below show the existing rectangular swimming pool and a cylindrical swimming pool which the owners plan to build at the holiday resort.

CYLINDRICAL SWIMMING POOL	RECTANGULAR SWIMMING POOL
	
<p>Inner dimensions of the pool:</p> <p>Diameter = 7 m Depth = 1 m</p> <p>Tiles = 20 cm × 20 cm (16 in a box)</p>	<p>Inner dimensions of the pool:</p> <p>Length = 6,2 m Width = 3,25 m Depth = 1,65 m</p>

NOTE: 1 m³ = 1 000 litres

Use the information above to answer the questions that follow

1.2.1 Give ONE reason why you think the cylindrical pool is designed for small children. (2)

1.2.2 Explain the meaning of **capacity** of a swimming pool. (2)

1.2.3 Calculate, rounded to the nearest litre, the difference in volume of the two swimming pools.

You may use the following formulae:

Volume of a cylinder = $3,142 \times (\text{radius})^2 \times \text{depth}$

Volume of a rectangular prism = $\text{length} \times \text{width} \times \text{depth}$ (8)

1.2.4 The total inner surface of the cylindrical pool will be tiled. An additional 10% tiles were purchased.

You may use the following formula:

Surface area of an open cylinder
= $3,142 \times \text{radius} \times (\text{radius} + 2 \times \text{depth})$

(a) Give ONE reason why additional tiles were purchased. (2)

(b) The tiler states that he requires more than 100 boxes of tiles to complete the tiling.

Verify, showing ALL calculations, whether his statement is valid. (11)



ACTIVITY 4: Measurement

(23 marks: 25 minutes)



1.1 Fruit juice for lunch boxes is normally packaged in boxes or tins.

The diagrams below show pictures and dimensions of packaged juice.

Picture of 200 ml juice box	Picture of 200 ml juice tin:
	
Dimensions of juice box:	Dimensions of juice tin:
Length: 35 mm Width: 45 mm Height: 120 mm	Diameter: 5,3 cm Height: 11,1 cm

Use the information above to answer the questions that follow.

1.1.1 Write down the unit of measurement for the surface area of a juice box. (2)

1.1.2 Choose the correct formula from the options below for the surface area of the juice tin:

Only write the correct letter in your answer book (e.g 1.1.4 D)

A. Surface Area = $\pi \times \text{radius}^2 \times \text{height}$



B. Surface Area = $2 \times \pi \times \text{radius}^2 + 2 \times \pi \times \text{radius} \times \text{height}$

C. Surface Area = $\pi \times \text{radius} \times \text{height}$ (2)

1.1.3 Convert the capacity of the juice box to litres. (2)

1.2 Abongile bought a 20-foot shipping container for storage.

The diagrams below show the dimensions of the container:

OUTER DIMENSIONS OF SHIPPING CONTAINER				INNER DIMENSIONS OF SHIPPING CONTAINER			
							
Dimensions	length	width	height	Dimensions	length	width	height
Foot	20,0	8,0	8,60	Foot	19,4	7,9	7,4
Metres	A	2,40	2,60	Metres	5,89	2,35	2,39
Note: 1m = 3,28084 foot				You may use the following formulae: Volume = length × width × height Perimeter = 2 × (length + width)			

Use the information above to answer the questions that follow.

1.2.1 Identify the shape of the base of the container. (2)


1.2.2 Calculate, in cubic foot (ft³) rounded to two decimals places, the inner volume of the shipping container. (4)

1.2.3 Calculate, in m², the outer surface area of the shipping container.
You may use the formula:

$$\text{Surface area of rectangular prism} = 2 \times (\text{length} \times \text{width}) + 2 \times (\text{width} \times \text{height}) + 2 \times (\text{length} \times \text{height}) \quad (5)$$

1.3 Abongile calculated that the total inner surface area (excluding the floor of the container) to be painted with rustproof paint is 53,2287 m².

The paint to be used to paint the inner dimension of the shipping container is given below:

TIN OF PAINT	INFORMATION
	<ul style="list-style-type: none"> Duram NS4 Anti-Rust Coating Primer Grey 5 litre tin. Spread rate of 8 m² per tin of paint. <p>R599,00 (INCL VAT)</p>

1.3.1 Determine the number of tins of paint that must be bought. (4)

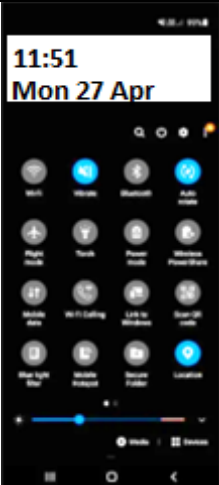
1.3.2 Calculate the total cost of the paint for this project. (2)

ACTIVITY 5: Measurement

(21 marks: 25 minutes)



- 1.1 The following is a picture of the Samsung S20 cell phone together with the dimensions of the cell phone.

PICTURE OF SAMSUNG CELLPHONE	DIMENSIONS OF CELLPHONE
	Length: 151,7 mm Width: 69,1 mm Thickness: 7,9 mm Weight (mass) = 163 g

Use the information above to answer the questions that follow.

- 1.1.1 Determine the weight (mass) of the cell phone in kg. (2)
- 1.1.2 Which formula (A to D) can be used to calculate the perimeter of the Samsung S20 cell phone? (2)
- A length \times width
B $2 \times (\text{length} \times \text{width})$
C $2 \times (\text{length} + \text{width})$
D length \times width \times height
- 1.1.3 Sandile leaves his home exactly at the time displayed on the cell phone and arrives 2 hours later at his destination. Determine what time he reaches his destiny and write that time in words. (3)
- 1.1.4 Determine the difference between the width and the thickness of the cell phone (in mm). (2)
- 1.1.5 The Samsung S20 is available in the following colours: Grey, blue and white.
A customer can also choose between the following colours for a protective cell phone cover: Pink, blue, black and grey.
Write down the number of options a customer has when choosing a phone and a protective cover. (2)

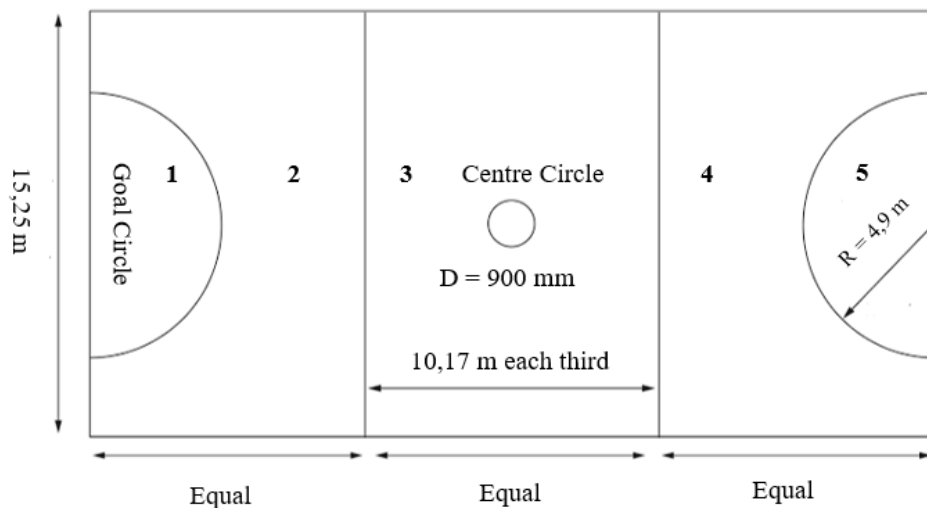
- 1.2 In a netball team, each player has a specific playing area where they can be playing during the game. In table 2, the playing areas per playing positions are shown.

TABLE 2: PLAYING POSITIONS AND PLAYING AREAS

Player	Position	Playing Areas				
1	Goal Shooter	1	2			
2	Goal Attack	1	2	3		
3	Wing Attack		2	3		
4	Centre		2	3	4	
5	Wing Defence			3	4	
6	Goal Defence			3	4	5
7	Goalkeeper				4	5

Playing area: An area which a player is allowed to play in.

NETBALL COURT WITH SPECIFICATIONS



Where D = Diameter

R = Radius

1 – 5 are playing areas

Use the information above to answer the questions that follow.

- 1.2.1 Write down which players are not supposed to play in the playing area 4 and 5. (3)

- 1.2.2 Show, by means of calculations, that the difference between the radius of the goal circle and the radius of the centre circle is 4,45 m. (4)

- 1.2.3 Calculate, (in m²) the area of the netball court.

You may use this formula:

Area of rectangle = length × width (3)

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
<ul style="list-style-type: none">• BMI < 5th percentile	<ul style="list-style-type: none">• BMI = 5th-84th percentile	<ul style="list-style-type: none">• BMI = 85th-94th percentile	<ul style="list-style-type: none">• Obese: BMI \geq 95th percentile

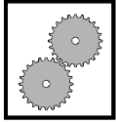
BMI Categories for Adults			
Underweight	Normal Weight	Overweight	Obese
<ul style="list-style-type: none">• BMI < 18.5	<ul style="list-style-type: none">• BMI = 18,5-24,9	<ul style="list-style-type: none">• BMI = 25-29,9	<ul style="list-style-type: none">• Obese: BMI \geq 30

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:

(4)

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

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)

Overweight

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

(2)

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)

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? (3)

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:

$$\text{BMI} = \frac{\text{Mass in kg}}{(\text{Height in m})^2} \quad (6)$$

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

$$= \frac{55}{2,25}$$

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

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

The claim is valid

ACTIVITY 1: Body Mass Index

(09 marks: 10 minutes)



- 1 The BMI of a person who is over 30 years of age can be calculated by the following formula:

$$\text{BMI} = \frac{\text{Weight (in kg)}}{[\text{height (in m)}]^2}$$

According to this value, an adult can be classified according to the following table:

Table 2	
BMI	Category
Less than 18,5	Underweight
From 18,5 to 24,9	Normal
From 25 to 29,9	Overweight

Use TABLE 2 above to answer the questions that follow:

- 1.1 Write down the acronym *BMI* in full. (2)
- 1.2 Determine the BMI of a person whose mass is 72 000g and height of 1,79m (rounded to 2 decimal places) (3)
- 1.3 Write down the BMI status of the person mentioned on 1.2 (2)
- 1.4 Explain why it is important to know your BMI status (2)

ACTIVITY 2: Body Mass Index

(11 marks: 15 minutes)



- 1.1 Mr Ntema is a rugby player is concerned about his weight. He weighs himself before joining a gymnasium and calculates that his BMI is 25,1 kg/m². He has a height of 175 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.

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

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

You may use the formula below:

You may use the formula: $BMI = \frac{\text{weight}}{\text{height}^2}$ (5)

- 1.1.3 Write down Mr Ntema's current weight status. (2)

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

- 1.2 Mr Kasongo is a soccer player is concerned about his weight. He weighs himself before joining a gymnasium and calculated his body mass index. 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 **for body mass index**. (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



(09 marks: 10 minutes)

Ruth is a mother to twins Nick and Nicolene. She is very health conscious and regularly monitors their Body Mass Index (BMI). On a particular day, she recorded the twins' mass and height as follows:

TWIN	MASS	HEIGHT
NICK	56 kg	1,65 m
NICOLENE	45 kg	60 inches

NOTE: 1 cm = 0,3937 inches

Use the information above to answer the questions that follow.

1.1.1 Convert, rounded off to TWO decimal places, Nicolene's height to metres. (3)

1.1.2 Ruth states that, the difference between the twins' BMI is less than 1 kg/m².

Verify, showing ALL calculations, whether her statement is CORRECT.

You may use the following formula: $BMI = \frac{\text{Weight (in kg)}}{[\text{height (in m)}]^2}$ (6)

TOPIC: Scales, Maps and Plans

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
<p>It is also known as ratio scale. Number Scales are always written in the form.</p> <p style="text-align: center;">1 : 20 Map : Reality</p> <p>This means that 1 unit on the map equals 100 units in reality.</p> <p>NB: The explanation is only correct when units are the same.</p> <p><u>Advantage of the Number Scale</u> - More accurate than bar scales.</p> <p><u>Disadvantage of the Number Scale</u> - if there is resizing of the map or plan the number scales become inaccurate</p>	<p>Also known as a linear scale, it is a means of visually showing the scale of the map. Example of a bar scale</p> <div style="text-align: center;"> <p>0 75 150 300 Kilometers</p> <p>0 25 50 100 150 200 Miles</p> </div> <p>It also shows the relationship between distances on the map and the real world.</p> <p><u>Advantage of the Bar Scale</u> - quick and easy to use.</p> <p><u>Disadvantage of the Bar Scale</u> - Measurements (using a ruler) obtained using bar scales tend to be less accurate.</p>

Maps

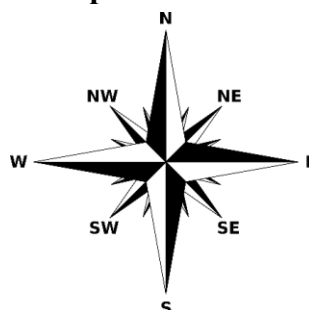
What is a Map?

A map is a two-dimensional representation of an area of the earth's surface, e.g. country map; street map; building map, etc.

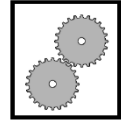
Relative positions on a map are used when describing the position or directions to someone in relation to surrounding landmarks. Key words that must be used include **left; right; up; down; in front of; behind;** and the compass directions which are also known as cardinal points [i.e. **North(N), South(S),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

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

Compass Directions



Worked Example: Scale and Maps



- 1.1 Mr Tyulu and his family stay at Polokwane. One weekend he decided to visit his uncle in Mbabane which is a city in Swaziland. ANNEXURE A shows a road map from Polokwane to Mbabane.

Use the map on ANNEXURE A to answer the questions that follow.

- 1.1.1 Write the down the general of Mbabane from Polokwane (2)

South East

- 1.1.2 Write down the name and one advantage of the type of the scale used on the map. (3)

Bar Scale

Quick and easy to use.

- 1.1.3 Measure, in mm, the length of the scale on the map. (2)

26 mm

NB: Check the measurement on the printed copy

- 1.1.4 The measured distance on the map from Mokopane to Hendrina is 8,2 cm. Mr Tyulu claims that the actual distance between these two towns is 266,6 km.

Use the scale on the map to prove whether the claim is correct. (5)

Scale on the map 2, 6 cm: 100 km (check the printed copy)

Measured distance = 8,5 cm

$$\text{Therefore} = \frac{100 \text{ km} \times 8,5 \text{ cm}}{2,6 \text{ cm}} \\ = 326,92 \text{ km}$$

His claim is incorrect

- 1.1.5 Write down the total number of provinces that appears on the map. (2)

Five (5)

- 1.1.6 The distance from Polokwane to Mbabane is 430,6 km. Mr Tyulu took 5 hours 36 minutes to drive between these two cities.

Calculate the average speed (to the nearest km/h) he drove from Polokwane to Mbabane.

You may use the following formula: **Distance = speed × time** (4)

5 hour 36 minutes = 5, 6 hours

$$\begin{aligned}\text{Distance} &= \text{speed} \times \text{time} \\ 430,6 \text{ km} &= \text{speed} \times 5,6 \text{ hours} \\ \text{Speed} &= \frac{430,6 \text{ km}}{5,6 \text{ h}} \\ &= 76,89 \text{ km/h} \\ &= 77 \text{ km/h}\end{aligned}$$

- 1.1.7 The petrol consumption for Mr Tyulu's car is 11 km/ℓ and the petrol price is R16, 38/ℓ. Mr Tyulu claims that the amount that he will spend on petrol to Mbabane and return will be more than R1 500, 00.

Verify, showing ALL calculations, whether his claim is correct. (5)

$$\begin{aligned}\text{Number of km} &= (2 \times 430,6 \text{ km}) \\ &= 861,2 \text{ km} \\ \text{Number/aantal of litres} \\ &= 861,2 \text{ km} \div 11 \text{ km/ } \ell \\ &= 78,29 \text{ OR } 78,2909090909 \\ \text{Cost} &= 78,29 \times \text{R}16,38 \text{ OR } 78,29090909 \times \text{R}16,38 \\ &= \text{R}1\,282,39 \text{ OR } \text{R}1\,282,41 \\ \text{His claim is incorrect}\end{aligned}$$

ANNEXURE A

ROAD MAP FROM LIMPOPO, MPUMALANGA TO SWAZILAND.



ACTIVITY 1: Scale and Maps

(15 marks: 15 minutes)



- 1 Sheldon lives in Boksburg and goes to Boksburg High School. He delivers newspapers after school so that he can earn some pocket money.

ANNEXURE B shows the map of part of Boksburg

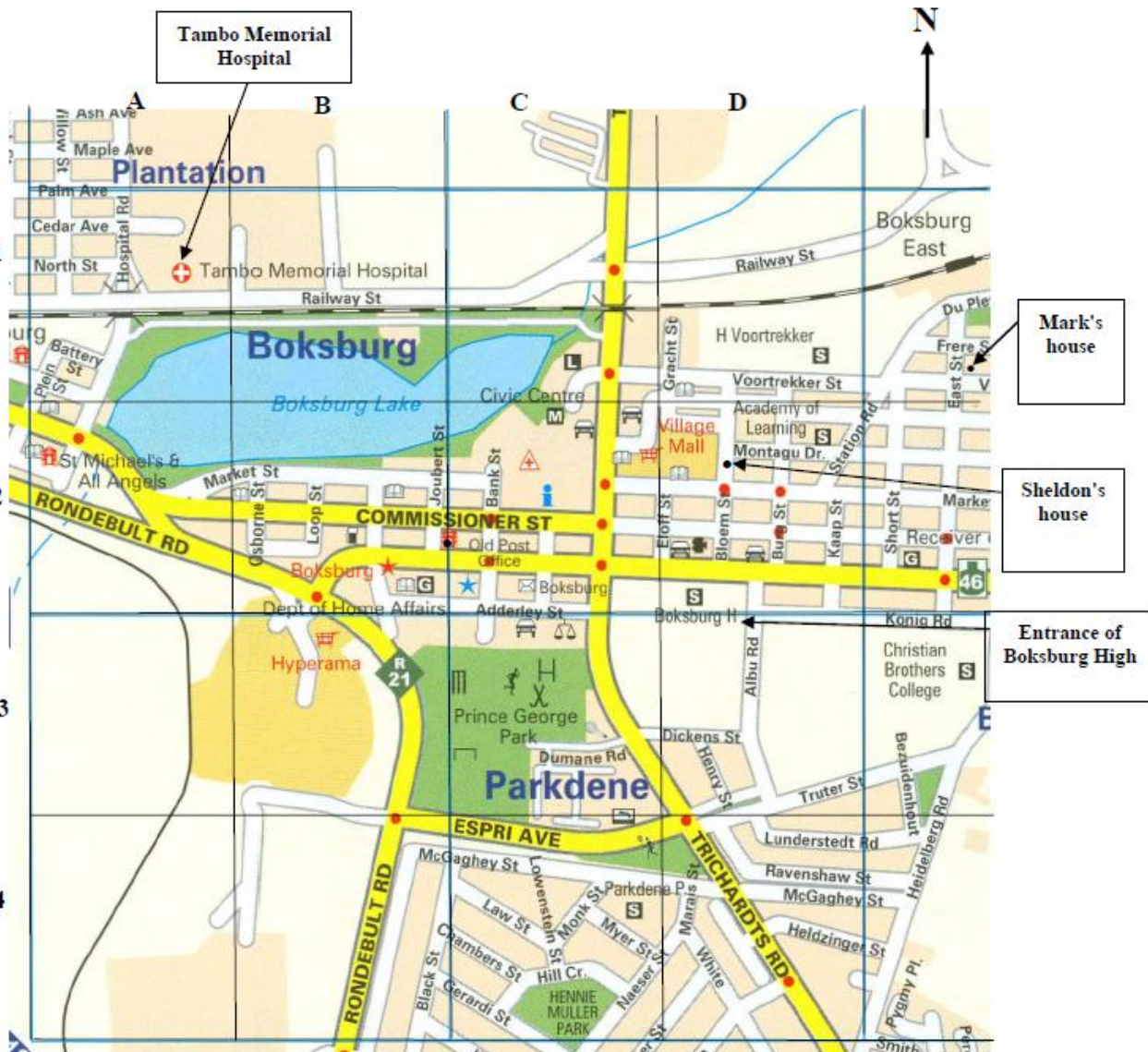
Use the map on ANNEXURE B to answer the questions that follow.

- 1.1 Write down the grid reference for the Tambo Memorial Hospital. (2)
- 1.2 His friend, Mark, lives in East Street between Frere Street and Voortrekker Street. Write down the street that leads to Mark's home. (2)
- 1.3 Boksburg High School has its entrance in Albu Street. On the map the distance Sheldon walks from his home to school is 2,9 cm.
- He claimed that the actual distance that he will be travelling is less than a kilometre. Use the scale 1:16 000 to verify his statement. (4)
- 1.4 Write down the general direction of the school from Sheldon's home. (2)
- 1.5 Give the relative position of Boksburg Lake with respect to Boksburg High School on the map. (2)
- 1.6 Every day Sheldon cycles around the area delivering newspapers.

Sheldon covers a distance of 2,4 km in 9,5 minutes. Calculate the average speed in km/h at which he cycles.

Use the formula: **Average speed** = $\frac{\text{distance}}{\text{time}}$ (3)

ANNEXURE B : MAP OF PART OF BOKSBURG



ACTIVITY 2: Scale and Maps

(11 marks: 15 minutes)



- 1 Mr Coetzee uses the following map of South Africa to plan his trips between the different national parks:



Use the map to answer the following questions.

- 1.1 Write down the grid reference for the Vaalbos National Park. (2)
- 1.2 Which national parks are situated in the Western Cape? (2)
- 1.3 In which general direction is Kimberley from East London? (2)
- 1.4 It took Mr Coetzee 30 minutes to fly the distance of 153 kilometres between Kimberley and Bloemfontein.

Calculate the average speed in kilometres per hour.

Use the formula: **Average speed** = $\frac{\text{distance travelled}}{\text{time taken}}$ (3)

- 1.5 Write down the name of the city that is situated on the far east on the map. (2)

ACTIVITY 3: Scale and Maps

(32 marks: 35 minutes)



- 1.1 Ms Nana used a street map of Pretoria to travel around the city. The street map, together with the recent street name changes, is given on ANNEXURE C. Some of the roads are one-way roads (traffic travels in one direction only). Use the map to answer the following questions:

Use the map on ANNEXURE C to answer the following questions.

- 1.1.1 Write down the grid reference for the Steve Biko Hospital. (2)
- 1.1.2 In which general direction is Hospital Hill from the Union Buildings? (2)
- 1.1.3 Write down the name of a road on the map where the traffic travels in the opposite direction to the traffic in Steve Biko Street. (2)
- 1.1.4 Ms Nana drove the minibus from the Arcadia Hotel in Johannesburg Ramohase Street to her friend's house in Tenth Avenue. Describe in detail the route she took to the house. (4)

- 1.2 The Naidoo family lives in Pietermaritzburg. A map of South Africa showing the national roads (marked N1, N2, et cetera) is given on ANNEXURE D.

Use the map on ANNEXURE D to answer the following questions.

- 1.2.1 The family travelled from Pietermaritzburg to Johannesburg by car, using the N3.
- (a) Use the map and, if necessary, the ruler on ANNEXURE D to measure the distance, in centimetres, on the map between these two cities and use the scale given on the map to calculate the actual distance, in kilometres, between these two cities. (7)
- (b) The car travelled at an average speed of 110 km/h. They departed at 08:15 and planned to arrive in Johannesburg at 14:30. Determine whether they arrived at their destination at the predicted time.

Use the formula: **Distance = average speed × time** (4)

- 1.2.2 The family left Pietermaritzburg with a full tank of petrol. Along the way they stopped at a petrol station to refuel at a cost of R455,40.

The capacity of the tank is 60 litres and the cost of fuel is R10,12 per litre.

(a) Before refuelling, the fuel gauge indicated that the tank was half full. Verify, showing ALL calculations, whether the fuel gauge was working properly. (6)

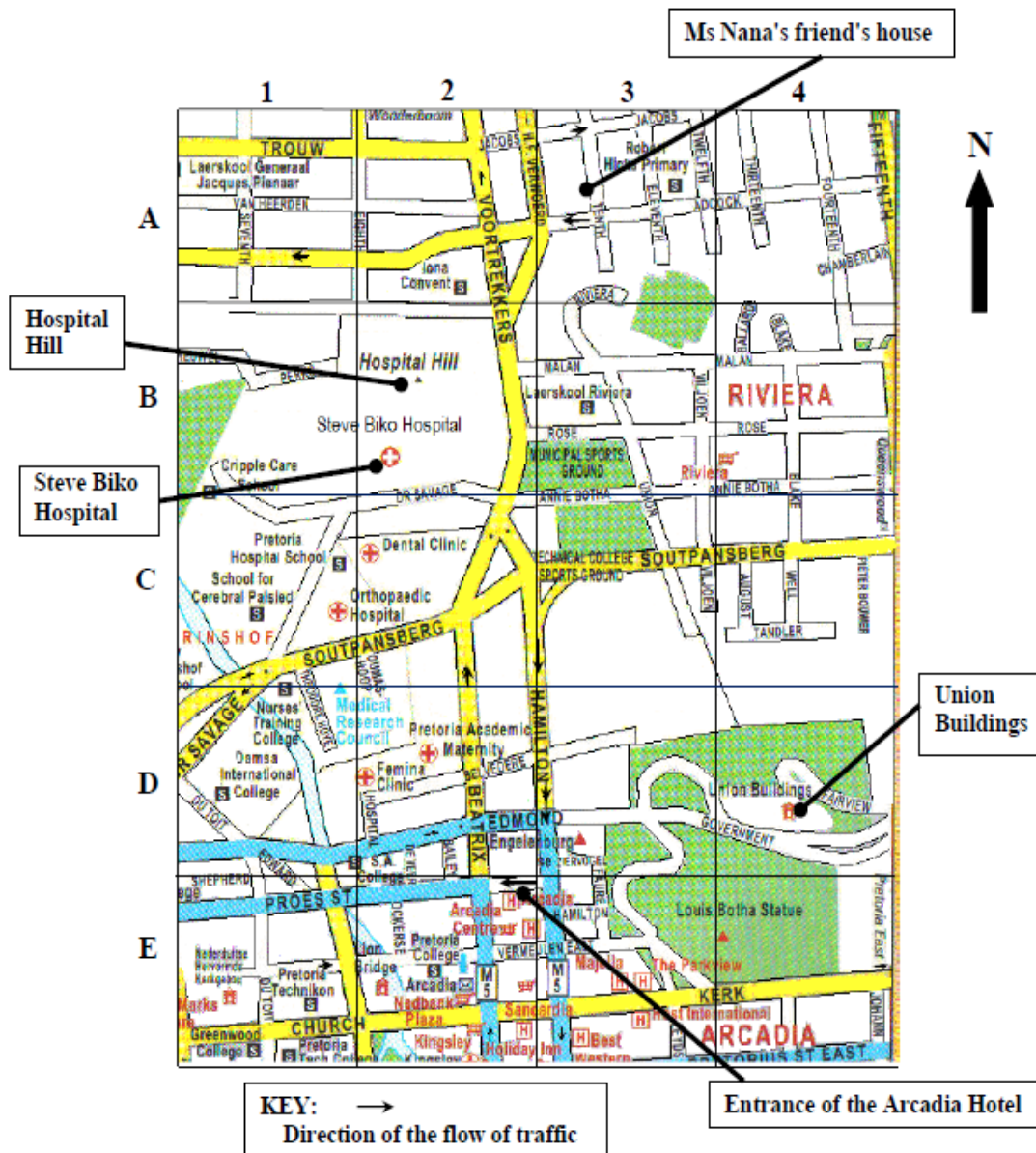
(b) If the car's fuel consumption was 9 litres per 100 km, determine how far they were from Johannesburg when they refuelled. (3)

1.2.3 Mr Naidoo gave the following directions to Mrs Khumalo using his cell phone:

From George, travel north along the N12. When you reach Beaufort West, take the N1 and travel through Bloemfontein to Pretoria. Then travel along the N4 in a westerly direction. The next town will be your destination.

What is Mrs Khumalo's destination? (2)

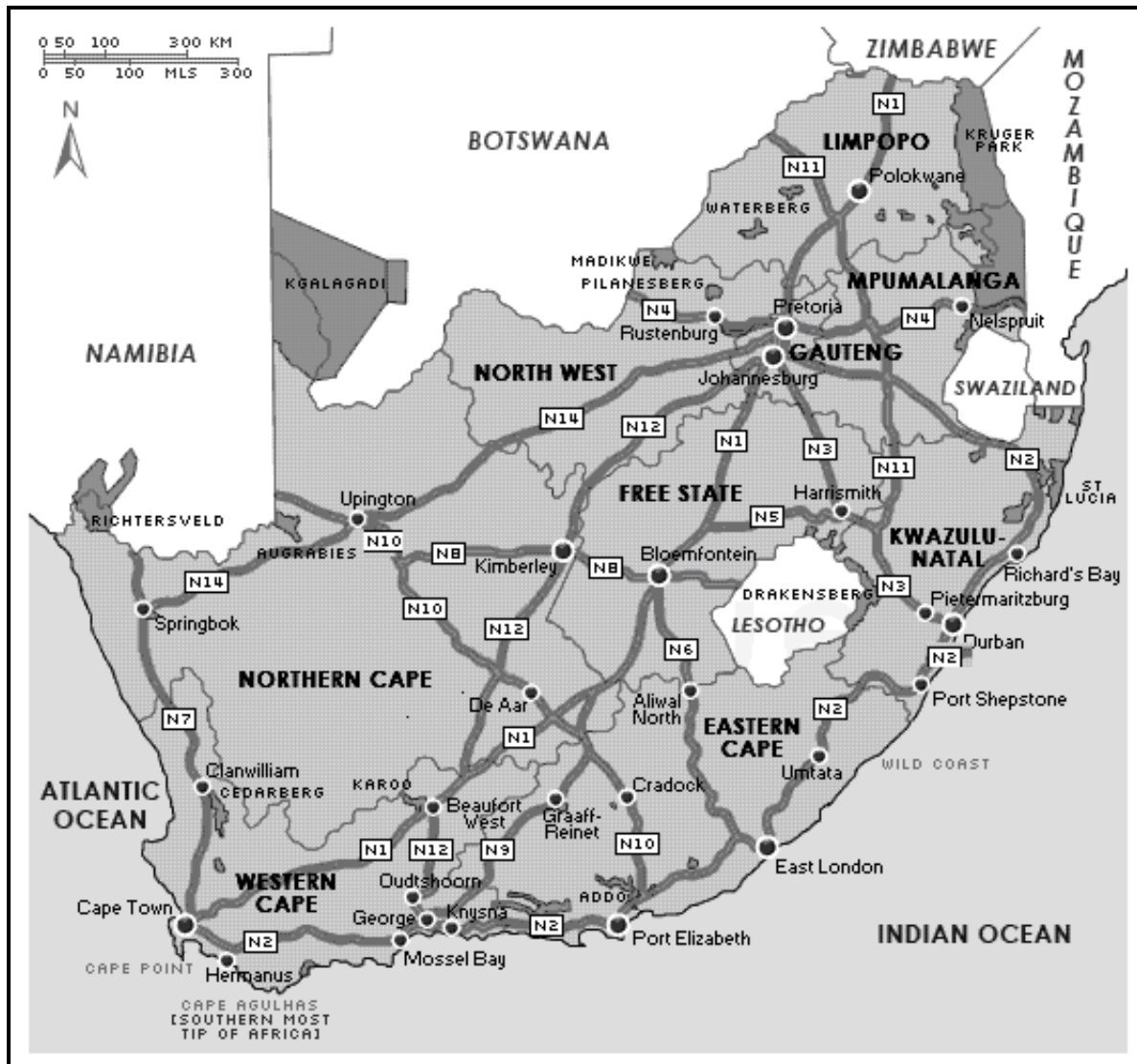
ANNEXURE C



Pretoria street name changes:

Church Street east of Nelson Mandela Drive	changes to	Stanza Bopape Street
Beatrix/Voortrekkers Street	changes to	Steve Biko Street
Vermeulen Street	changes to	Madiba Street
Proes Street	changes to	Johannes Ramohoaase Street

ANNEXURE D



ACTIVITY 4: Scale and Maps

(14 marks: 15 minutes)



Boitumelo received a bursary to study at the University of Victoria in Canada. She travelled from the university of Victoria to Victoria to Victoria Downtown

ANNEXURE E shows the map and two routes she could have used to travel on.

A summary of the route via Cadboro Road and Pandora Avenue [12 min. (6,8 km)] she used (with some information missing) is listed below.

SUMMARY OF THE ROUTE

Section	Description of her journey
1	Head ... On Cedar Hill Road towards Crestview Drive 190 m
2	Turn right into Cadboro Road Drive 3,2 km
3	Continue onto Fort Street Drive ... km
4	Slight right onto Pandora Avenue Drive 2,1 km You have reached your destination

Use ANNEXURE E and information above to answer the questions that follow

- 1.1 In which general direction did she head from Cedar Hill Cross Road towards Crestview? (2)
- 1.2 Determine the distance that she travelled on Fort Street. (3)
- 1.3 Name the road she travelled on after crossing Flower Street. (2)
- 1.4 Calculate (in km/h) the average speed she travelled.

You may use the formula:

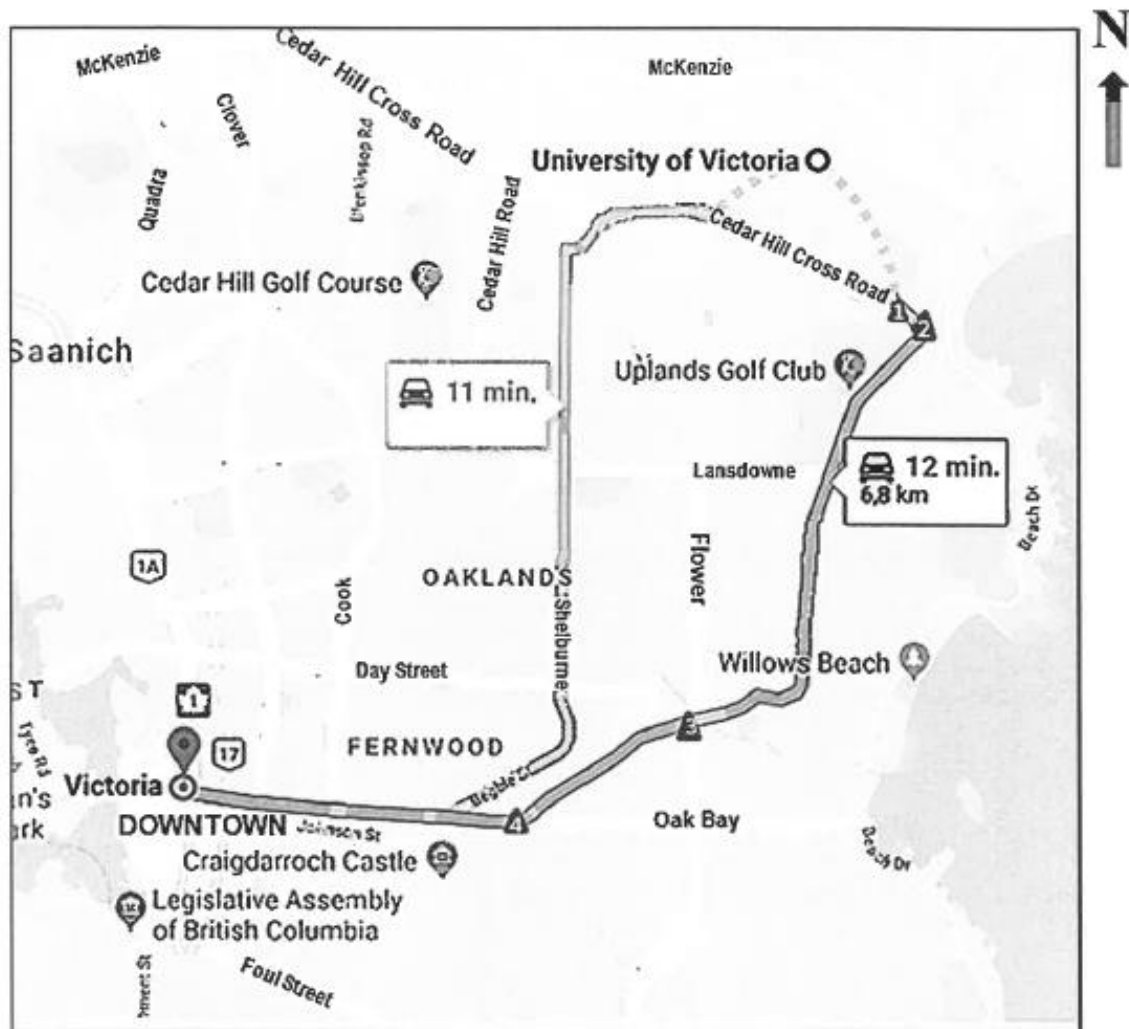
$$\text{Distance} = \text{Speed} \times \text{Time} \quad (4)$$

- 1.5 On another day, Boitumelo travelled from the University of Victoria to Victoria Downtown via Shelburne at an average speed of 36,5 km/h

Calculate (in metres) the difference between the distances of the two routes. (3)

ANNEXURE E

MAP OF A PORTION OF VICTORIA IN CANADA



[Adapted from Google Maps]

ACTIVITY 5: Scale and Maps

(17 marks: 20 minutes)



Sibabalwe, one of the students at the nursing college, visited the Ambleside town centre and stayed at the Queens Hotel for one week.

The Ambleside town centre map is given in ANNEXURE F.

Use ANNEXURE F to answer the questions that follow.

1.1 Identify the road in which parking is not allowed. (2)

1.2 Sibabalwe travels from Keswick to Rydal Road.

Give one reason why she cannot turn right into Compston Road. (2)

1.3 Give the general direction of the Queens Hotel from the tennis courts (2)

1.4 On the map, **X** is a point at the information centre and **Y** is the point at the University of Cumbria.

Use the scale on the map to calculate, in yards, the straight-line distance from **X** to **Y**. (4)

1.5 Sibabalwe parked in Church Street from 12:00 to 15:25. A traffic officer who monitors the area issued her with a fine.

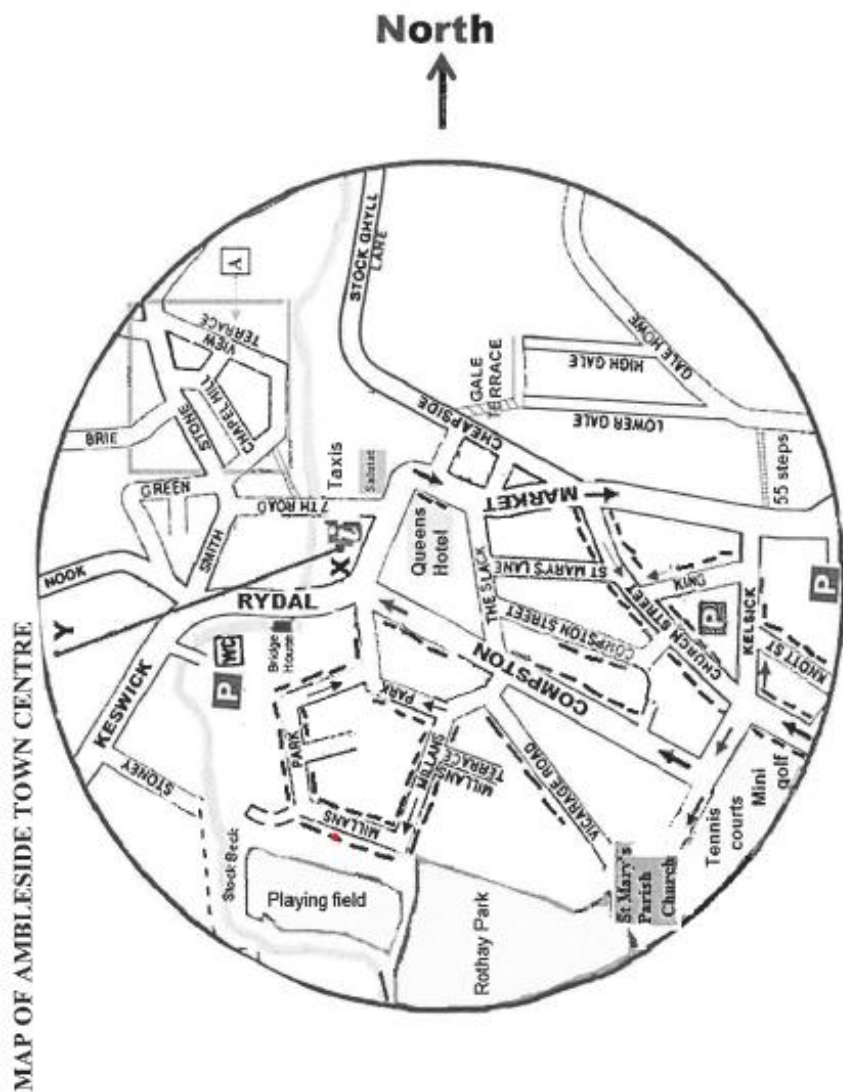
NOTE: A fine is the amount of money that someone has to pay if there is an offence.

(a) Write down for which offence the traffic officer issued her with a fine. (2)

(b) Sibabalwe was fined £79,75 by the traffic officer.

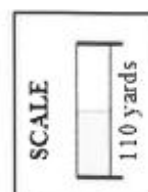
Calculate, to the nearest £, the rate per hour for this fine. (5)

ANNEXURE F



[Adapted from amblesideonline.co.uk]

KEY:	
	Information
	Parking in this area is not allowed
	Maximum 1 hour free parking before 5 pm
	Public car park



ACTIVITY 6: Scale and Maps

(25 marks: 30 minutes)



- 1.1 Linda is a student at the Durban University of Technology, studying to become a radiographer.

The campus layout map on ANNEXURE G shows the Ritson Campus where she is studying.

Use ANNEXURE G to answer the questions that follow.

- 1.1.1 Give the general direction of Mansfield Hall from Security. (2)

- 1.1.2 Determine the probability, as a decimal, of a student entering the campus at a gate that is not on Winterton Walk. (3)

- 1.1.3 The actual clinics section of the campus (**K**) has a length of 175 m.

Determine the scale used to draw this map. (5)

- 1.1.4 Linda needs to go to the Inkosi Albert Luthuli Central Hospital to do practical work for her course. The hospital is 14,25 km away from her campus.

The average speed driving to the hospital is 52 km/h.

Determine in minutes, the time taken to travel to the hospital.

You may use the formula:

Distance = speed × time (4)

- 1.2 Linda decides to take a road trip during her holidays.
- Her car has an average fuel consumption rate of 6,5 litres per 100 kilometres.
- The map on ANNEXURE H shows the distances between some cities on the route.

Study the map on ANNEXURE H and answer the questions that follow.

1.2.1 Identify the number of national roads indicated on this map. (2)

1.2.2 Write the probability of randomly selecting a route traveling directly to East London from Gqeberha ONLY using a national road. (2)

1.2.3 Use the driving instructions provided below regarding the route taken by Linda:

- Travel from Kei Mouth in the Direction of Durban.
- Travel 132 km of which 66 km is on the N2
- Continue driving on the N2
- Turn right onto the first regional road.
- Continue on the regional road for 251 km.

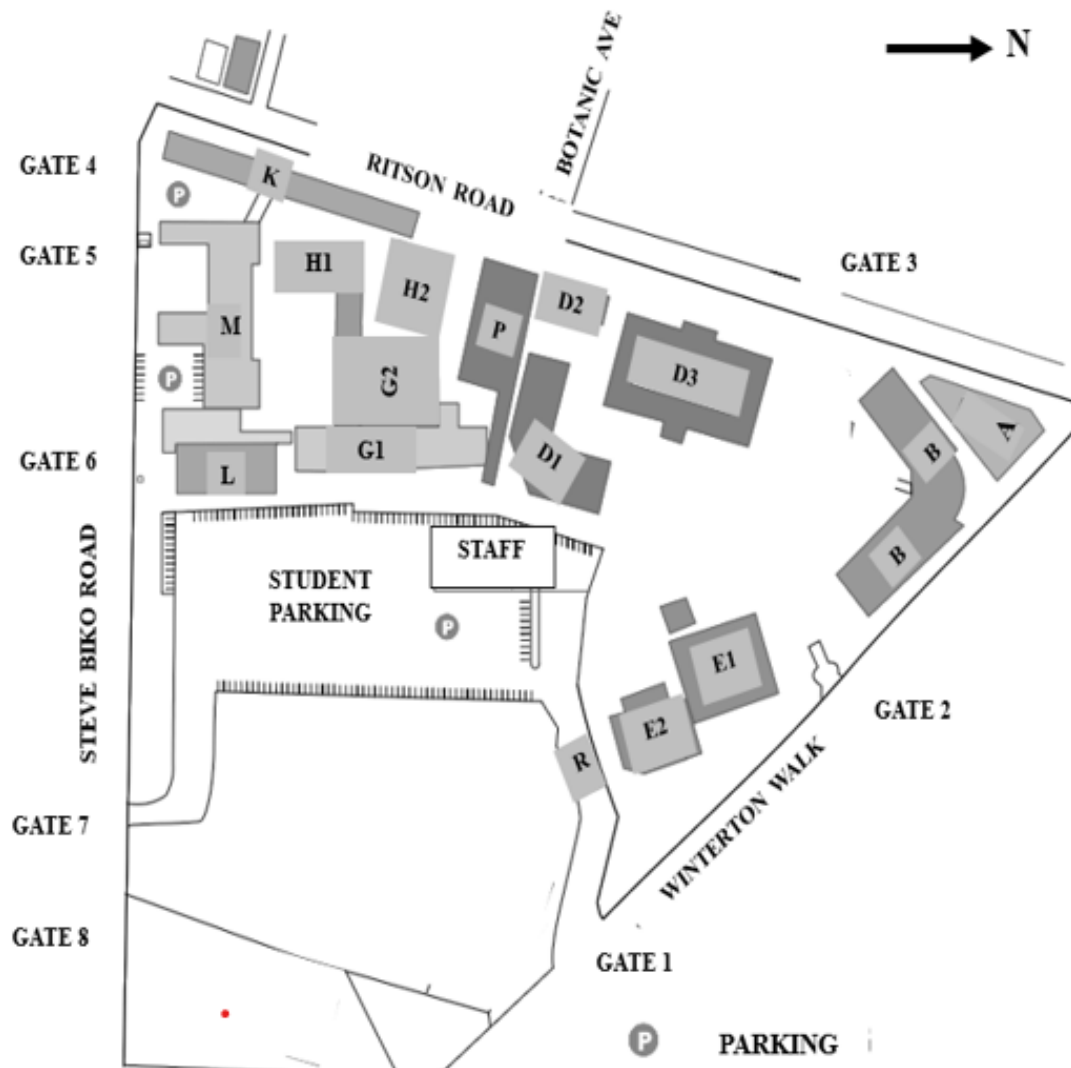
Write down the name of the town that is the destination. (2)

1.2.4 On another journey, Linda travels from Durban via Pietermaritzburg to Kokstad to pick up a parcel for her family.

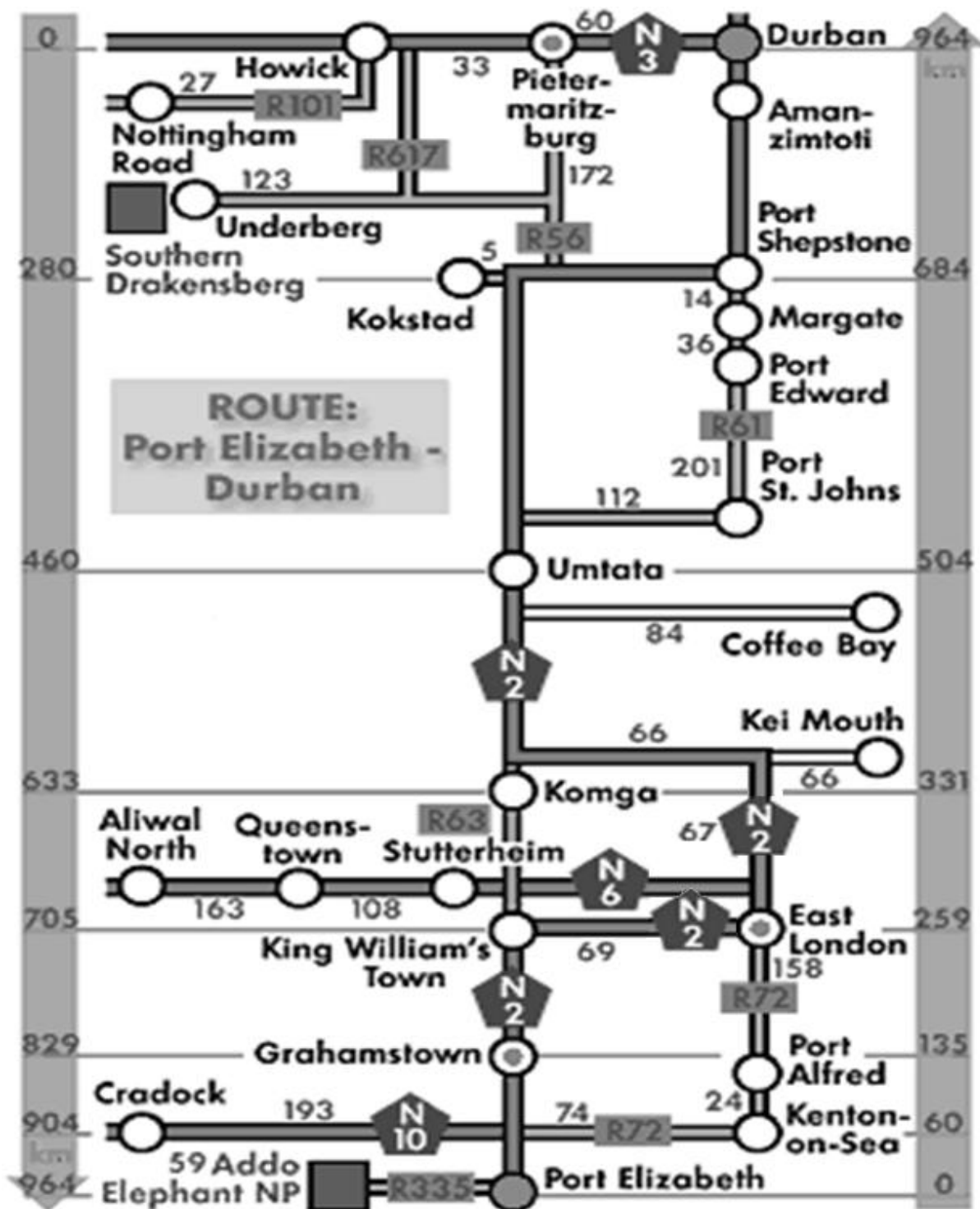
She claims that she would need less than 15 litres of fuel for this part of the trip.

Verify, showing all calculations, whether her claim is valid. (5)

ANNEXURE G



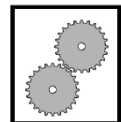
ANNEXURE H



Scale and Plans

Plan	A more detailed representation of a smaller area, often showing landmarks or objects. E.g., layout plan of a school hall.
Floor Plan	A two-dimensional view of a building/ structure from above, excluding the roof of a building and provides information regarding the size and shape of each room, together with positions of exterior and interior walls, doors, windows.
Layout Plan	A layout plan is a top view that shows the arrangement of features/A layout plan is the structural arrangement of items within a certain space.

Worked Example: Scale and Plans



1.1 ANNEXURE A shows the floor plan of Joe's house, with a veranda in South Africa

The picture alongside is an artist's drawing of one side of the house.

NOTE: Veranda, also know as a porch or a stoep, is an open area with a roof over it.



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

1.1.1 Write down the number of bedrooms on the floor plan (2)

3

1.1.2 Which room will be the first room you will enter from the veranda (2)

Living room

1.1.3 In which general direction does the master bedroom window face? (2)

North East

- 1.1.4 One of the door locks needs to be changed. Write down the probability, in the simplified fraction form, that is not one of the interior doors. (4)

$$P = \frac{2}{6} \\ = \frac{1}{3}$$

- 1.1.5 Joe remarked that the kitchen gets a lot of the sunlight. Critically comment on his remark (3)

Jan is wrong, the kitchen is on the Southern side. In South Africa it does not get a lot of sun.

- 1.1.6 Give one reason why the window shown in the above drawing do NOT represent the windows of the kitchen and dining room. (2)

**It cannot be the view showing the kitchen and dining room, as it does not show the extra window for the bathroom. OR
It does not show the other rooms on both sides of the windows. OR
It shows the veranda, door, bedroom and living room windows.**

- 1.1.7 The scale used for the floor plan is 1 cm representing 1 000 mm in real life.

- (a) Write the given scale in the number scale format. (2)

$$10 \text{ mm} : 1\,000 \text{ mm} \\ = 1 : 100$$

- (b) Measure the inner length of bedroom 2 and use the given scale to calculate the actual length (in m) of bedroom 2. (4)

$$\begin{aligned} \text{Length on floor plan} &= 4,4 \text{ cm} \\ 1 \text{ cm} &= 100 \text{ cm} \\ 4,4 \text{ cm} &= 4,4 \times 100 \text{ cm} \\ &= 440 \text{ cm} \\ &= 4,4 \text{ m} \end{aligned}$$

- (c) Joe stated that the given scale is NOT very accurate to use if photocopies were going to be made of the plan.

Critically comment on his statement and give a reason for your answer. (3)

Jan is correct.

When a photocopy is made the size of the plan may change while the number scale remains the same.

1.2 Mr Joe bought a farm in order to sell chickens and vegetables.

ANNEXURE B shows the layout plan of the farmyard.

1.2.1 Explain the term *layout plan* (2)

Plan that shows how items are arranged in a certain space

1.2.2 Name the feature on the layout plan which has an irregular shape (2)

**Perennial garden bed
Compost**

1.2.3 The letter J on the plan represents the Jojo tanks.

Give a reason why it is important to have water tank at one's house (2)

Water is scarce **OR**
Rainwater is free compared to tap water **OR**
Pay less water bills **OR**
Water storage **OR**
To save water for future use **OR**
To harvest rainwater

1.2.4 Write down the shape representing the following

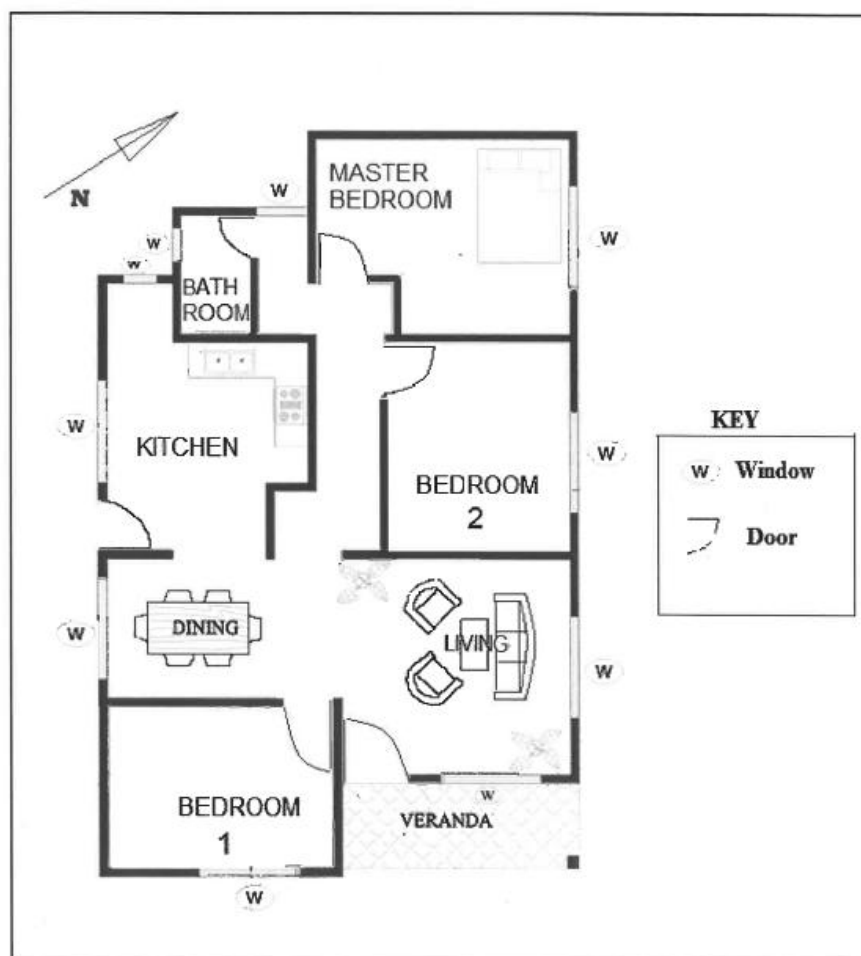
(a) Chicken site (2)

Circle

(b) Garden expansion (2)

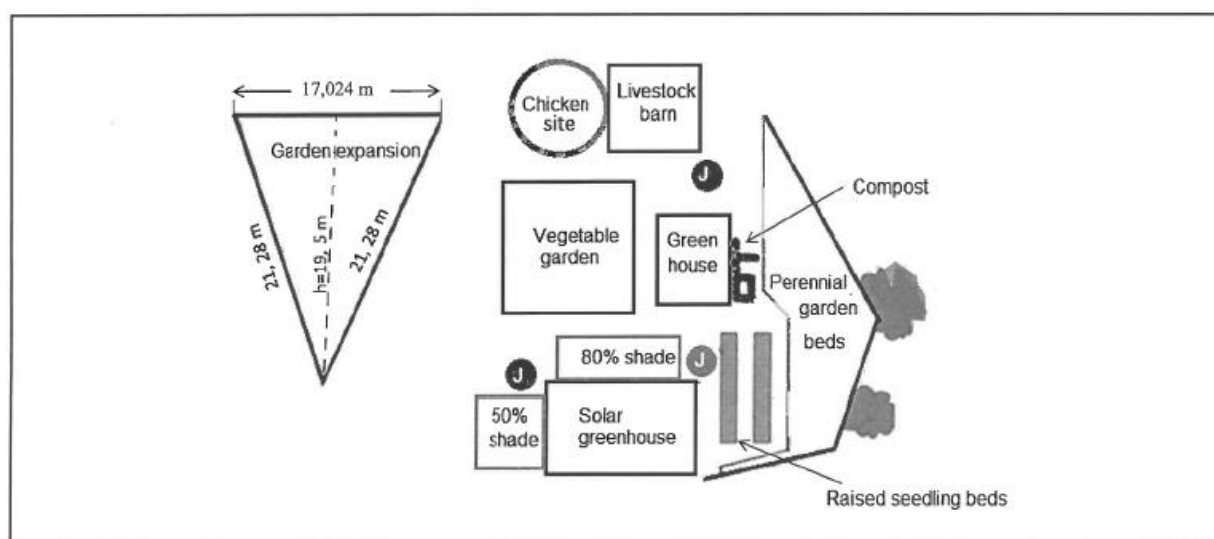
Triangle

ANNEXURE A: FLOOR PLAN OF A HOUSE



ANNEXURE B

LAYOUT PLAN OF THE FARMYARD

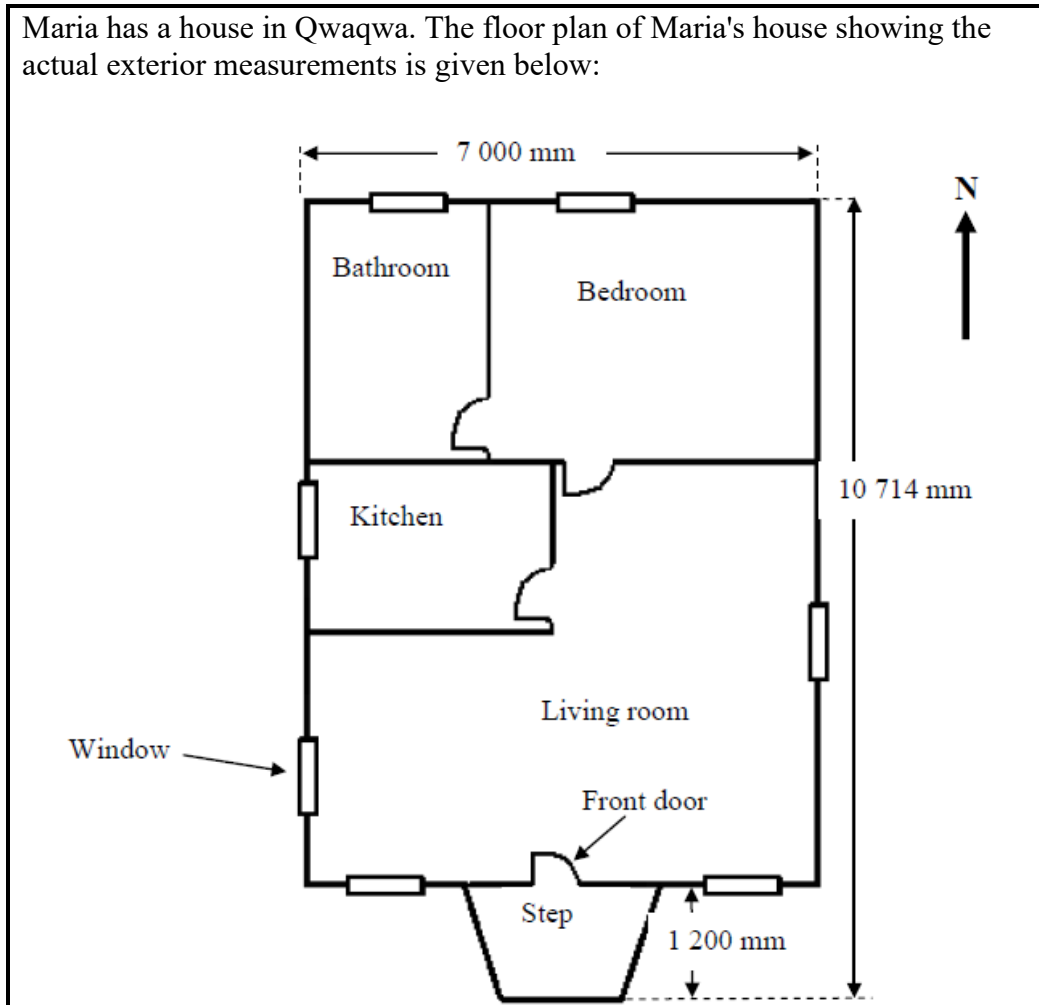


ACTIVITY 1: Scale and Plans

(16 marks: 20 minutes)



Maria has a house in Qwaqwa. The floor plan of Maria's house showing the actual exterior measurements is given below:



Use the information above to answer the following questions

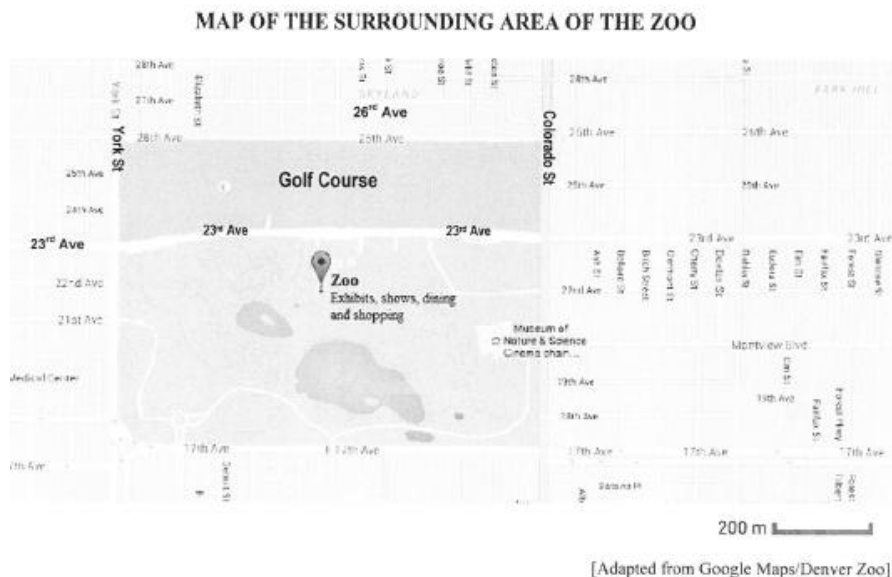
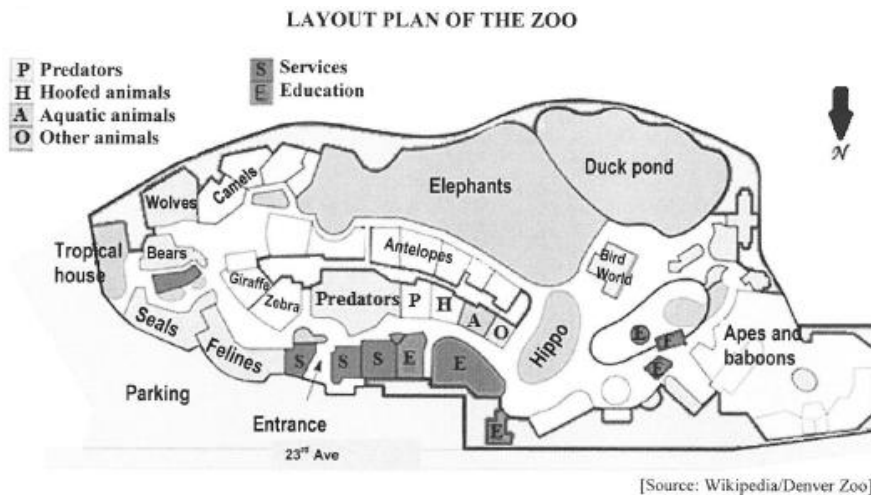
- 1.1 Write down the number of windows shown on the plan. (2)
- 1.2 On the floor plan the exterior length of the northern wall is 70 mm. Determine the scale of the floor plan in the form 1 : ... (2)
- 1.3 Write down TWO shortfalls about the plan shown above. (4)
- 1.4 Calculate the exterior side length of the house excluding the step section. (2)
- 1.5 Write down the ratio, in a unit form, of the number of doors to the number of windows. (3)
- 1.6 The area of the kitchen is 72% less than the area of the living room. Calculate the area (in m^2) of the kitchen if the area of the living room is $39,54 \text{ m}^2$. (3)

ACTIVITY 2: Scale and Plans

(14 marks: 15 minutes)



Zukiswa visited the Denver Zoo during his stay in America. The layout plan of the zoo, showing some animal enclosures and a map of the surroundings is given below



Use the map above to answer the questions that follow

- 1.1 Determine the total number of venues that are available for services and education. (2)
- 1.2 Zukiswa entered the zoo, passed the predator enclosure and continues walking in the westerly direction, Name the next major animal enclosure that he will encounter. (2)

- 1.3 Write down the ratio, in simplified form, of the number of service points to the number of education points. (3)

- 1.4 The shortest distance between York Street and Colorado Street is 1,6km. Verify (showing all calculations) whether the bar scale on the map is correct.

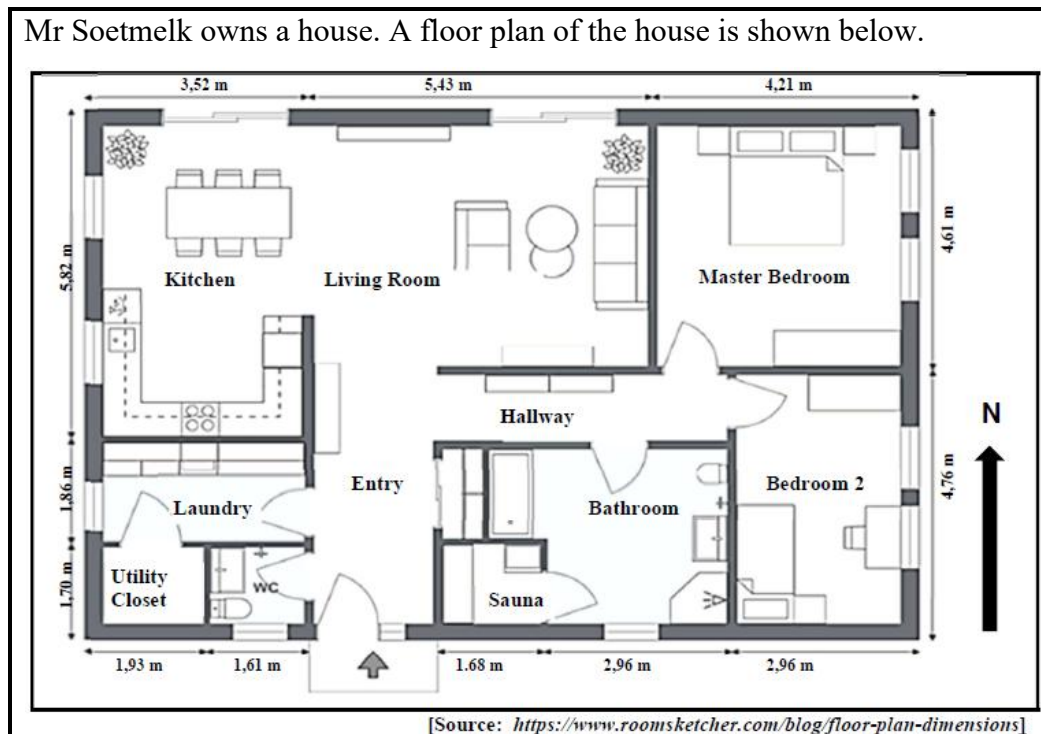
Take note: The distance on the map between York Street and Colorado Street is 72 mm or 7,2 cm (7)

ACTIVITY 3: Scale and Plans

(12 marks: 15 minutes)



Mr Soetmelk owns a house. A floor plan of the house is shown below.



Study the floor plan above and use it to answer the following questions.

- 1.1 Determine the number of windows on the eastern elevation of the floor plan. (2)
- 1.2 How many bedrooms are indicated on the floor plan? (2)
- 1.3 Write, as a simplified ratio, the number of doors to the number of windows on the floorplan. (2)
- 1.4 Mr Soetmelk stated that the perimeter of the floor plan is 45,06 m. Explain the word perimeter in the given context. (2)
- 1.5 Select from the options below the correct unit that can be used for the area of the master bedroom. Write only the letter (A - C) next to the

question number (1.5).

A. m

B. m^2

C. m^3 (2)

- 1.6 Write down, as a percentage, the probability of finding a window on the EAST side on the house. (2)

ACTIVITY 4: Scale and Plans

(29 marks: 30 minutes)



Sifiso works at a restaurant near her home. The restaurant can accommodate a maximum of 56 customers. Every Friday night they are normally fully book because they have a sushi special.

ANNEXURE C shows the floorplan of a restaurant.

Use ANNEXURE C to answer the questions that follow.

- 1.1 Write down the maximum number of people that can be seated in the courtyard. (2)
- 1.2 Explain the meaning of the term floorplan (2)
- 1.3 Write down the ratio, in the simplified form, of the number of chairs in the dining room to the number of tables in the courtyard. (3)
- 1.4 On one Friday a group of 17 people visited the restaurant. They all ordered pizza. The manager told the chef that there is a probability that 76% of all their customers will order the Friday special.
- Verify by means of calculations whether his statement is correct. (5)
- 1.5 Write down the total number of doors that lead into the courtyard from outside. (2)
- 1.6 Determine, rounded to the nearest whole number, the scale used on the plan. (4)
- 1.7 ANNEXURE D shows the choices on the set menu for meals at the restaurant.

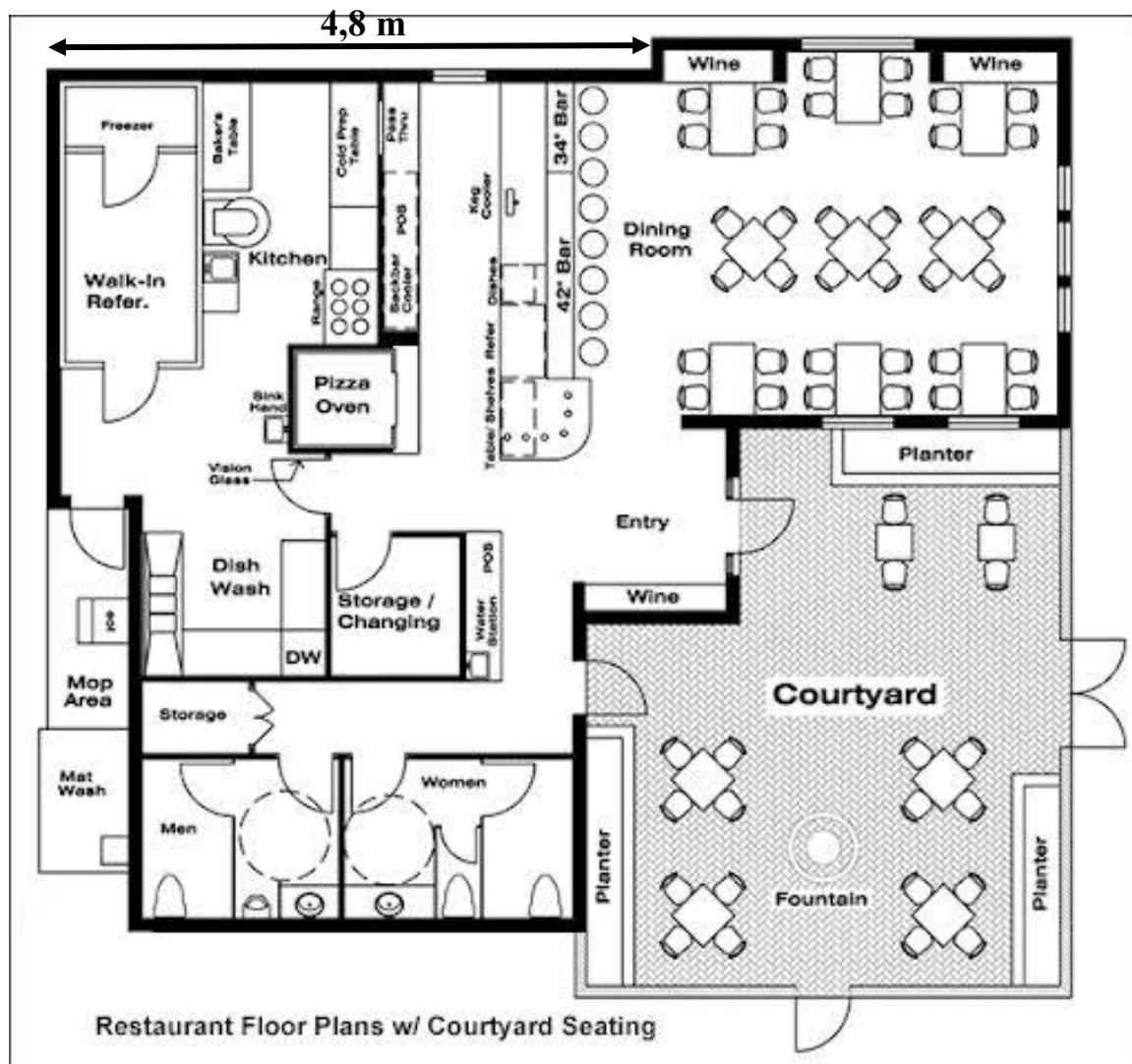
Customers can choose:

- One protein: Chicken (C), Beef (B) or Fish (F)
- One side order: Vegetables (V) or a Salad (S)
- One dessert: Ice cream (I) or malva pudding (M)

Use ANNEXURE D to answer the questions that follow.

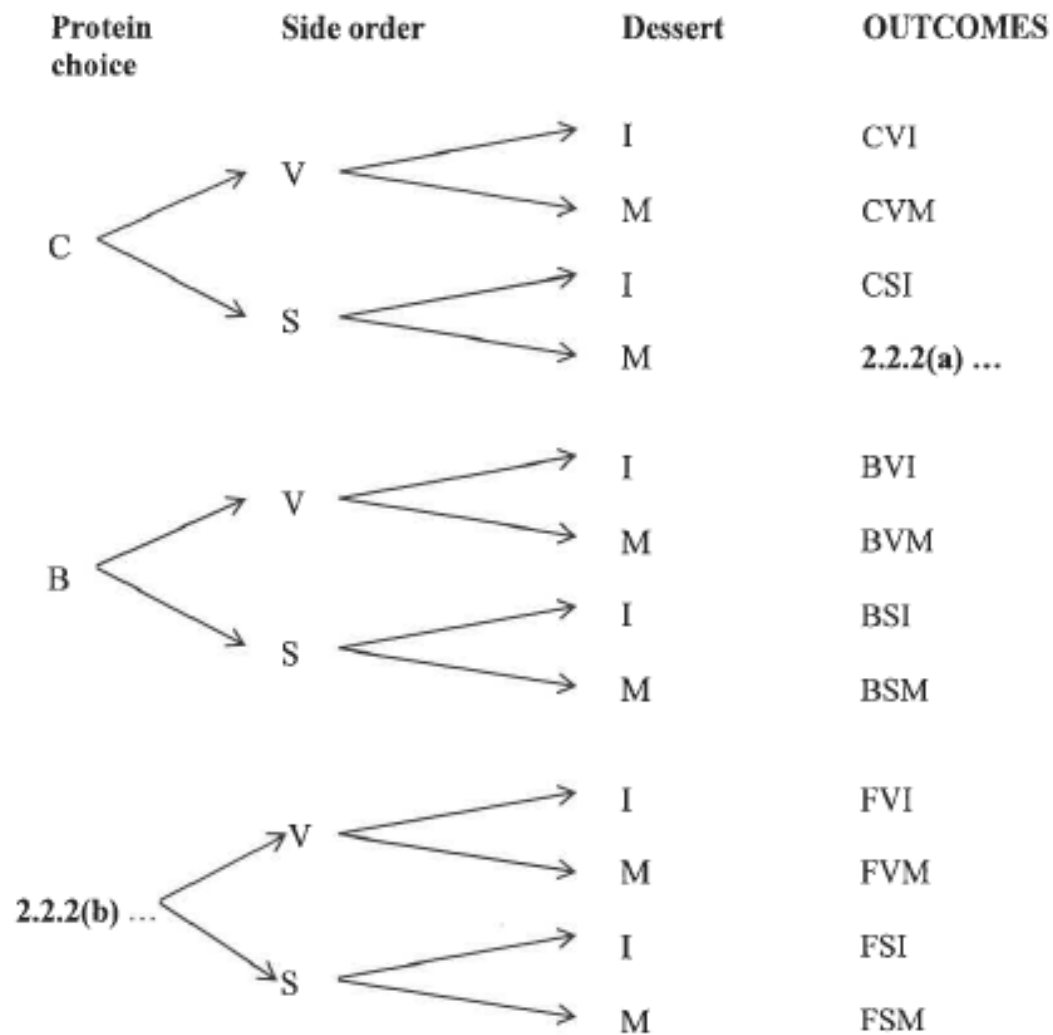
- 1.7.1 Name the type of the diagram illustrated on ANNEXURE D (2)
- 1.7.2 Write down the missing outcome at 2.2.2(a) and the protein outcome at 2.2.2(b) (4)
- 1.7.3 State the number of combinations with beef as a protein. (2)
- 1,7,4 Determine, as a percentage, the probability of randomly selecting a meal with a malva pudding as a dessert. (3)

ANNEXURE C



ANNEXURE D

CHOICES FROM A SET MENU AT THE RESTAURANT

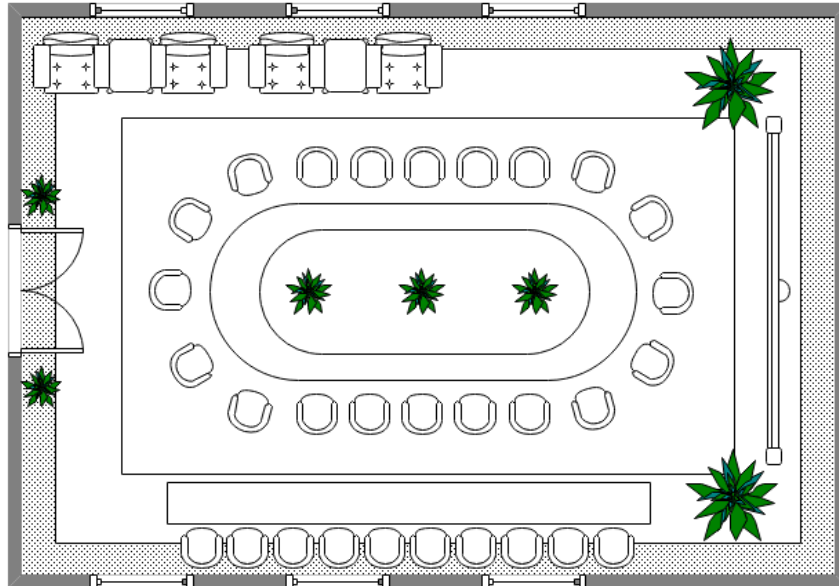





ACTIVITY 5: Scale and Plans

(13 marks: 15 minutes)



Shown below is the layout plan of a conference room in the Pretoria Hotel



KEY		
Chair	Plant	Screen for presentation
		

Use the information above to answer the questions that follow.

- 1.1 Define the term layout plan (2)
- 1.2 Write down the number of chairs around the oval-shaped table. (2)
- 1.3 Which one of the following statements regarding the conference room layout is TRUE? (2)
 - A. The screen is on the eastern side of the room
 - B. The screen covers some windows
 - C. The screen is opposite the door leading into the room.
- 1.4 Give one possible reason why plants are not placed on the table on the northern side of the room. (2)
- 1.5 The actual outside length of the conference room is 12m. (2)
 - (a) Measure the outside length of the conference room on the layout plan. (2)
 - (b) Hence, calculate the scale used in this layout plan. (3)

Elevation Plans

What is an elevation Plan

- A two-dimensional picture of the outside of a building/structure and provides information regarding the height of the building/structure and external features.

We have four (4) elevations:

North Elevation

The side view of the building from the northern side



North Elevation

Layout Plan



East Elevation

The side view of the building from the east side



East Elevation

South Elevation

The side view of the building from the southern side



South Elevation

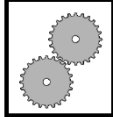
West Elevation

The side view of the building from the west side.

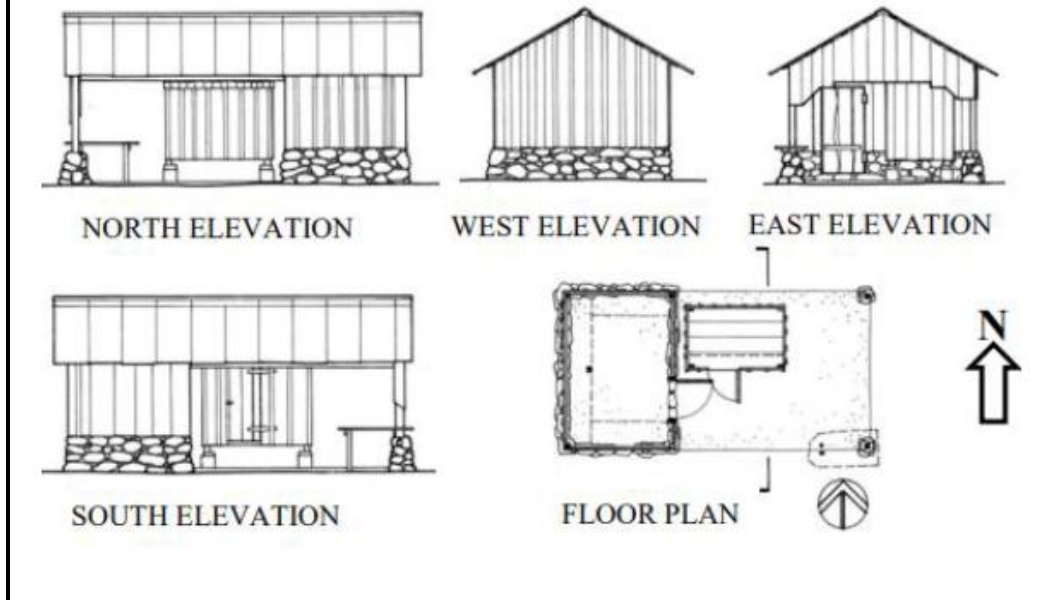


West Elevation

Worked Example: Elevation Plans



- 1.1 The diagram below shows a floor plan and an elevation plan of a farmhouse. Study the diagram and answer the questions that follow.



- 1.1.1 Explain the meaning of 'North Elevation' on the diagram. (2)

The "North Elevation" shows the side view of the building from the northern direction.

- 1.1.2 Refer to the diagram above. Define the following terms respectively:

- (a) A floor plan

A floor plan shows a top view of the inside of a building.

(4)

- (b) An elevation plan

An elevation plan shows the side view of the outside of the building

- 1.1.3 Use the scale of 1 : 100 to determine the actual length in centimetres on the plan if the measured length is 5 cm. (2)

Scale = 1 : 100

Measured length: 5 cm

Actual length: 5 cm x 100

= 500 cm

- 1.2 Kyle will be staying with family. The floorplan and elevation plan of Kyles family home is given in ANNEXURE A

Use the information in ANNEXURE A to answer the following questions.

- 1.2.1 Name the rooms that can be seen on the elevation plan. (3)

Storeroom

Hall

Bedroom

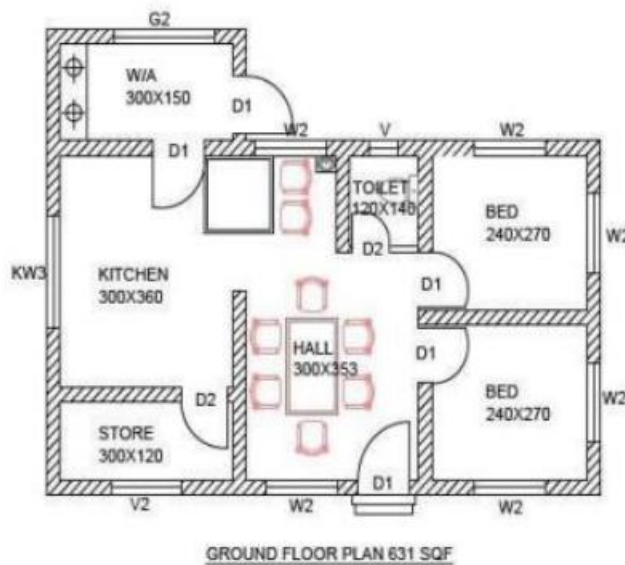
- 1.2.2 Give the compass direction of the elevation shown on ANNEXURE A. (2)

South Elevation

- 1.2.3 Determine which room of the house will receive the late afternoon sun. (2)

Kitchen OR W/A OR Store

ANNEXURE A

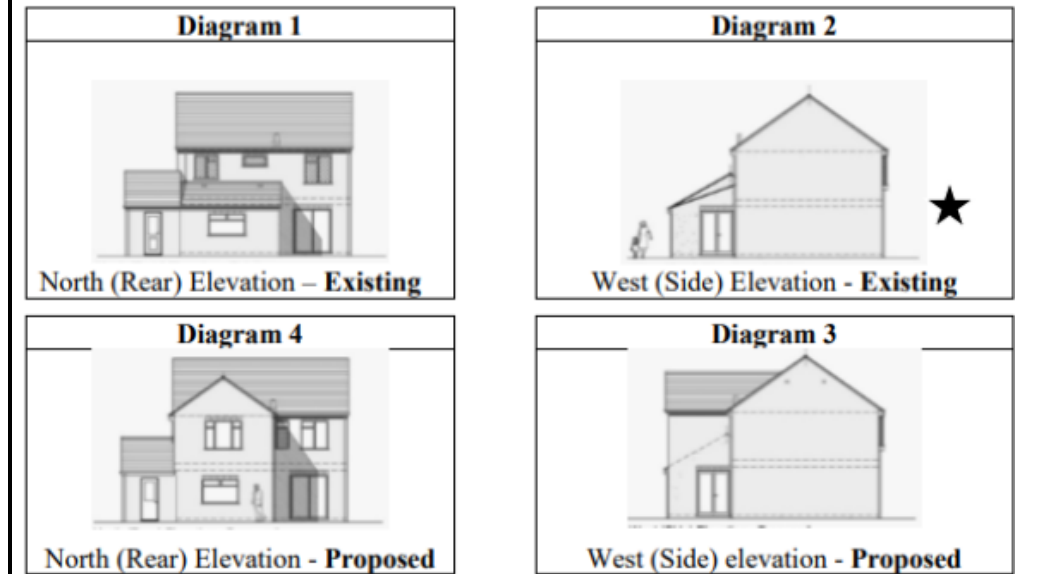


ACTIVITY 1: Elevation Plans

(17 marks: 20 minutes)



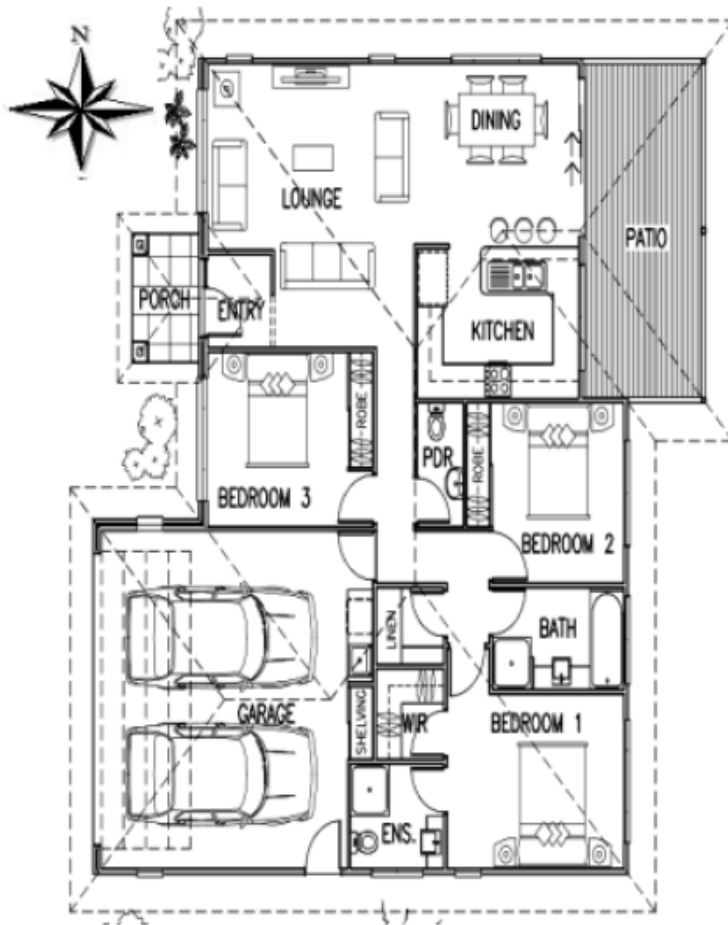
- 1.1 Keitumetse Construction company is contracted to renovate a 2-storey house. Below are two elevations sides of the house to be renovated.



Use information above to answer the questions that follow.

- 1.1.1 Complete the following statement:
The purpose of an elevation drawing is to show the _____ appearance of a given side of the house. (2)
- 1.1.2 State the elevation on which the Black star is positioned on Diagram 2. (2)
- 1.1.3 Mention at least two additional renovation observed or building inclusions made on Diagram 1 as seen in Diagram 4. (4)
- 1.1.4 Determine the total sheets of glass seen on windows and door of Diagram 4. (2)
- 1.2 On ANNEXURE B is a proposed floor plan for the house Mr Sol intends to buy.
- Study the floor plan and answer the questions
- 1.2.1 Name the type of scale that is used in this plan. (2)
- 1.2.2 Determine the number of ordinary doors shown on the plan. (2)
- 1.2.3 On which elevation will you find the patio? (2)
- 1.2.4 Use the given scale to determine the actual length in meters of Bedroom 3. It is given that the measured length of Bedroom 3 is 31mm. (3)

ANNEXURE B



WEST ELEVATION



NORTH ELEVATION

Scale 1: 200

KEY:



Window



Ordinary Door



Sliding Door



Garage Door

ACTIVITY 2: Elevation Plans

(14 marks: 15 minutes)



- 1.1 Nthabiseng has a 3-bedroom house. ANNEXURE C shows the layout plan of the house.

The front of the house looks like this:



Covered porch

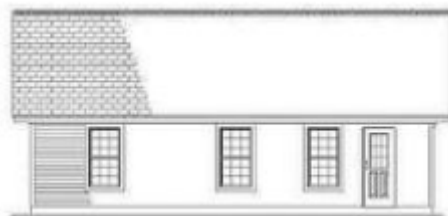
Column

The front of the house is facing north.

Use ANNEXURE C and the information above and answer the questions that follow.

- 1.1.1 There are two closets associated with bedroom 2. The doors of the closet open in different directions. Give a reason for this. (2)
- 1.1.2 Identify each of the following elevation plans of Nthabiseng's house.

(a)



(2)

(b)



(2)

- 1.2 DIAGRAM 5 below shows Miss Ndoe's family home in Witbank, Mpumalanga. The house has one aluminium sliding door on the North elevation and one aluminium door on the West elevation. Each door is fitted with two panels of safety glass. The aluminium sliding door (DIAGRAM 6) is shown alongside the elevation plans.

DIAGRAM 5: ELEVATION PLANS



DIAGRAM 6



Use the elevation plans and information above to answer the questions that follow.

- 1.2.1 Define the term “elevation plan”. (2)
- 1.2.2 Measure the height (in cm) of the safety glass of the aluminium+ sliding door in DIAGRAM 6. (2)
- 1.2.3 Describe the term used for the space within the perimeter of a two-dimensional flat surface. (2)
- 1.2.4 How many windows are shown on the plan's West elevation? (2)

ANNEXURE C

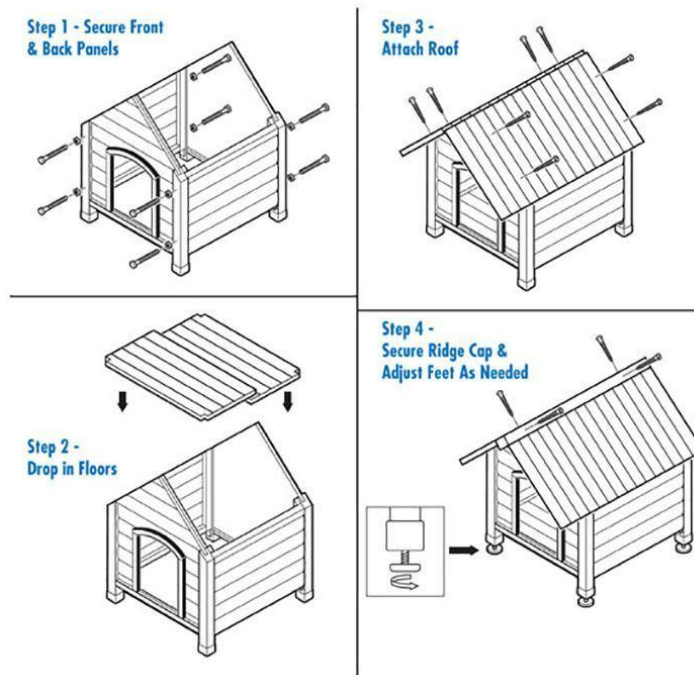
PLAN FOR NTHABISENG'S HOUSE



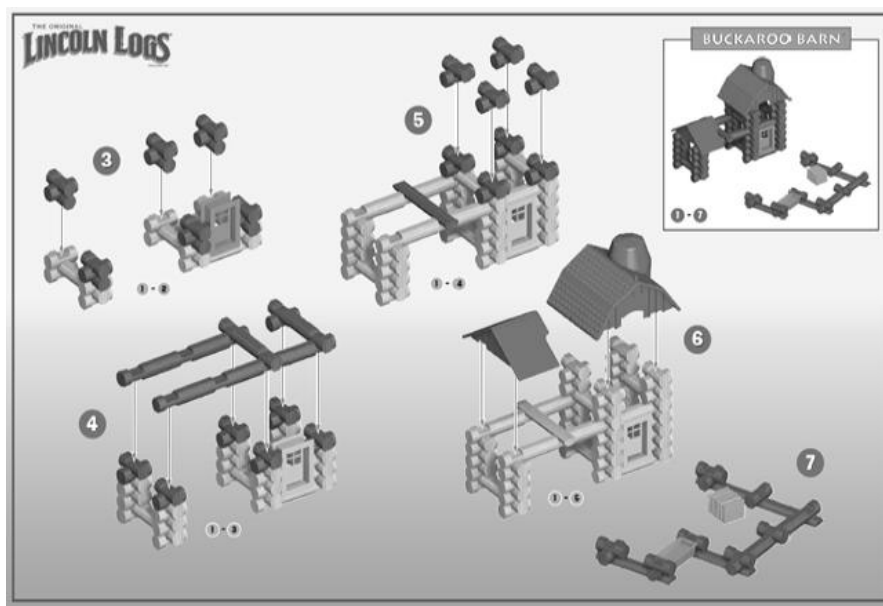
ASSEMBLY DIAGRAMS

- Show diagrams/pictures/nets of complete items
- They use symbols for the different components of an item.
- They have written instructions on how to put the different components together.

INSTRUCTION/ ASSEMBLY DIAGRAMS ON HOW TO BUILD A PALLET DOGHOUSE



INSTRUCTION/ ASSEMBLY DIAGRAMS CHILDREN'S TOYS



INSTRUCTIONS AND ASSEMBLY DIAGRAMS







- When we buy goods such as furniture (TV stands, chairs, etc) or electronic equipment (cell phones, computers, printers, etc), they sometimes come in pieces, and we need to follow instructions provided in manuals to assemble them.
- It is therefore important to make sense of the instructions if you want the optimal use from the item that you have bought.
- Failing to follow the instructions might lead to the equipment not been able to work properly.

Note to learners:

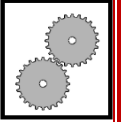
The following points are important when you have to write your own set of instructions:

- Use short and clear sentences.
- Use precise and descriptive words.
- Numbering, arrows, and dotted lines help to show the measurement and direction.
- Diagrams and pictures should be clear, large and easily understandable.
- Colourful diagrams are very effective.

Example

Instructions to assemble the Cell phone holder		
Clean the desired location then peel the protective skin from the suction pad. 	Place the suction pad on the desired surface. 	Pull down the lever to secure the mount. 
Adjust the car mount in any angle. 	Place your cell phone on the holder and adjust the holder according to the size of the cell phone. 	Pull on the tab at the side for easy removal. 

Worked Examples



- 1.1 Mr January imports bar stools that he sells again for a profit. The imported bar stools come in boxes with an assembly diagram. ANNEXURE A shows the assembly diagram for one of these chairs.

Use the information in ANNEXURE A to answer the questions that follow.

- 1.1.1 Write down the function of the part labelled as F within the context.

To tighten/fasten/loosen all screws (2)

- 1.1.2 Match each of the descriptions for A, B and C below to steps 1 to 3 on the diagram to explain how to assemble the bar stool. Write only the correct order of letters (A–C) next to your number.

- A. Push the seat and pedestal with footrest combination onto the shock absorber.
- B. Remove the cap from the shock absorber and press the shock absorber into the base.
- C. Fasten the pedestal with the footrest with screws to the seat.

Step 3

Step 1

Step 2

OR

B

C

A

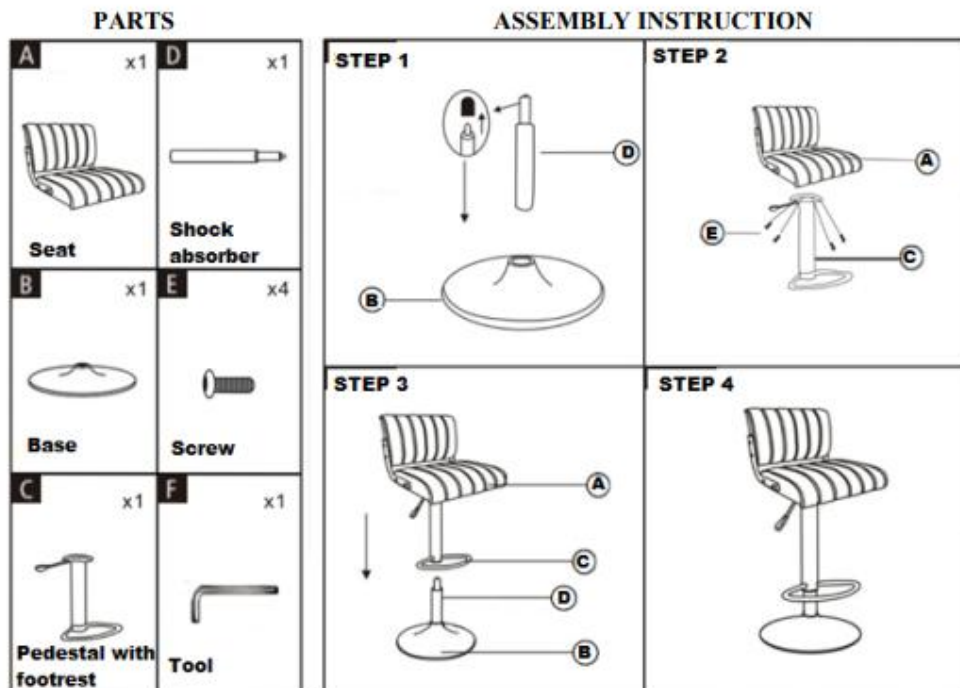
(3)

- 1.1.3 The shock absorber allows the bar stool to be adjusted upwards or downwards. Give ONE reason why a bar stool must be adjustable.

To fit different counter levels (2)

ANNEXURE A

DIAGRAM: 2 ASSEMBLY DIAGRAM FOR BAR STOOL



[Source: jwmhchair.com]

- 1.2 Joan will be taking an office chair to Colesburg. To make transportation easier, the chair is packaged in a box and will be assembled when she arrives in Colesburg. Assembly instructions for the chair are given on ANNEXURE C.

Use ANNEXURE C to answer the following questions.

- 1.2.1 Identify a part on the parts list that comes in quantities of five. Also, state the function of this part(s) once the chair is assembled. (4)

Wheels

To move around while sitting on the chair.

OR

To move it around

- 1.2.2 Write down the number of different parts shown on the diagram. (2)

Four (4)

- 1.2.3 Match each of the following descriptions A – C with the correct steps as shown on ANNEXURE C.

A. Fitting the seat marked A onto the base.

B. Insert B, the seat post into C, the base and push D into the ends of C.





C. Put the chair upright and check that all parts are well mounted. (3)

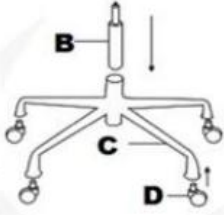


A match step 2

B match step 1

C match step 3

ANNEXURE C

Parts Listing			
	B		1x
	C		1x
	D		5x

ASSEMBLY INSTRUCTIONS		
Step 1: 	Step 2: 	Step 3: 

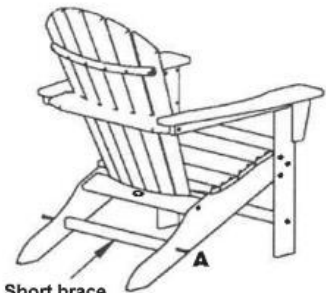

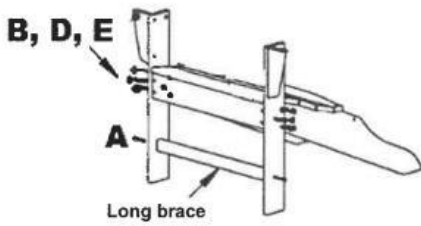
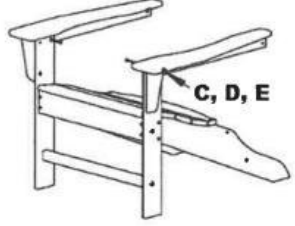
ACTIVITY 1: Assembly Diagrams






(38 marks: 40 minutes)



- 1.1 Illustrated below are steps and some instructions to assemble a deck chair. To assemble the deck chair, the wooden pieces are joint together using fasteners (screws, bolts, washers and nuts). There are 32 pieces in the packet of fasteners. Each bolt is screwed by a nut and a washer.

STEPS TO ASSEMBLE A DECK CHAIR

<p style="text-align: center;">STEP 4 COMPLETED CHAIR</p>  <p style="text-align: center;">STEP 3</p>  <p>Attach the back to the seat and arms using the screws (A).</p>	<p style="text-align: center;">STEP 1</p>  <p>Attach the seat using bolts (B), nuts (E) and washers (D) to the two front legs. Attach the long brace using the screws (A).</p> <p style="text-align: center;">STEP 2</p>  <p>Attach the arms to the two front legs using the bolts (C), nuts (E) and washers (D).</p>
--	--

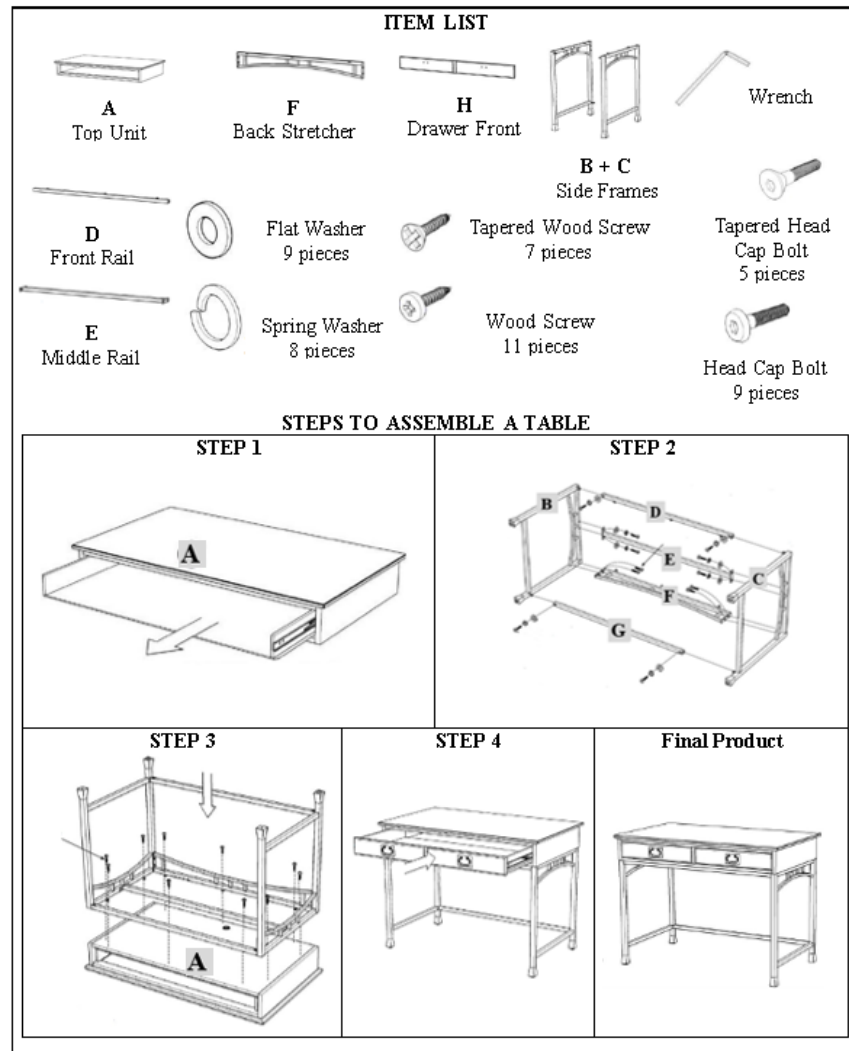
TYPE OF FASTENER					
	A Screw	B Bolt	C Bolt	D Washer	E Nut
					
Quantity	8	6	...	8	8

[Adapted from www.bin.com]

Use the information above to answer the questions that follow.

- 1.1.1 Determine the number of type C bolts used to assemble the deck chair (2)
- 1.1.2 State the number of nuts left over after step 1 is completed. (2)
- 1.1.3 Name the piece required to complete the assembly of the deck chair. (2)

- 1.2 The Central University of Technology wants to replace the old student desks in their student accommodation centres with new ones.
The picture below shows the item list that comes in the box of a student desk.

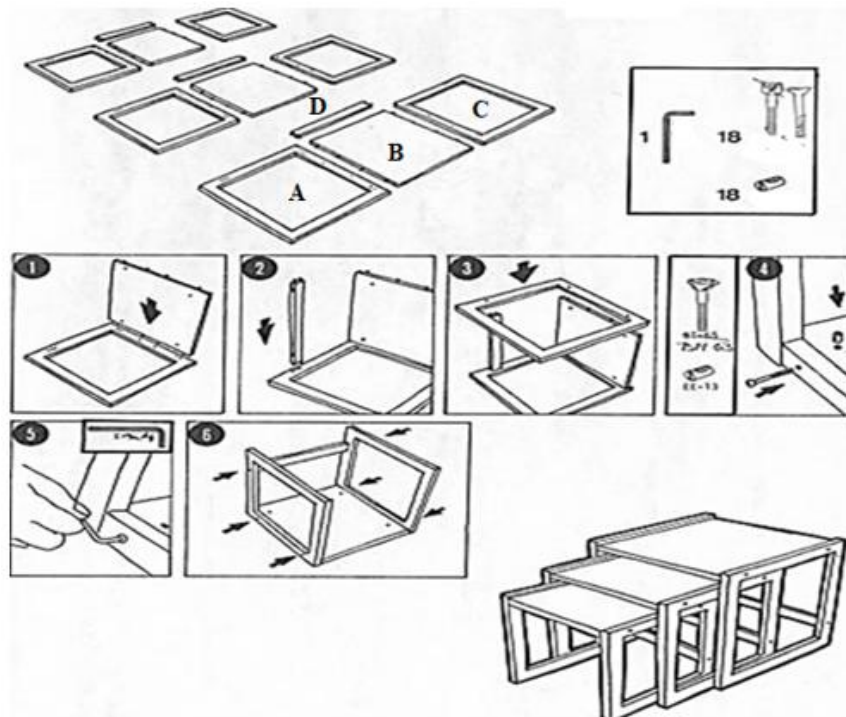





Use the information above to answer the questions that follow.

- 1.2.1 Determine the total number of washers needed to assemble the student desk. (2)
- 1.2.2 Give ONE use of a student desk. (2)
- 1.2.3 Write down the item, using a symbol from step 2, which is not listed under the item list. (2)
- 1.2.4 Write down the number of screws used to attach the top unit in step 3. (2)
- 1.2.5 One apartment has four rooms. Calculate the number of new desks needed for fifteen apartments if one desk is placed in every room. (2)

1.3

An assembly plan for a set of side tables can be seen below. This assembly plan has no instructions.



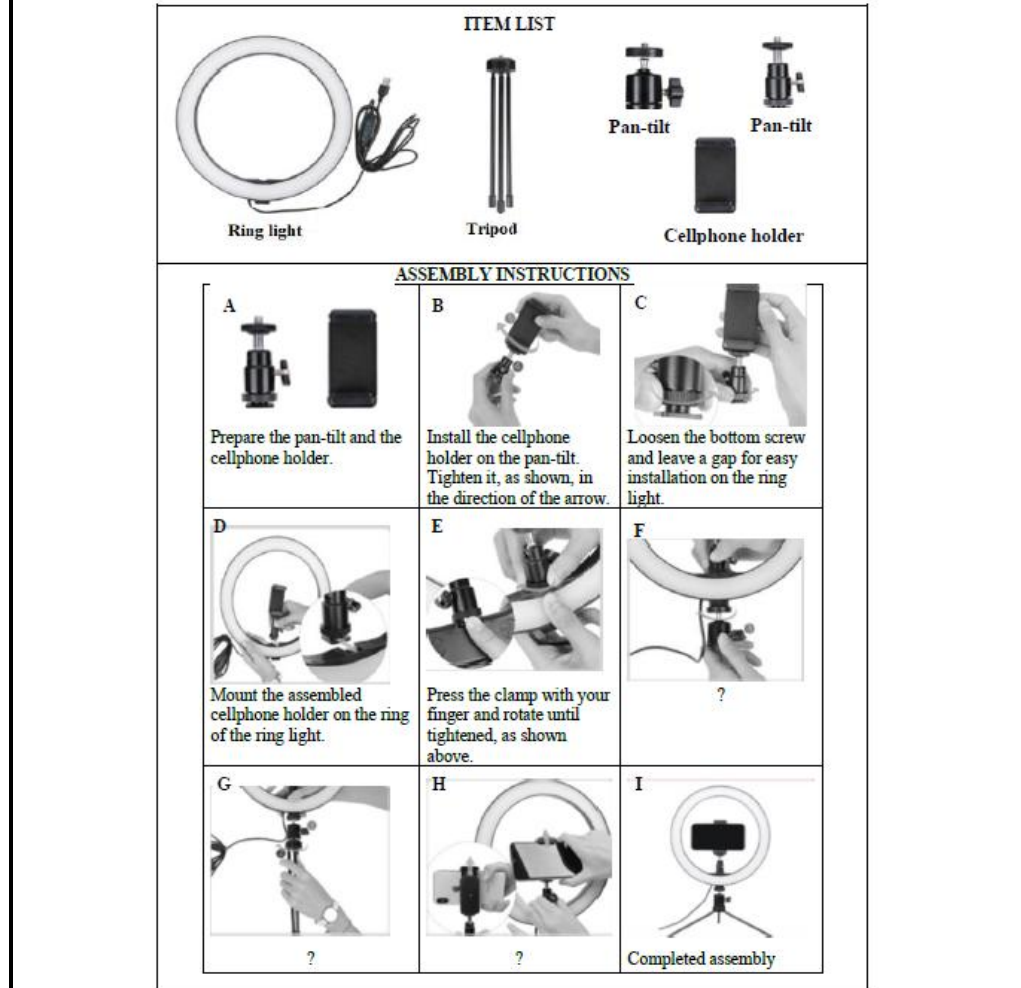
COMPONENTS USED TO ASSEMBLE THE TABLES		
1 ALLEN KEY	18 BIG SCREWS	18 SMALL BOLTS
		

Use the information above to answer the following questions.

- 1.3.1 Determine the total number of parts that must be used to make up all the tables. (3)
- 1.3.2 Identify the part of the table that will help to reinforce or support the table. (2)
- 1.3.3 Name the step of the assembly diagram which will secure the screws and small bolts. (2)
- 1.3.4 Write a set of instructions for Steps 1 to 3 of the assembly diagram. (3)

1.4

Ring lights are the best lighting option for close-up photography and videography. Ring lights are used for projects like make-up sessions. The picture below shows the item list and assembly instructions for a ring light. Some of the instructions have been omitted.



Use the information above to answer the following questions.

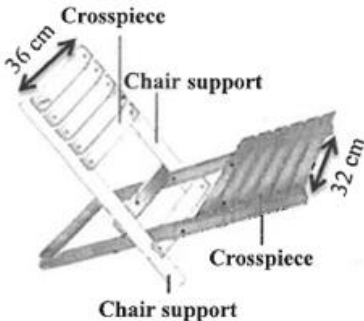
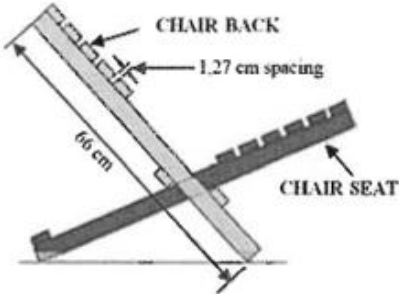
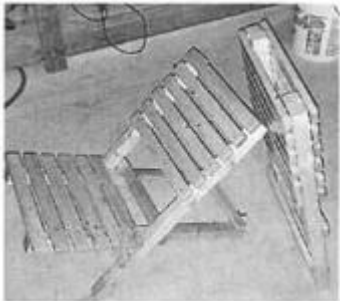
- 1.4.1 Determine the total number of items needed to assemble the ring light. (2)
- 1.4.2 Identify, in the list, the item that will be used as the ring light stand. (2)
- 1.4.3 Is the direction of the arrow in diagram B clockwise or anticlockwise? (2)
- 1.4.4 Match the following instructions with the correct picture (F, G or H): (2)
- (a) Clamp the cellphone to the cellphone holder (2)
- (b) Install the tripod on the pan-tilt and rotate until tightened. (2)

ACTIVITY 2: Assembly Diagrams

(27 marks: 30 minutes)



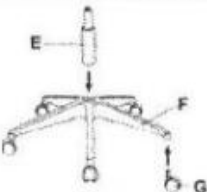
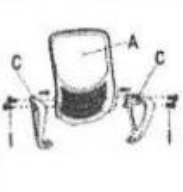
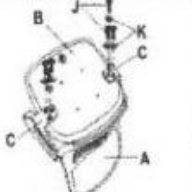
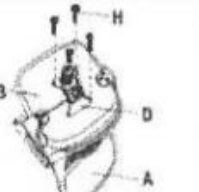
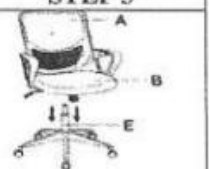

- 1.1 The fold-up chair is a beach chair that folds into itself. A 3D sketch, a side view, material list, the assembled chair and a folded-up chair are shown below.













<h3>3D SKETCH OF FOLD-UP CHAIR</h3>	<h3>SIDE VIEW OF FOLD-UP CHAIR</h3>															
																
<h3>MATERIAL LIST</h3>	<h3>ASSEMBLED CHAIR AND FOLDED-UP CHAIR</h3>															
<table><tr><th colspan="3">MATERIAL LIST</th></tr><tr><th>#</th><th>Wooden Item</th><th>Dimensions (in cm)</th></tr><tr><td>4</td><td>Chair supports</td><td>1,9 × 3,8 × 66</td></tr><tr><td>13</td><td>Crosspieces</td><td>1,9 × 3,8 × 36</td></tr><tr><td>1</td><td>Seat back, bottom crosspiece</td><td>1,9 × 3,8 × 32</td></tr></table> <p>NOTE:</p> <ul style="list-style-type: none">• The thickness of the wood is the smallest dimension.• # is the number of item(s).	MATERIAL LIST			#	Wooden Item	Dimensions (in cm)	4	Chair supports	1,9 × 3,8 × 66	13	Crosspieces	1,9 × 3,8 × 36	1	Seat back, bottom crosspiece	1,9 × 3,8 × 32	
MATERIAL LIST																
#	Wooden Item	Dimensions (in cm)														
4	Chair supports	1,9 × 3,8 × 66														
13	Crosspieces	1,9 × 3,8 × 36														
1	Seat back, bottom crosspiece	1,9 × 3,8 × 32														

Use the information above to answer the questions that follow.

- 1.1.1 Write down the total number of the wooden items needed to assemble this chair (2)
- 1.1.2 Determine the number of crosspieces found on the seats of THREE chairs (3)
- 1.1.3 Name the item in the material list with the longest dimension (2)
- 1.1.4 Identify which dimension of the chair support will represent the thickness of the wood (2)
- 1.1.5 Write down, in millimetres, the length of the spacing between the crosspieces of the back of the chair (2)

- 1.2 Illustrated below are the steps and components needed to assemble a chair. The components to assemble the chair are labelled alphabetically (A – K).

STEPS TO ASSEMBLE A CHAIR					
STEP 1	STEP 2	STEP 3	STEP 4		
					
					

COMPONENTS NEEDED TO ASSEMBLE THE CHAIR					
A	B	C	D	E	F
Chair back	Chair seat	Seat mechanism	Gas lift	Chair base	Chair arms
					
G	H	I	J	K	L
Casters	Screws	Screws	Screws	Washer	Assembly tool: Allen key
					

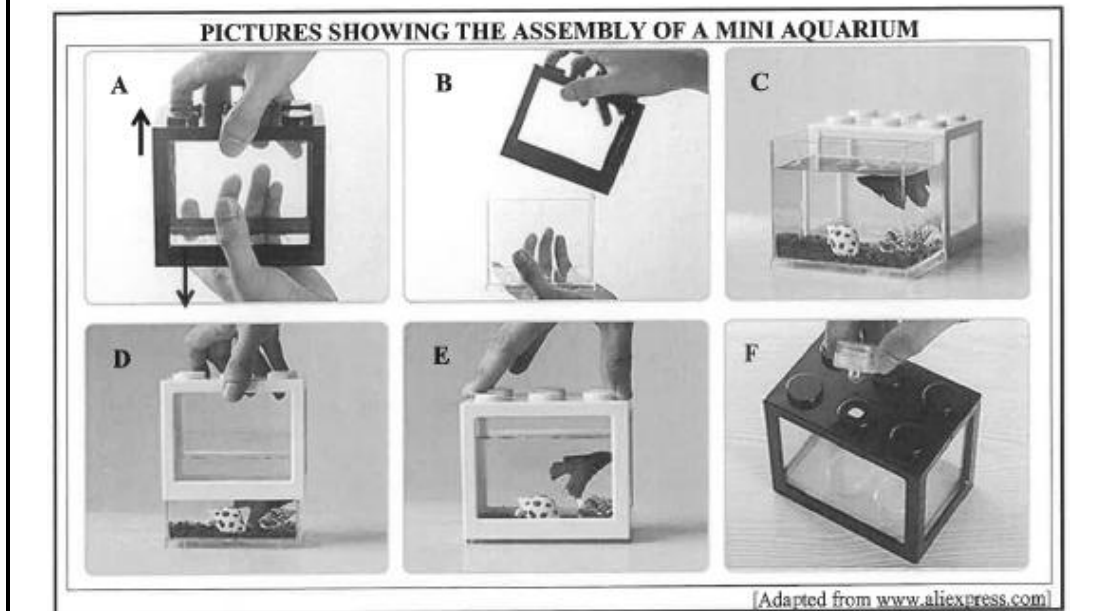
Use the information above to answer the questions that follow

- 1.2.1 Determine how many different types of screws are needed to assemble the different parts of the chair. (2)
- 1.2.2 Use the steps to assemble a chair to identify the following (2)
- The letter that indicates the chair base. (2)
 - The number of screws used in step 4 (2)
- 1.2.3 Name the tool needed to assemble the chair (2)
- 1.2.4 Identify the component of the chair that comes as a pair. (2)

1.3 Nikita received the different pieces for assembling the mini aquarium tank.

The pictures below show the different steps required to assemble one mini aquarium.

You may assume that the colours of the frames of the tank are the same in all the pictures below.



Choose a picture above that will match a written instruction below. Write down only the letter (A, B, C, D, E and F) of the picture next to the question number, e.g. 1.3.7 H

1.3.1 Place the outer frame over the transparent inner to cover it

1.3.2 Pull in opposite directions to open the mini aquarium.

1.3.3 The hole is for feeding or to put in the light.

1.3.4 One hand will hold the transparent inner tank while the other hand will hold the outer frame.

1.3.5 Add water and decorating items as you like

1.3.6 Close tightly by pressing down on the outer frame.



(6)

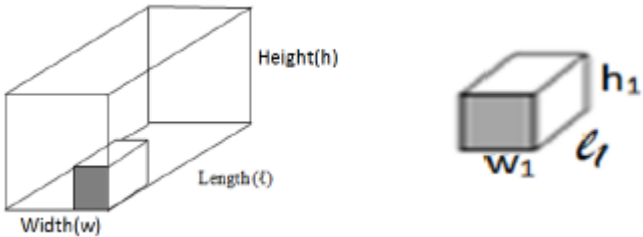
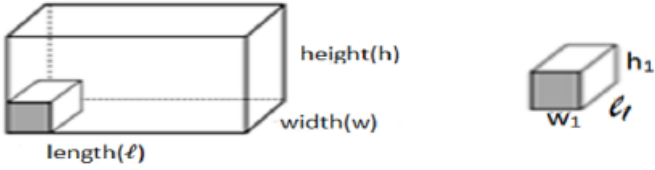
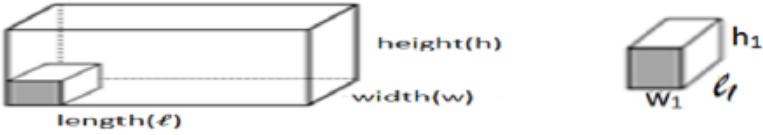
MODELS

Objectives

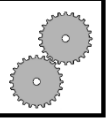
By the end of this section learners must be able to:

- Determine the most appropriate way to package can/or optimum use of space
- Determine the most cost-effective way to package a number of cans and/or boxes
- Investigate the best packaging shape for packaging a particular product.
- Investigate the best packaging shape to use for fragile and irregular shaped objects.
- Investigate the amount of material used to make a box.
- Investigate the number of furniture items that can fit into a venue.
- Estimate quantities of materials needed.
- Investigate possible ways to stack/arrange boxes in a storeroom in order to maximise wasted space.
- Critique aspect of the layout and/or design of a structure and make suggestions for alterations
- Investigate the placement of furniture in a room

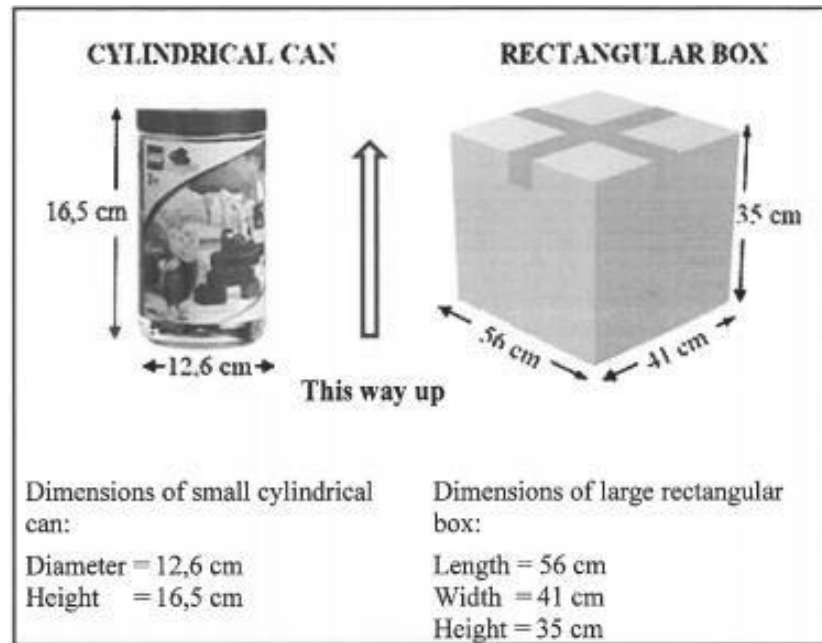
MODELS (PACAKGING IN 2DIMENSIONAL SCALE)	MODELS (PACAKGING IN 3-DIMENSIONAL SCALE)
	

PACKAGING LENGTH-WISE	 <p>The Length(l1) of the small box is packed along the Length(l) of the large box.</p> <p>CALCULATION: The number of small boxes = Length of large box ÷ Length(l1) of the small box that can be packed along Length(l) of the large box.</p>
PACKAGING WIDTH-WISE	 <p>The Width of the small box is packed along the Width/Breadth of the large box.</p> <p>CALCULATION: The number of small boxes = Width(w) of large box ÷ Width(w1) of the small box that can be packed along Width(w) of large box</p>
PACKAGING HEIGHT-WISE	 <p>The Height(h1) of the small box is packed along the Height(h) of the large box.</p> <p>CALCULATION: The number of small boxes = Height(h) of large box ÷ Height(h1) of the small box that can be packed along Height(h) of the large box Total number of small = number at length × number at width × number at height boxes packed</p>

Worked Example 1



- 1.1 The building blocks are packed into small cylindrical cans that are then packed into a large rectangular box as shown in the diagrams below.



The cylindrical cans are placed upright in the box.

- 1.1.1 Determine the number of layers of cans that can be placed in an upright position of the box. (2)

Possible answer

$$\begin{aligned}\text{Number of layers} &= 35 \text{ cm} \div 16, \\ &= 2,12... \\ &\approx 2\end{aligned}$$

- 1.1.2 Hence, determine the maximum number of cans that can be packed into ONE box. (3)

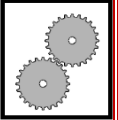
Possible answer



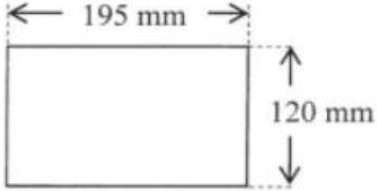
$$\begin{aligned}\text{Number of cans which can be packed lengthwise} &= 56 \text{ cm} \div 12,6 \text{ cm} \\ &= 4,444... \\ &\approx 4\end{aligned}$$

$$\begin{aligned}\text{Number of cans which can be packed width-wise} &= 41 \text{ cm} \div 12,6 \text{ cm} \\ &= 3,253... \\ &\approx 3\end{aligned}$$

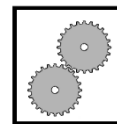
$$\text{Maximum number of cans} = 4 \times 3 \times 2 = 24$$

Worked Example 2




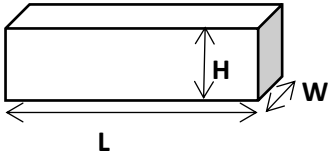
1	<p>Petru buys rectangular boxes with reels of thread for stitching stockings. The radius of a cylindrical reel is 11,5 mm.</p> <div data-bbox="292 427 1366 723"> <div> <p>Reels of thread</p>  </div> <div> <p>A box with reels of thread</p>  </div> <div> <p>Top view showing dimensions of the box</p>  </div> </div> <p>Determine the maximum number of reels of thread that will fit exactly into a rectangular box that is 120 mm wide and 195 mm long. Show ALL calculations</p>
	<p>Number of reels along length = $195\text{mm} \div 23\text{mm}$ $= 8,4782\dots$ $= 8$ Number of reels along breadth = $120\text{ mm} \div 23\text{ mm}$ $= 5,2173\dots$ $= 5$ Total = $5 \times 8 = 40$</p>

Worked Example 3



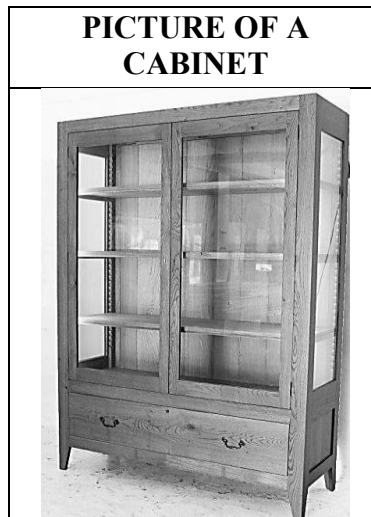
1.1 A Mathematical Literacy teacher collected 36 reams of paper from her learners.

Shown below is a picture and a diagram, with the dimensions, of a ream of paper.

PICTURE OF A REAM OF PAPER	DIAGRAM OF A REAM OF PAPER WITH DIMENSIONS
	 <p>Length (L) = 27,94 cm Width (W) = 21,59 cm Height (H) = 6,35 cm</p>

The teacher intends packing the reams of paper in a secure cabinet, as shown in the picture alongside.

The dimensions of the maximum space on one shelf are 102 cm long, 44 cm wide and 39 cm high.



Use the information above to answer the questions that follow.

1.1.1 Show, with calculations, that all the reams of paper collected can fit on ONE shelf of the cabinet.

Possible Solution

Number of reams lengthwise
 $102 \text{ cm} \div 27,94 \text{ cm} = 3,65$
 ≈ 3

Number of reams widthwise
 $44 \text{ cm} \div 21,59 \text{ cm} = 2,04$

(7)

$$\approx 2$$

Number of reams heightwise

$$39\text{cm} \div 6,35 = 6,14$$

$$\approx 6$$

Total number of reams

$$= 3 \times 2 \times 6$$

$$= 36$$

- 1.1.2 Give ONE reason why the teacher would like to pack the reams of paper in the cabinet. (2)

To keep them dust free

OR

To keep them safe for later use

OR

For learners to see that the teacher is using their reams of paper

OR/OF

To keep the reams dry

ACTIVITIES: Models



- 1.1 The cylindrical bottles of Coca-Cola are packaged as shown below:



Dimensions of the trailer cover:

- Length = 8,1 m
- Width = 2,45 m
- Height = 2,6 m

Measurements of a 2 litre Coca-Cola bottle:

- Radius = 52 mm and height = 327 mm
- Size of pallet consists of 8 x 8 bottles

NOTE:

- 1 ton = 1 000 kg
- 1 kg = 1 litre

Use the information above to answer the questions that follow.

- 1.1.1 Calculate the maximum number of the Coca-Cola pallets that could be loaded on the second trailer of the truck. (8)

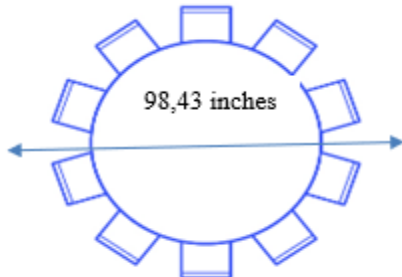
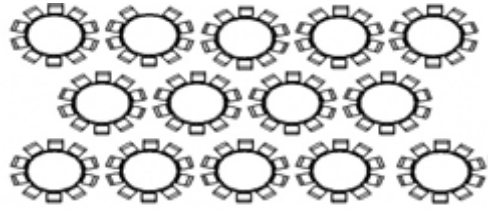
- 1.1.2 Duan states that 12 pallets of the load from the second trailer will fit into a smaller van used by a shop owner for his own stock.

The van load size is 1,5 tons.

Verify, showing ALL calculations, whether his statement is true. (5)

1.2

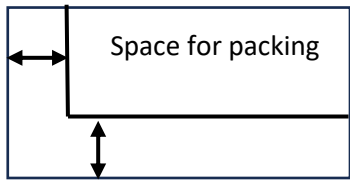

The layout plan shows the number of round tables that can fit in the seating area in the hall. A wedding planner wants to confirm that the seating area can accommodate all the tables shown below.

LENGTH OF TABLE INCLUDING CHAIRS AND SPACE AROUND TABLE	DIMENSIONS OF THE SEATING AREA
	
NOTE: 1 inch = 2,54 cm	LENGTH = 15 metres WIDTH = 7,5 metres

Use the information above to answer the following questions.

- 1.2.1 Determine the length of the table, including chairs, and the space around the table in metres. (4)
- 1.2.2 Calculate the maximum number of tables that can fit in the seating area. (5)

- 1.3 Bedroom 2 will be used to store boxes of paper for printing purposes. 20% of the space on each side as shown on the picture below will not be used to allow movement when the packing and unpacking of the boxes is done.

LAYOUT PLAN FOR PACKAGING	PICTURE OF A BOX OF PAPER	DIMENSIONS OF THE BOX
		Length = 28 cm Width= 23 cm Height = 31,8 cm

Dimensions of bedroom 2	Dimensions of Master Bedroom
Length = 3 m	Length = 3 m
Width = 2,6 m	Width = 3 m
Height of the wall = 2,4 m	

Use the information above to answer the questions that follow.

- 1.3.1 One of the employees stated that they will be able to pack seven layers of boxes in the bedroom.

Verify, using calculations, whether his statement is VALID. (5)

- 1.3.2 Calculate the maximum number of boxes that can be packed in the bedroom if the length of the box is packed along the width of the room and the width of the box along the length of the room. (8)

Finance

Sections

1. Exchange rates
2. Inflation
3. Tariff Systems
4. Taxation

Exchange rates

Exchange rates are the prices at which one currency can be exchanged for another.

They tell you how much of one currency you need to buy a unit of another currency.

Example

We want to convert \$75 to Rands.

Using: = R1= \$0,0625 \longrightarrow $\$75 \div 0,0625 = \text{R1 } 200,00$

Using: = \$1= R16,00 \longrightarrow $\$75 \times 16 = \text{R1 } 200,00$

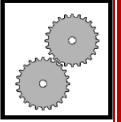
Factors influencing exchange rates

1. Economic indicators
2. Supply and demand
3. Political Stability
4. Global Events

Importance of Exchange Rates

1. Travelling
 - Knowing exchange rates helps when travelling to other countries
2. Investments
 - Exchange rates impact investments in foreign markets
3. International Trade
 - Exchange rates affect trade between countries

Worked Examples



- 1.1 Sally is planning to visit her family in Sweden during December to experience a white Christmas. She decided to save up her travel and meal allowances for one year to ensure that she will have enough money for meals, transportation, and entertainment. The current exchange rate is 1,82 ZAR (South African Rand) for 1 SEK (Swedish Krona)

Use the information above to answer the questions that follow.

- 1.1.1 Between the two countries, which currency is stronger?

Swedish Krona (2)

- 1.1.2 Convert 28 573 South African Rand to Swedish Krona.

R1,82:1 Krona
R28 573: x Krona
 $R28\,573 \div R1,82$
= Krona 15 699,45 (2)

- 1.2 Brazil has trade relationships with a number of countries.

TABLE 5 below shows the value (in billions of US\$) of imports and exports for Brazil with six countries.

TABLE 5: THE VALUE (IN BILLIONS OF US\$) OF IMPORTS AND EXPORTS FOR BRAZIL WITH SIX COUNTRIES

COUNTRY	IMPORTS (Billions of US\$)	EXPORTS (Billions of US\$)
China	36,74	67,79
United States of America	29,72	21,62
Germany	9,68	4,12
Argentina	8,22	8,49
South Korea	4,66	3,76
Japan	4,32	4,13

TABLE 6 below indicates the exchange rates on 27 April 2022.

TABLE 6: CURRENCY CONVERSION FACTORS

CURRENCY	EXCHANGE RATES
US dollar (US\$) to Brazilian real (BRL)	US\$1 = BRL4,9642
Brazilian real (BRL) to South African rand (ZAR)	1BRL = R3,2026
Euro (€) to Brazilian real (BRL)	€1 = BRL5,2379

Use TABLE 5 and TABLE 6 above to answer the questions that follow.

- 1.2.1 State the country with the smallest range between the imports and exports to Brazil.

Japan (2)

- 1.2.2 Identify the weakest currency against the Brazilian real.

ZAR OR/OF South African Rand OR/OF Rand (2)

- 1.2.3 Calculate the exchange rate between the euro and the South African rand in the form €1 = R...

€ 1 = BRL 5,2379
= 5,2379 × R3,2026
= R16,77489 (3)

- 1.2.4 Ludwig, a German citizen, stated that the difference between the United States imports and exports to Brazil is more than 7 600 million euros.

Verify, showing ALL calculations, whether Ludwig's statement is VALID

(6)

Difference (in US\$/V\$)
 = 29,72 billion– 21,62 billion
 = 8,1 billion
Difference (in BRL)
 = 8,1 billion × 4,9642
 = 40,21002 billion
Difference (in €)
 = 40,21002 ÷ 5,2379
 = 7,676744497 billion
 = 7 676,744497 million
 His statement is **VALID**.

ACTIVITY 1: Exchange Rates

(14 marks: 15 minutes)



- 1.1 Mr Gwabeni intends to visit his friend in the United States. He has R30 000 to spend while he is there. The exchange rate on that date is 1 dollar (\$) = R13,97

- 1.1.1 Explain the term exchange rates within the context above. (2)
- 1.1.2 State whether the rand is stronger or weaker than the dollar. (2)
- 1.1.3 Calculate how much his spending money is worth in dollars. (2)

- 1.2 TABLE 1 below indicates the exchange rate between South Africa (SA) and some other high-ranking countries.

TABLE 1: EXCHANGE RATE BETWEEN SA AND SOME SIX COUNTRIES

Exchange rate of SA and other Countries		October 02, 2017 09:00
CURRENCY	UNITS PER ZAR	ZAR PER UNIT
US Dollar	0,073482	13,608770
European Euro	0,062562	15,984219
British Pound	0,055187	18,120130
Indian Rupee	4,811223	0,207847
Australian Dollar	0,094072	10,630196
Canadian Dollar	0,091895	10,881951

[Source: w.w.w.x-rates.com]

Use the information above to answer the questions that follow.

- 1.2.1 On which date was the exchange rate recorded? (2)
- 1.2.2 Determine the amount of South African rands (ZAR) that are equivalent to 1US Dollar. (2)
- 1.2.3 Name the currency used in Australia. (2)

1.2.4 Express 10,881951 as a whole number.

(2)

ACTIVITY 2: Exchange Rates

(22 marks: 25 minutes)



- 1.1 The exchange rate between South Africa and Great Britain on 07 June 2021 is shown below:

Great Britain Pound to South African Rands	
1 British pound (£)	R 19, 19 (ZAR)
[Source: exchange rates.org.uk]	

Use the information above to answer the questions that follow:

- 1.1.1 Explain what the term exchange rate means. (2)
- 1.1.2 State if the rand is weaker or stronger against the British pound. (2)

- 1.2 A developer, Mr. Zuma, has to install solar geysers into 1 250 houses (one solar geyser per house) that he is building in a new housing development. He asks solar geyser manufacturers in TWO countries for a quote.

TABLE 2: EXCHANGE RATES OF CURRENCIES

Country	Currency	Price per geyser	Exchange rate
India	Indian Rupee (INR)	15 000 INR	1 ZAR = 0,20 INR
China	Chinese Yuan (CNY)	1 893,33 CNY	1 CNY = ZAR 2,02

Use the information in TABLE 2 to answer the following questions:

- 1.2.1 Identify the country with the strongest currency. (2)
- 1.2.2 Calculate the total amount (in Rands) that the developer will pay if he buys the geysers from India. (4)

- 1.3 Rafael Nadal raises a mammoth amount of €14 million for coronavirus victims in Spain which was equivalent to R292 318 460 in South Africa. PPE – Personal protective equipment Use the table below and answer the questions that follow.

TABLE 3: CURRENCY EXCHANGE TABLE

1\$ (US dollar)	R17,76459
1€ (Euro)	R20,87989
1¥ (Yen)	R0,16719
1¥ (Yen)	0,0080 € (Euro)

[Adapted from www.countries of the world.com]

Use the information above to answer the questions that follow.

- 1.3.1 Determine which currency is the weakest according to the table? (2)
- 1.3.2 Write down R292 318 460 in words. (2)
- 1.3.3 Explain why there are more than two digits after the decimal comma. (2)
- 1.3.4 Show, by means of calculations that €14 million is indeed equal R292 318 460. (3)
- 1.3.5 Rafael Nadal request that the donation money be used for PPE's, to staff payment, purchase ventilators in the ratio 1:2:4, respectively. Determine the amount in rand that needs to be spent on ventilators in Spain. (3)

Inflation

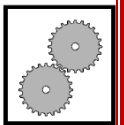
Inflation is a sustained increase in the general price level of goods and services in an economy overtime

It means that the purchasing power of money decreases as prices rise.

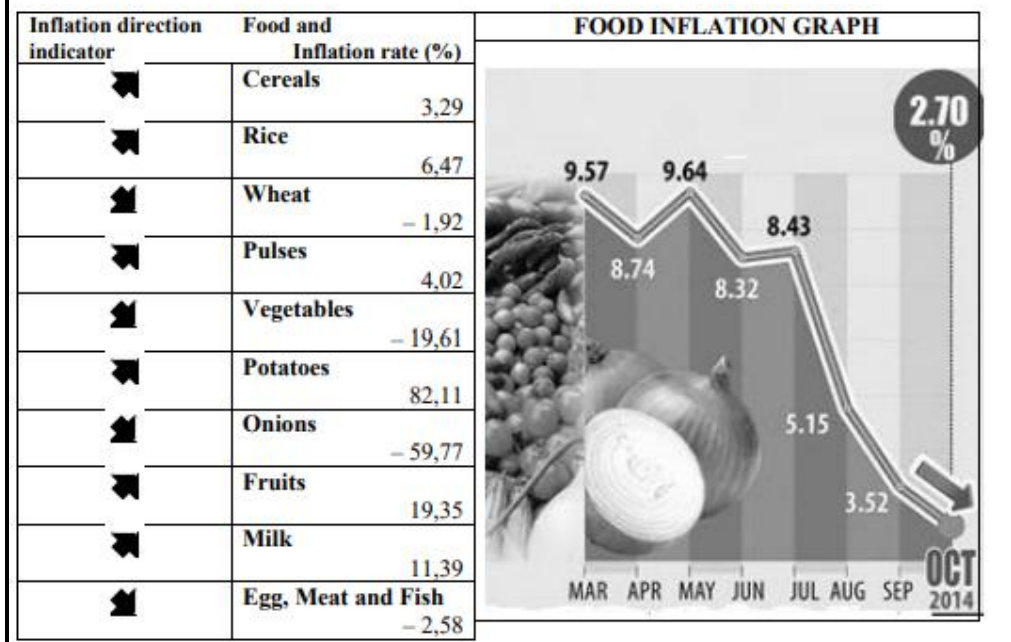
Example:

If you had R100 last year, and you could buy 10 burgers with it, this year, due to inflation, the price of burgers increased and R100 can only buy 8 burgers.

Worked Examples



- 1.1 Information below refers to food inflation rate for various food items over time.



Use information above to answer the questions that follow

- 1.1.1 Define the food inflation rate. (2)

Food inflation rate is the percentage increase or decrease in food prices during a specified period, usually a month or a year.

- 1.1.2 What does inflation rate tell one about price of goods? (2)

How quickly prices rise or decline during the specified period.

- 1.1.3 Identify food TWO items that showed the most decline in inflation rate. Give the value. (3)

Onions and Vegetables. Declined by 59,77 and 19,61%.

OR

Onions and Vegetables. – 59%, –19,61%

1.1.4 What was the average food inflation recorded in October 2014? (2)

2,7%

1.1.5 Identify the type of graph shown to reflect food inflation from March 2014 to October 2014. (2)

Line graph OR Broken line graph

1.2 The table below shows the inflation rate for over a period of five years.

Table 1: Inflation rate for the period 2015 to 2020

Year	2015	2016	2017	2018	2019
Inflation rate (%)	6,34	5,27	4,78	4,8	5,3

Use the information above to answer the questions that follow.

1.2.1 Explain the meaning of the term inflation. (2)

Inflation is the increase in the general price level of goods and services

1.2.2 Identify a year in which the inflation rate was the SECOND HIGHEST and write down the year. (2)

2019

1.2.3 The inflation rate decreased by 0,49% between 2016 and 2017. Does this mean the prices of goods went down? Explain your answer. (2)

No. Prices will go up at a lower rate.

ACTIVITY 1: Inflation

(20 marks: 25 minutes)



- 1.1 The average inflation rates for the period 2006 to 2010 are shown on table 1 below.

TABLE 1: AVERAGE INFLATION RATES FOR PERIOD 2006-2010

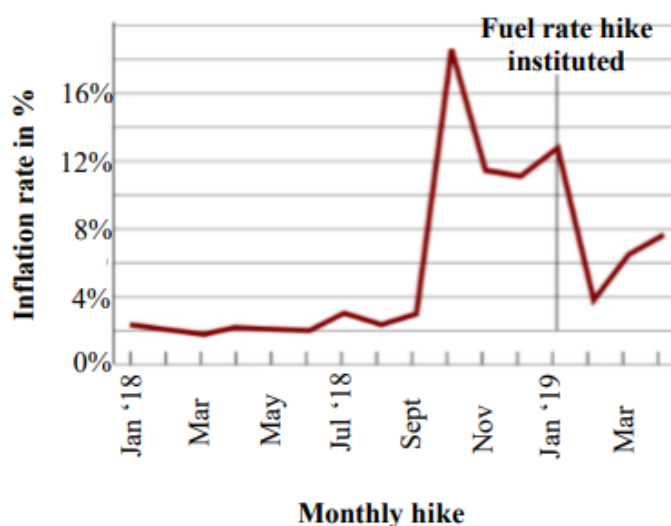
Year	2006	2007	2008	2009	2010
Average inflation rate	5%	6,5%	11,3%	7,2%	4,5%
Cost of a loaf of bread (R)	4,34	4,56	4,85	5,40	5,79
Cost of a taxi trip to work (R)	5,00	5,25	5,59	6,22	6,97

[Source: statista.com]

Use the information above to answer the questions that follow:

- 1.1.1 Explain the meaning of the term inflation. (2)
- 1.1.2 During which year was the inflation rate the highest? (2)
- 1.1.3 Determine the difference between the highest cost and the lowest cost of a taxi trip. (2)
- 1.1.4 Calculate the number of loaves of bread that can be bought with R270,00 in 2009. (2)

- 1.2 The graph below shows the month-to-month inflation rate for January 2018 to April 2019 as released by The Reserve Bank of Zimbabwe. The graph also indicates when a fuel rate hike was instituted.



Use the information above to answer the questions that follow.

- 1.2.1 Identify the statement that DOES NOT describe the inflation.
- (a) It is an overall increase in the price of goods and services.
- (b) It increases the purchasing power of currency.

- (c) It is an economic or financial situation when one has to spend more to buy a loaf of bread; fill your car's tank with petrol or to get a haircut (amongst others). (2)
- 1.2.2 Identify the type of graph used to represent the inflation information above. (2)
- 1.2.3 Write down the year and month on the graph during which Zimbabwe experienced the lowest rate of inflation. (2)
- 1.2.4 Write down the year and months on the graph during which Zimbabwe experienced the biggest change in the inflation rate. (2)
- 1.2.5 Estimate the fuel's rate of increase for July 2018. (2)
- 1.2.6 Mugabe claimed that rate of inflation was negative in February 2019. Explain whether he was CORRECT or NOT CORRECT. (2)

ACTIVITY 2: Inflation

(15 marks: 20 minutes)



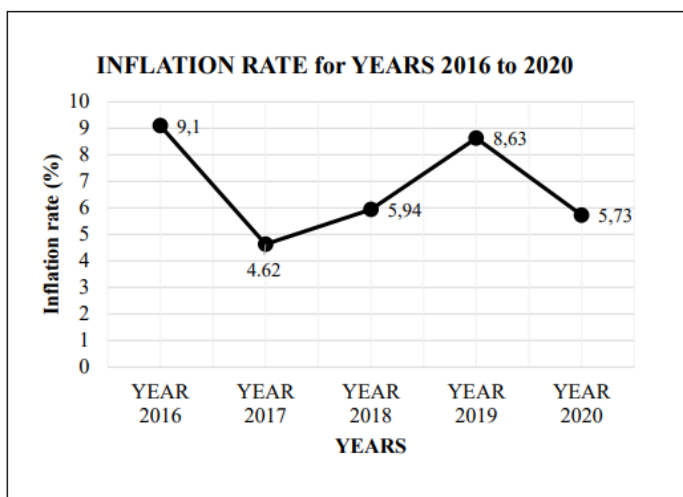
- 1.1 Match the word in COLUMN A with the correct definition given in COLUMN B. Simply write the letter in COLUMN B that corresponds with the word in COLUMN A

COLUMN A	COLUMN B
Inflation	A. A compulsory financial charge or some other levy type imposed upon a taxpayer by a governmental organization in order to fund various public expenditures
	B. A tax that is added to the price of goods or services.
	C. A general increase in prices and fall in the purchasing value of money over a period.

(2)

- 1.2 The average inflation rate for South Africa for the period 2016 to 2020 is indicated in the graph below.

SOUTH AFRICA'S AVERAGE RATE OF INFLATION FROM 2016 TO 2020



Use the above information on the graph to answer the questions that follow.

- 1.2.1 Explain why it is referred to as the average inflation rate. (2)
- 1.2.2 Briefly explain the changes in the rate of inflation and the impact it had on the prices of goods from 2016 to 2019. (4)
- 1.2.3 The price of a dining table was R5 356 in 2018. Use the rates of inflation shown above to calculate the difference in its price in 2017 and 2019.

You may use the formula:

$$\text{New price} = \text{Old price} \times (100\% + \text{Inflation rate } \%) \quad (7)$$

Tariff System

A tariff is the charge in rands per measuring unit for a specific service.

Tariffs are not always constant; they change from time to time.

Type of tariffs that learners must know:

1. Electricity Tariffs

Electricity tariff (sometimes referred to as the price of electricity) varies widely from country to country, province to province and may vary significantly from municipality to municipality within a particular province. There are many reasons that accounts for these differences in price, such as market price of the fuel used, government subsidies and even local weather patterns.



- Electricity usage is measured in kilowatt per hour (KWh)
- The amount of electricity that a person will pay each month depends on the number of Kwh of electricity used during the month.
- Electricity is charged at a sliding scale. This means that the more electricity you use, the higher the rate at which you are charged for electricity

2. Water Tariffs

Water tariff, just like electricity tariffs also varies from one place to the other.

Water consumption is measured in kilolitres (kl)

- The amount payable for water also depends on the number of kl of water used during the month.
- Water is charged at a sliding scale. The more water you use, the higher the rate at which you are charged.



3. Transport Tariffs

Transport Tariffs

Majority of the people in South Africa depend on public transport. Of the 35 million daily trips recorded in South Africa, over 60% are by public transport. The most common means of public transport are:

- Taxi
- Bus
- Train
- Aeroplane
- Motor vehicle (car)



Transport tariffs (fares) are based on the distance travelled, cost of fuel and the general wear-and-tear on the vehicle. Fares can be purchased as:

- Single trip – one-way only
- Return (round) trip – there-and-back
- Weekly and monthly tickets

4. Cell phone Tariffs

Cell phone networks use either **prepaid** or **contract** billing structure. Different networks charge different tariffs. The most common networks in South Africa are *Vodacom, MTN, Cell C, Telkom*

Prepaid tariff system

The general formula for the prepaid tariff system is:

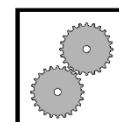
$$\text{Prepaid cost} = \text{total number of units} \times \text{tariff}$$

Contract tariff system

- A cellphone contract for a specific period is taken out from a service provider.
- The cost per month includes subscription fee and cost for the calls
- The cost formula for the contract tariff system is: = subscription fee + (number of minutes – free minutes) x tariff



Worked Example



- 1.1 Thando received the slip below after purchasing prepaid water at one of the approved vendors.

PREPAID WATER SLIP

Blue Approved Tax Invoice Mangaung Metropolitan Municipality Credit Token 3974 0445 6670 6712 5026		
6 kℓ	@ 9,6600 R/kℓ	= R57,96
9 kℓ	@ 22,7200 R/kℓ	= R204,48
15 kℓ	@ 25,2300 R/kℓ	= ...
22,4 kℓ	@ 29,6900 R/kℓ	= R665,056
Amount:		R1 305,95
VAT @ 15%:		R195,89
Total:		R1 501,84
Free Units:		0,00 kℓ
Credit Units:		52,40 kℓ
Total Units : 52,50 kℓ		
Receipt No:		01166515
Meter No:		41150801599
Date:	25/02/2022	18:20:27

[Adapted from actual slip]

Use the information above to answer the questions that follow.

- 1.1.1 Write down Thando's water meter number. (2)

41150801599

- 1.1.2 Define the term tariff in the given context. (2)

Tariff is the amount charged per kilolitres of water

- 1.1.3 Identify the maximum number of kilolitres that can be bought at R9,6600 per kilolitre. (2)

Six (6)

- 1.1.4 Determine the missing value, the cost of using 15 kℓ of water in the context above. (3)

Amount charged

$$15 \text{ kℓ} \times R25,2300/\text{kℓ} = R378,45$$

- 1.2 Morwesi used 47 kilolitres (kℓ) at her residence site. She consulted the municipal water tariff to check how much she will have to pay for ALL the water used. TABLE 1 below shows the costing structure of water at Nkutilwelleng Municipality:

WATER TARIFFS	
Water usage in kilolitres	Tariff * (per kilolitre)
0 kℓ to 9 kℓ	R0,00
From 9 kℓ to 25 k	R9,27
From 26 kℓ to 30 kℓ	R12,46
From 31 kℓ to 45 kℓ	R19,06
More than 45 kℓ	R20,96
Fixed charges per month	
	Tariff *
0 kℓ to 9 kℓ	R0,00
Greater than 9 kℓ	R83,56
Tariffs excludes 15% VAT	

Use TABLE 1 above to answer the following questions.

- 1.2.1 The tariffs in Table 1 above are said to be in “progressive or sliding scale of billing” explain this. (2)

The more the water is used the more one is charged / pays.

- 1.2.2 Calculate how much must Morwesi pay for using 47 kℓ of water. (10)

Cost of water usage (excluding VAT):

$$\begin{aligned} &= [R0,00 \times 9 \text{ kℓ}] + [R9,27 \times 16 \text{ kℓ}] + [R12,46 \times 5 \text{ kℓ}] + [R19,06 \times 15 \text{ kℓ}] + [R20,96 \times 2 \text{ kℓ}] \\ &= R0,00 + R148,32 + R62,30 + R285,90 + R41,92 \\ &= R538,44 \end{aligned}$$

Cost of fixed charges per month (excluding VAT):

$$= R83,56 \text{ for amount higher than 9 kℓ}$$

$$\begin{aligned} \text{Total cost (excluding VAT):} &= R538,44 + R83,56 \\ &= R622 \end{aligned}$$

$$\text{VAT (at 15\%)} \text{ on total costs: } \frac{15}{100} \times R622 = R87,08$$

$$\text{Hence, total cost (including VAT): } R622 + R87,08 = R709,08$$

- 1.2.3 State how the cost would be if the same amount of water had been used by the Business purpose on its site. Explain. (4)

Will be higher.

Business are billed higher than residence. Different tariffs apply for residence (LOW) and business (HIGHER).

ACTIVITY 1: Tariff Systems

(14 marks: 15 minutes)



- 1.1 The table below shows the water tariffs for the financial year 2024-2025 for the Swartland Municipality.

TABLE 3: WATER TARIFFS FOR THE FINANCIAL YEAR 2024-2025

Step		Total In Rand VAT (Excl)	VAT In Rands 15%	Total Tariff In Rand VAT (Incl)
1	0 – 6 kℓ	6,44	0,97	7,41
2	>6 – 10 kℓ	10,58	1,59	12,17
3	>10 – 15 kℓ	20,07	3,01	23,08
4	>15 – 20 kℓ	25,78	3,87	29,65
5	>20 – 25 kℓ	37,86	5,68	43,54
6	>25 – 35 kℓ	56,94	8,54	65,48
7	>35 kℓ	106,18	15,93	122,11
Fixed monthly charge		79,50	A	91,43

Use the information above to answer the questions that follow.

- 1.1.1 Determine the missing value A, the 15% VAT amount for the fixed monthly charge. (2)
- 1.1.2 Write down the maximum number of kilolitres of water that can be charged at a rate of R43,54 (VAT inclusive). (2)
- 1.1.3 Show how R122,11, the Total tariff (VAT inclusive) for Step 7 was calculated. (2)
- 1.2 Tshwane Municipality uses the following domestic water tariffs to bill Mr. Khoza. Use the table below to answer the questions that follow

Category	Domestic	Charge per kℓ in R (VAT Excl)
1	1 – 9 kℓ	R0.00
2	10 – 18 kℓ	R 28.97
3	19 – 30 kℓ	R39.20
4	30 – 42 kℓ	R45.13
5	42 – 60 kℓ	R 48.28
6	More than 60 k	R 51.70
		FIXED COST = R240

- 1.2.1 Identify the maximum number of kℓ in category 2. (2)

- 1.2.2 Calculate VAT inclusive amount that Mr Khoza has paid for using 40 kℓ of water. (6)

ACTIVITY 2: Tariff Systems

(17 marks: 20 minutes)



- 1.1 Municipalities across South Africa publish their electricity tariffs annually in compliance with regulations. Sam works from home most of the time and recently discovered that his electricity bill has increased significantly.

TABLE 4 below shows information regarding electricity tariffs published by the City of Tshwane for the 2022/23 and 2023/24 financial years.

TABLE 4: CITY OF TSHWANE ELECTRICITY TARIFFS FOR 2022–2024 FINANCIAL YEARS.

BLOCK	2022/23 TARIFF (R/KWH)	2023/24 TARIFF (C/KWH)
1 (0 to 100 kWh)	2, 0970	270,33
2 (101 to 400 kWh)	2, 4541	316,37
3 (401 to 650 kWh)	2, 6738	344,67
4 (more than 650 kWh)	2, 8824	371,58
NB: All tariffs exclude 15% VAT.		

Use the information above and answer the questions that follow.

- 1.1.1 Define the term tariff in this context. (2)
- 1.1.2 Determine the number of kWh allocated in block 3. (2)
- 1.1.3 Calculate the tariff, including VAT, for block 1 for 2023/24 in rands. (3)
- 1.1.4 In June 2024 Sam spent R1 941,42, including VAT, on electricity. Calculate the number of units (kWh) of electricity he used for the month. (8)
- 1.1.5 Suggest TWO ways in which Sam can reduce his electricity usage. (2)

ACTIVITY 3: Tariff Systems

(12 marks: 15 minutes)



- 1.1 Mrs Swanepoel and her husband are using the same cell-phone network provider, but each uses it under different conditions.

Mrs Swanepoel is on a cell-phone contract where:

- She pays a fixed cost of R450 per month for 100 minutes free
- Thereafter the cost of R1,40 per minutes or part there of

Mr Swanepoel is on a prepaid and pays R2,25 per minute.

TABLE 2 below shows the number of minutes total cost per single trip for different distances travelled.

TABLE 2: NUMBER OF MINUTES AND COST FOR A CELLPHON CONTRACT

Number minutes per month	0	50	100	200	300	B
Contract Total cost (R)	450	450	A	590	730	1990
Prepaid Total cost (R)	0	112,50	225	C	675	2700

Use the information above to answer the questions that follow

- 1.1 Write down the formula that can be used to calculate Mrs Swanepoel's contract total cost, in the form:

Total cost = ... (3)

- 1.2 Calculate the value of:

(a) A, contract total cost. (2)

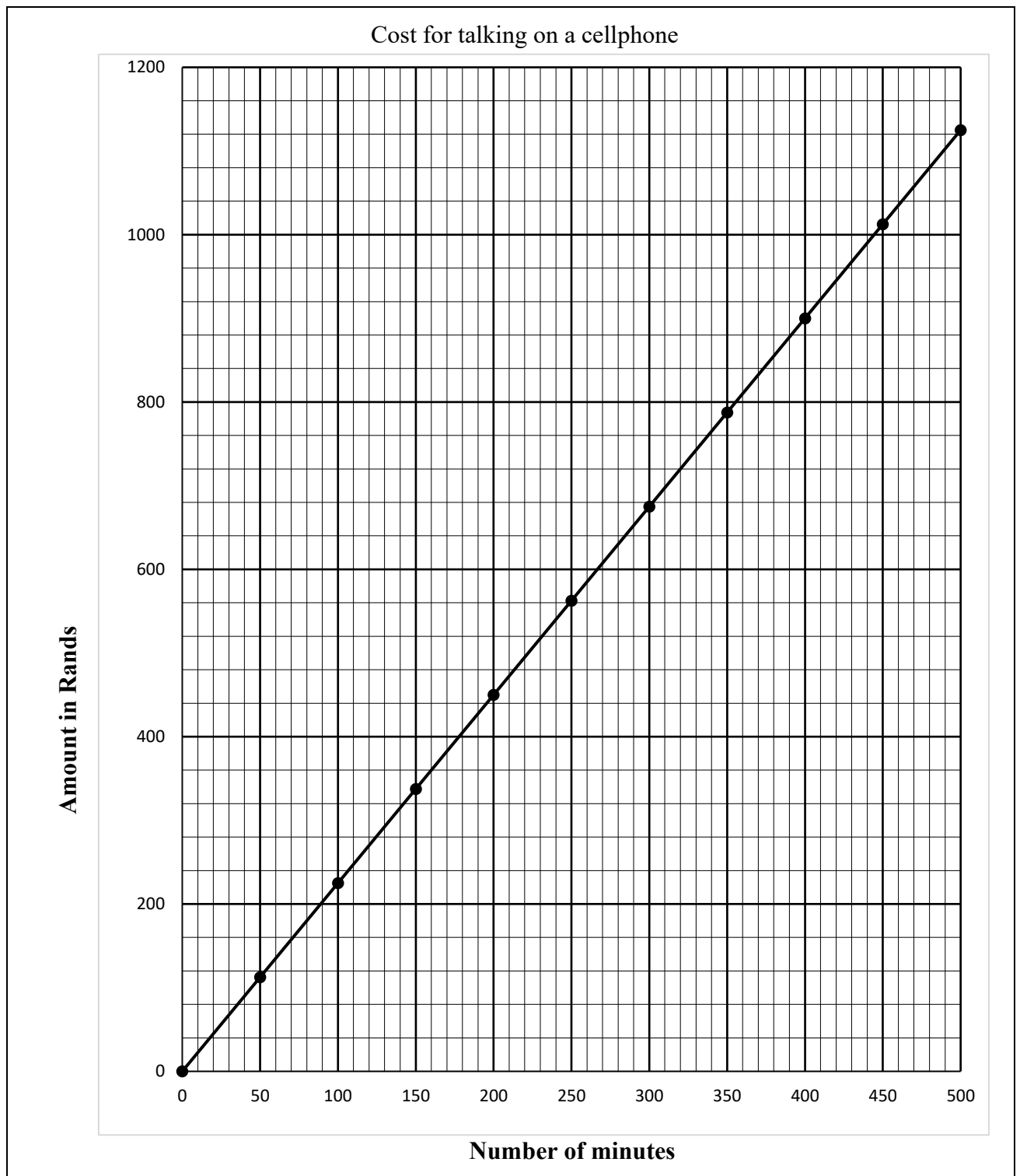
(b) B, the number of minutes per month. (2)

(c) C, prepaid total cost. (2)

- 1.3 The prepaid graph has already been drawn on the attached ANSWER SHEET.

Use the information from Table 2 to draw on the same set of axes a graph representing the contract cost. (3)

ANSWER SHEET
QUESTION 2.2.3



ACTIVITY 4: Tariff Systems

(13 marks: 15 minutes)



- 1.1 Mr. Sethole is a resident at Mangaung Metropolitan (Metro) Municipality. The municipality uses the tariff table below to calculate the cost for water usage by customers.

TABLE 2: MANGAUNG METRO MUNICIPALITY WATER TARIFFS

Block	Tariff Structure	Tariff R/kℓ 2022/23	Tariff R/kℓ 2023/24
1	0 – 6 kℓ	10,86	11,40
2	7 – 15 kℓ	26,30	28,14
3	16 – 30 kℓ	29,84	32,23
4	31 – 60 kℓ	36,41	39,69
5	61 or more kℓ	43,58	48,37

[Source: adapted from www.mangaung.co.za]

Note:

- Tariffs above are excluding VAT at 15%.
- Charges are calculated monthly.

Use the information above and TABLE 2 to answer the questions that follow.

- 1.1.1 Determine the maximum kℓ that can be charged in Block 2. (2)
- 1.1.2 Mr. Sethole claimed that he will pay R814,68 for using 27 kℓ of water using the 2023/24 tariffs. (7)
- Verify, with calculations, whether his claim is valid.
- 1.1.3 Calculate the percentage increase for Block 4 tariff from 2022/23 to 2023/24. (4)

ACTIVITY 4: Tariff Systems

(15 marks: 20 minutes)



1.1 Mr. van Wyk will participate in the Two Oceans marathon.

He stays in Blouberg and will have to travel to the Greenpoint stadium daily for the 5 days before the race for training.

The stadium is 20 km from where he stays.

He is considering the travelling options indicated in the table below.

TABLE 3: COST OF UBER AND MyCiTi BUS.

Company	Tariff	
Uber	Initial fee	R6,40
	Cost per km	R9,50
MyCiTi bus	A day fare of R88	

Use the information above to answer the questions that follow.

1.1.1 Define the term *tariff* within this given context. (2)

1.1.2 Write down a formula to calculate the cost when taking an uber in the following format:

Cost of Uber = (2)

1.1.3 Mr. van Wyk states that he will save more than R1 500 during the week if he uses the MyCiTi bus.

Verify his statement by showing the necessary calculations. (9)

1.1.4 Give one possible reason why Mr. van Wyk would still choose an Uber despite the cost. (2)

ACTIVITY 5: Tariff Systems

(20 marks: 25 minutes)



- 1.1 The table below indicates the tariffs for Emfuleni Local Municipality for 2017/18

Emfuleni Local Municipality		
Household (all tariffs are VAT exclusive)		
Block 1	0 - 50 KWh	R0,8375 per KWh
Block 2	51 - 350 KWh	R0,9440 per KWh
Block 3	351 - 600 KWh	R1,2629 per KWh
Block 4	Over 600KWh	R1,5156 per KWh

Use the information above to answer the questions that follow.

- 1.1.1 How much will Thabo pay for 350 KWh of electricity? (5)

- 1.1.2 If VAT is charged at 15%, how much will Thabo pay in total? (2)

- 1.2 Marisel stays in Bethlehem (Dihlabeng Municipality) and she uses pre-paid electricity. The tariffs for pre-paid electricity in Dihlabeng Municipality are:

<i>Prepaid electricity (Including VAT)</i>	
Domestic (kWh)	Cost per kWh (R)
0 - 50	0,7986
51 - 350	1,0755
351 - 600	1,4356
> 600	1,5735

Use the information above to answer the questions that follow.

- 1.2.1 Show that the cost for 45 kWh of electricity is R35, 94. (2)

- 1.2.2 Calculate the cost of Marisel's electricity if she uses 240 kWh of electricity during a particular month. (5)

- 1.3 After looking at the crime statistics Mr Duze is considering installing electrical fencing around his property.

According to his municipality's website electricity usage is calculated as indicated in Table 9 below.

TABLE 9: ELECTRICITY TARIFFS FOR 2023

For total kWh purchased per calendar month, per kWh	c/kWh
Block 1 (0 to 100 kWh)	209,70
Block 2 (More than 100 to 400kWh)	245,41
Block 3 (More than 400 to 650 kWh)	267,38
Block 4 (More than 650 kWh)	288,24

[Adapted from tshwane.gov.za]

Please note: Electricity in Tshwane is calculated on a fixed rate according to the block that the usage falls into.

Use the information in TABLE 9 above to answer the following question:

Mr Duze's neighbour told him that after he installed electrical fencing his average monthly electricity usage increased from 600kWh to 900kWh. Use the Tariff table above to calculate the potential increase (in Rand) in the cost of his electricity bill if he installs electric fencing.

(6)

Taxation

Things that a learner must know

1. VAT

- VAT stands for VALUE ADDED TAX
- Calculating 15% VAT of the price
- Calculating the price excluding VAT

2. UIF

- UIF stands for unemployment insurance fund
- Calculating 1% of the gross income
- Know that UIF is 2%, 1% employer contribution and 1% employee contribution

3. Personal Income Tax

- Definition of terms

Gross Income	An individual or company's income before taxes and deductions.
Taxable Income	Gross income – Tax deductible expenses
Tax Threshold	Is the income level at which a person begins paying income taxes
Tax Rebate	is form of discount that you get when you pay tax
Medical Tax Credit (MTC)	is a rebate which reduces the normal tax a person pays.

- Calculating
 1. Annual Taxable Income
 2. Annual tax payable
 3. Monthly taxable income

TAX TABLE

TAX TABLE FOR THE 2025/26 FINANCIAL YEAR

	TAXABLE INCOME	TAX RATE (IN RANDS)
1	1 – 237 100	18% of taxable income
2	237 101 – 370 500	42 678 + 26% of taxable income above 237 100
3	370 501 – 512 800	77 362 + 31% of taxable income above 370 500
4	512 801 – 673 000	121 475 + 36% of taxable income above 512 800
5	673 001 – 857 900	179 147 + 39% of taxable income above 673 000
6	857 901 – 1 817 000	251 258 + 41% of taxable income above 857 900
7	1 817 001 and above	644 489 + 45% of taxable income above 1 817 000

A person earning an annual taxable income of R456 789 will fall in tax bracket number 3

TAX REBATES	
Primary	R17 235
Secondary (65 years and older)	R9 444
Tertiary (75 years and older)	R3 145

1. **Primary:** R 17 235 - Everyone receives this rebate
2. **Secondary:** R 9 444 Persons 65 and older (in addition to primary rebate)
3. **Tertiary:** R 3 145 Persons 75 and older (in addition to primary and secondary)

Tax Thresholds	
Persons Under 65	R78 150
Persons 65 and older	R121 000
Persons 75 and older	R135 300

MEDICAL TAX CREDITS	
PER MONTH	2025/2026
Main member with no additional dependants	R364
First dependant	R364
For each additional dependant	R246

A person who is on medical aid with his four family members will receive the following MTC

$$\text{MTC} = \text{R364} + \text{R364}$$

$$= \text{R728 (For the first two)}$$

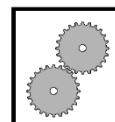
$$\text{MTC} = \text{R246} + \text{R246} + \text{R246}$$

$$= \text{R738}$$

$$\text{Total} = \text{R728} + \text{R738}$$

$$= \text{R1 466}$$

Worked Example



- 1.1 Mr Thuso is a 67-year-old businessman. He receives a monthly salary of R46 750 and has a monthly pension contribution of R3 506,25. He is a member of a medical scheme and pays for himself and his child. Table 2 below shows the tax table for the 2024/25 tax year.

TABLE 2: TAX RATES FOR 2024/25 TAX YEAR

RATES APPLICABLE TO INDIVIDUALS		
Taxable income(R)	Rates of tax(R)	
1 – 216 200	18% taxable income	
216 201 – 337 800	38 918 + 26% of taxable income above 216 200	
337 801 – 467 500	70 532 + 31% of taxable income above 337 800	
467 501 – 613 600	110 739 + 36% of taxable income above 467 500	
613 601 – 782 200	168 335 + 39% of taxable income above 613 600	
782 201 – 1 656 600	229 089 + 41% of taxable income above 782 200	
1 656 601 and above	587 593 + 45% of taxable income above 1 656 600	
Age Category	Rebates(R)	Tax threshold (R)
Below age of 65	17 235	95 750
Age 65 to below 75	9 444	148 216
Age 75 and older	3 145	165 689
MEDICAL TAX CREDITS		
CRITERIA	AMOUNT PER MONTH(R)	
Taxpayer	364	
Taxpayer + 1 st dependant	728	
Additional dependants	246	

Use TABLE 2 and the information above to answer the questions that follow.

- 1.1.1 Write down the name of the government institution that is responsible for collecting income tax in South Africa. (2)

SARS/ South African Revenue Services

- 1.1.2 Show by means of calculation that a person who earns an annual taxable income of R95 750 and is under the age of 65 years, is not liable to pay tax. (3)

$$\begin{aligned}
 \text{Tax payable} &= \text{R}95\,750 \times \frac{18}{100} \\
 &= \text{R}17\,235 - \text{R}17\,235 \\
 &= \text{R}0
 \end{aligned}$$

- 1.1.3 Calculate Mr Thuso's annual taxable income (4)

$$\text{Monthly taxable income} = \text{R}46\,750 - \text{R}3\,506,25$$

$$= \text{R}43\,243,75$$

$$\text{Annual taxable income} = \text{R}43\,243,75 \times 12$$

$$= \text{R}518\,925$$

1.1.4 Mr Serwalo claims that the monthly tax that he has to pay is less than R7 800.

Verify by means of calculations whether his claim is valid. (8)

Annual tax

$$= \text{R}110\,739 + 36\% \text{ of taxable income above R}467\,500$$

$$= \text{R}110\,739 + \frac{36}{100} (\text{R}518\,925 - \text{R}467\,500)$$

$$= \text{R}110\,739 + \frac{36}{100} \times \text{R}51\,425$$

$$= \text{R}110\,739 + \text{R}18\,513$$

$$= \text{R}129\,252 - \text{R}17\,235 - \text{R}9\,444$$

$$= \text{R}102\,573 - (\text{R}728 \times 12)$$

$$= \text{R}93\,837$$

$$\text{Monthly tax} = \frac{\text{R}93\,837}{12}$$

$$= \text{R}7\,819,75$$

The claim is not valid

ACTIVITY 1: Personal Income Tax

(20 marks: 25 minutes)



- 1.1 Mrs Swanepoel, a 72-year-old Minister at the department of Basic Education earns an annual income of R2 475 566, 00. She contributes 7,5% to a Government Employee Pension Fund (GEPPF) and donates R20 000 per month to a charity organisation.

She is a member of a medical aid scheme and contributes to a medical aid for herself, husband and four grandchildren.

Table 1 on ANNEXURE A shows the tax table for the 2024/2025 tax year.

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

- 1.1.1 Write the annual income in words. (2)
- 1.1.2 Identify the non-taxable income. (2)
- 1.1.3 Calculate the minister's annual taxable income. (4)
- 1.1.4 Show by means of calculations how the annual medical tax credit value of R20 544 was calculated. (3)
- 1.1.5 Mrs Swanepoel claims that she is paying an annual tax of more than R900 000. Verify, showing ALL calculations, whether her claim is valid. (7)
- 1.1.6 Give a reason why people who are aged 75 years and older pay less tax than people younger than 75 years but earning the same taxable income (2)

ANNEXURE A

Table 1: Tax rates for 2024/2025 tax year

Taxable income (R)	Rates of tax (R)
1-237 100	18% of taxable income
237 101-370 500	42 678 + 26% of taxable income above 237 100
370 501- 512 800	77 362 +31% of taxable income above 370 500
512 801- 673 000	121 475 + 36% of taxable income above 512 800
673 001 – 857 900	179 147 +39% of taxable income above 673 000
857 901- 1 817 000	251 258 +41% of taxable income above 857 900
1 817 001 and above	644 489 + 45% Of taxable income above 1 817 000

Rebate	Rebate amount (R)
Primary	R17 235
Secondary (65 and older)	R9 444
Tertiary (75 and older)	R3145

Age	Threshold 2024/2025
Under 65	R95 750
65 and older	R148 217
75 and older	R165 689

MTC (Medical Tax Credit)	Per month
Main member	R364
Main member + 1 st dependant	728
Each additional dependant	R246

[source: www.sars.gov.za]

ACTIVITY 2: Personal Income Tax

(20 marks: 25 minutes)



- 1.1 Mr Mathews is a 65-year-old employee who earns a basic salary of R40 165 per month. He contributes 7,5% of his basic salary towards pension fund and pays medical aid for himself and his 3 children.

TABLE 4.1: Tax rates for 2023/2024 tax year

Taxable Income (R)	Rate of Tax (R)
1 – 237 100	18% of taxable income
237 101 – 370 500	42 678 + 26% of taxable income above 237 100
370 501 – 512 800	77 362 + 31% of taxable income above 370 500
512 801 – 673 000	121 475 + 36% of taxable income above 512 800
673 001 – 857 900	179 147 + 39% of taxable income above 673 000
857 901 – 1 817 000	251 258 + 41% of taxable income above 875 900
1 817 001 and above	644 489 + 45% of taxable income above 1 817 000

Age	Threshold 2023/2024
Below age 65 years	R95 750
Age 65 years to below 75 years	R148 217
Age 75 years and over	R165 689

Rebate	Rebate Amount (R)
Primary	R17 235
Secondary (65 years +)	R9 444
Tertiary (75 years +)	R3 145

MTC (Medical tax credit)	Per month
Taxpayer	R364
First dependant	R364
Each additional dependant	R246

[Source: www.sars.gov.za]

Use TABLE 4.1 and the information above to answer the questions that follow.

- 1.1.1 Write down the abbreviation SARS in full. (2)
- 1.1.2 Show how the tax threshold value of R148 217 was calculated. (3)
- 1.1.3 Determine his annual medical tax credit for him and his 3 children. (4)
- 1.1.4 Mr Mathews claimed that his annual taxable income is R445 831,50. Verify, show all calculations, if his claim is correct. (5)
- 1.1.5 Hence, calculate his annual income tax. (6)

ACTIVITY 3: Personal Income Tax

(14 marks: 15 minutes)



- 1.1 Mr Yusuf is a 38-year-old quantity surveyor at Arrow Quantity Surveyors. He earns a gross monthly salary of R45 000. He contributes 7,5% of his salary to a pension fund and pays R3 200 per month for medical aid, which covers him and three dependants.

Use the tax table in ANNEXURE A to answer the questions that follow.

- 1.1.1 What does the abbreviation SARS stand for? (2)
- 1.1.2 Calculate Mr Yusuf's annual taxable income (4)
- 1.1.3 Determine his annual medical tax credit. (3)
- 1.1.4 Hence, calculate the annual income tax he had to pay for the 2024/2025 tax year. (5)

ANNEXURE A

TABLE 2: 2024/2025 TAX YEAR (1 March 2024 – 28 February 2025)

	ANNUAL TAXABLE INCOME (R)	RATES OF TAX (R)
A	1 – 237 100	18% of taxable income
B	237 101 – 370 500	42 678 + 26% of taxable income above 237 100
C	370 501 – 512 800	77 362 + 31% of taxable income above 370 500
D	512 801 – 673 000	121 475 + 36% of taxable income above 512 800
E	673 001 – 857 900	179 147 + 39% of taxable income above 673 000
F	857 901 – 1 817 000	251 258 + 41% of taxable income above 857 900
G	1 817 001 and above	644 489 + 45% of taxable income above 1 817 000

TAX REBATE	TAX YEAR
	2024/2025
Primary	R 17 235
Secondary (65 years and older)	R 9 444
Tertiary (75 years and older)	R 3 145

Medical Monthly Tax Credit	
For the tax payer and one dependant	R 728
For each additional dependant	R 246

[Adapted from www.sars.gov.za]

ACTIVITY 4: Personal Income Tax

(11 marks: 15 minutes)



- 1.1 Mr Itonga is a 33-year-old man who earns an annual taxable salary of R227 600. He also receives a taxable performance bonus that is equal to one-and-a-half times his monthly taxable salary.

He contributes towards a medical aid for himself and has no non-taxable deductions. He finds the table below to calculate his annual income tax.

TABLE 4: TAX TABLE FOR THE 2025/26 FINANCIAL YEAR

TAX BRAC-KET	TAXABLE INCOME	TAX RATE (IN RANDS)
1	1 – 237 100	18% of taxable income
2	237 101 – 370 500	42 678 + 26% of taxable income above 237 100
3	370 501 – 512 800	77 362 + 31% of taxable income above 370 500
4	512 801 – 673 000	121 475 + 36% of taxable income above 512 800
5	673 001 – 857 900	179 147 + 39% of taxable income above 673 000
6	857 901 – 1 817 000	251 258 + 41% of taxable income above 857 900
7	1 817 001 and above	644 489 + 45% of taxable income above 1 817 000

TAX REBATES

Primary	R17 235
Secondary (65 years and older)	R9 444
Tertiary (75 years and older)	R3 145

MEDICAL TAX CREDITS

PER MONTH	2025/2026
Main member with no additional dependants	R364
First dependant	R364
For each additional dependant	R246

Use the information above to answer the questions that follow.

- 1.1 Calculate Mr Itonga's performance bonus. (3)
- 1.2 Calculate Mr Itonga's income tax payable for the 2025/2026 financial year. (8)

ACTIVITY 5: Personal Income Tax

(12 marks: 15 minutes)



- 1.1 Mr. van Wyk is a 66-year-old events manager and earns a gross salary of R369 600 per annum. He also receives a thirteenth cheque of the same value as one month's salary. He finds the table below to calculate his annual income tax.

TABLE 2: TAX TABLE FOR THE 2023/24 FINANCIAL YEAR

TAX BRACKET	TAXABLE INCOME	TAX RATE (IN RANDS)
1	1 – 237 100	18% of taxable income
2	237 101 – 370 500	42 678 + 26% of taxable income above 237 100
3	370 501 – 512 800	77 362 + 31% of taxable income above 370 500
4	512 801 – 673 000	121 475 + 36% of taxable income above 512 800
5	673 001 – 857 900	179 147 + 39% of taxable income above 673 000
6	857 901 – 1 817 000	251 258 + 41% of taxable income above 857 900
7	1 817 001 and above	644 489 + 45% of taxable income above 1 817 000

TAX REBATES	
Primary	R17 235
Secondary (65 years and older)	R9 444
Tertiary (75 years and older)	R3 145

[Source:sars.co.za]

PLEASE NOTE: A thirteenth cheque is a bonus of the same amount as a gross monthly salary.

Use the information above to answer the questions that follow.

- 1.1.1 Name the government institution responsible for the collection of personal income tax. (2)
- 1.1.2 Calculate Mr. van Wyk's total income for the 2023/2024 financial year. (3)
- 1.1.3 Calculate Mr. van Wyk's income tax payable for the 2023/2024 financial year. (7)

ACTIVITY 6: Personal Income Tax

(21 marks: 25 minutes)



- 1.1 Mr Tshabalala is a 32-year-old man that works for Box Fashion. He oversees the packaging of the boxes that must be distributed to customers. He receives a monthly gross income of R 32 542,80. He contributes 7,5% towards his pension fund. Mr Tshabalala is married and has 4 children. He contributes towards a medical aid for himself and his family.

Refer to ANNEXURE B, Annual income tax deductions for individuals and special trusts.

- 1.1.1 Calculate Mr Tshabalala's annual taxable income. (5)
- 1.1.2 Calculate Mr Tshabalala's medical tax credit for the 2024 financial tax year. (3)
- 1.1.3 Calculate Mr Tshabalala's monthly tax contribution. (7)
- 1.1.4 Mr Tshabalala's mother is 65 years old and earns a taxable income of R10 321 per month. Mr Tshabalala claims that his mother is earning below the tax threshold for 2024, thus she is not supposed to contribute towards personal income tax.
- Verify, showing ALL calculations, whether his statement is valid. (3)
- 1.1.5 Show how the fixed amount of R179 147 in tax bracket 5 was calculated. (3)

ANNEXURE B

2023/2024 Annual income tax deductions for individuals and special trusts

Taxable income (R)	Rates of tax (R)
1 – 237 100	18% of taxable income
237 101 – 370 500	42 678 + 26% of taxable income above 237 100
370 501 – 512 800	77 362 + 31% of taxable income above 370 500
512 801 – 673 000	121 475 + 36% of taxable income above 512 800
673 001 – 857 900	179 147 + 39% of taxable income above 673 000
857 901 – 1 817 000	251 258 + 41% of taxable income above 857 900
1 817 001 and above	644 489 + 45% of taxable income above 1 817 000

Tax Rebate	Tax year		
	2024	2023	2022
Primary	R17 235	R16 425	R15 714
Secondary (65 and older)	R9 444	R9 000	R8 613
Tertiary (75 and older)	R3 145	R2 997	R2 871

Tax Thresholds	Tax year		
	2024	2023	2022
Under 65	R95 750	R91 250	R87 300
65 and older	R148 217	R141 250	R135 150
75 and older	R165 689	R157 900	R151 100

Medical Tax Credit Per month (R)	Tax year		
	2024	2023	2022
For the taxpayer	R728	R694	R664
For the first dependant	R728	R694	R664
For each additional dependant	R246	R234	R224

[Source: Adapted from <https://www.SARS.gov.za>]

ACTIVITY 7: Personal Income Tax

(23 marks: 25 minutes)



- 1.1 Mr. Naidoo is an educator and will be turning 65 in January 2025. Given his years of service in the profession, he expects his retirement fund to be R3 240 000. The following tax rule applies to retirement funds.

- At retirement **ONE THIRD** of the lump sum retirement benefit is tax free.

Given below are the 2024/2025 retirement tax tables.

TABLE 4: LUMP SUM RETIREMENT BENEFIT TAX TABLE 2024/2025

Taxable Portion of Lump Sum	Rates of Tax
R1 – R550 000	Nil
R550 001 – R770 000	18% of the amount over R550 000
R770 001 – R1 155 000	R39 600 + 27% of the amount over R770 000
R1 155 001 +	R143 550 + 36% of the amount over R1 155 000

Use the information above to answer the questions that follow.

- 1.1.1 Calculate the portion of Mr. Naidoo's lump sum retirement benefit that is tax free. (2)
- 1.1.2 Show that R143 550 for rates of tax on TABLE 4 is correct. (3)
- 1.1.3 Calculate the amount of tax that will be deducted from Mr Naidoo's retirement lump sum benefit (5)

- 1.2 Dante Salvador is 71 years of age. He is registered with SARS and pays his annual tax promptly. He is married and lives with his wife.

He still contributes towards a medical aid, which covers him and his wife.

ANNEXURE E represents the tax tables for the year 2023/2024.

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

- 1.2.1 Determine Dante's annual medical tax credit amount. (3)
- 1.2.2 Calculate the tax rebate amount that will be deducted from Dante's annual tax. (3)
- 1.2.3 TABLE 6 on ANNEXURE E show the tax table and rebates for the year 2023/2024. Dante receives a taxable income of R35 750 per month. (7)
- Calculate the monthly amount that Dante will contribute towards tax.

ANNEXURE E

**TABLE 6: INCOME TAX OF INDIVIDUALS AND TRUSTS FOR
(YEAR ENDING 28 February 2024)**

Tax Bracket	Taxable Income (in Rand)	Rate of Tax (in Rand)
1	0 – 237 100	18% of taxable income
2	237 101 – 370 500	42 678 + 26% of taxable income above 237 100
3	370 501 – 512 800	77 362 + 31% of taxable income above 370 500
4	512 801 – 673 000	121 475 + 36% of taxable income above 512 800
5	673 001 – 857 900	179 147 + 39% of taxable income above 673 000
6	857 901 – 1 817 000	251 258 + 41% of taxable income above 857 900
7	1 817 001 and above	644 489 + 45% of taxable income above 1 817 000

Tax rebate type	2023/2024
Primary (All individuals)	R17 235
Secondary (Age 65 to below 75)	R9 444
Tertiary (Age 75 and older)	R3 145

Tax thresholds	2023/2024
Below age 65	R95 750
Age 65 to below 75	R148 217
Age 75 and older	R165 689

Medical Aid ~ monthly tax credits	2023/2024
Main member	R364
First dependant	R364
Each additional member	R246

Data Handling

Stages of Data Handling

Stage	Statistical Process	Meaning
Stage 1	Developing a question or posing a problem	A question is posed regarding the problem and appropriate data sources are identified.
Stage 2	Collect data (information) related to the posed question	A data collection method and tool/technique are chosen and data is collected.
Stage 3	Classifying and Organising data	Process of organizing raw data, by classifying them into different categories.
Stage 4	Summarising Data	A large amount of data can be summarised using one or two numbers to represent all of it.
Stage 5	Representing Data	It is often very useful to represent the data visually. It can further quickly illustrate general behaviour or pattern of the data.
Stage 6	Analysing Data	Develop opposing arguments using the same summarised and/or represented data to conclude and bring about solutions to the posed question at stage 1.

Populations and Sample		
Concept	Definition	Worked Example
Population	Entire group or source of data involved in the research.	Identify the population and the sample from the question posed below: Question: <i>What percentage of Grade 12 learners in my school has cell phones?</i>
Sample	The small group chosen from the population to represent that population.	Answer: <u>Population:</u> All the learners at the school <u>Sample:</u> Grade 12 learners

The advantages and disadvantages of the data collection methods:

Methods	Example	Instrument	Advantages	Disadvantages
Observation	Watch someone or something closely and record the data you need on a data collection sheet.	Recording sheet	Easy to record information. Participants do not fill forms.	Time consuming for the observer. Reliant on accuracy of the observer.
Interview	Talk to someone face to face or over the telephone	Recording sheet and Questionnaire. The interviewer can clarify questions and make follow-ups.	Data is obtained immediately. Interviewee can be asked to clarify responses.	Time consuming and expensive. Difficult to target large audience.
Survey	Hand or send out a list of questions and obtain the data you need from the answers to those questions.	Questionnaire	Can be completed in convenient time. Many people can complete it simultaneously.	People can be dishonest. Questions can be vague or ambiguous.
Database	Class register, performance academic results, employee's personal information, etc.	Electronic device. (e.g., Computer)	Data can be retrieved quickly. It is often accurate, consistent, and reliable.	It can be expensive. Needs computer skills.

Classifying Data

Once the data has been collected, it can be classified as qualitative or quantitative, where qualitative data is **categorical** and quantitative is **numerical**.

Type of Data	Description	Examples
Categorical Data	<ul style="list-style-type: none"> It is descriptive in nature. Consists of words representing categories. Usually observed, not measured. 	<ul style="list-style-type: none"> Colour of the shoes Types of food Gender Names of the provinces in a country, etc.
Numerical Data	<ul style="list-style-type: none"> It is numerical. Consists of quantities. Can be further divided in two groups (<i>continuous and discrete</i>) <u>Continuous:</u> data which can be measured. <u>Discrete:</u> data which can be counted. 	<p>Continuous (measured):</p> <ul style="list-style-type: none"> Speed of the car Height of the building Mass of a cow Volume of the water <p>Discrete (counted):</p> <ul style="list-style-type: none"> Number of balls Number of calculators Quantity of money Number of water bottles

Measures of Central Tendency

There are three (3) types of measures of tendency namely:

- **Mean, Mode and Median**

These three (3) measures of tendency all reflect some aspect of the data values which is **representative** of the whole data set and further provides an indication of the “**middle**” or “**centre**” of the data.

Mean

- Commonly referred to as the “**average**”
- To calculate the **mean**, you add all the values of the data set and divide the sum by the total number of values in the data set.
- It can only be calculated if the data set is **numerical**.

$$\text{Mean} = \frac{\text{sum of all values in the data set}}{\text{total numbers of values in the data set}}$$

When to use the Mean, Median and Mode (Measures of Central Tendency)

- Now that all three measures of central tendency describe the “*middle*” value of a set of data, you need to know the most suitable measure amongst the three measures of central tendency.

Limitations of Measures of Central Tendency

Mean:

- This averages the total of the data by the number of pieces of data and is the most used measurement, but it is strongly affected by outliers.

Median:

- This is the most accurate measure of the centre of the data, but it can be very difficult to calculate with a large dataset.

Mode:

- This is often not a useful measure of the “average”. It is only useful when the data is categorical (*e.g., shoe size or cell phone brand*)

Analysis using Measures of Central Tendency

- Two sets of data can be compared by looking at their measures of central tendency (*mean, median and mode*), but they do not always give the complete picture or analysis. In Grade 12 a more and thorough analysis is required.

Advantages and Disadvantages of the Measures of Central Tendency

	Advantages	Disadvantages
Mean	<ul style="list-style-type: none">- Helpful when comparing two sets of data, e.g., <i>comparing test results of two different classes</i>.- Unique and it has only one answer.	<ul style="list-style-type: none">- It is affected by outliers.
Median	<ul style="list-style-type: none">- Useful when comparing sets of data.- Unique and it has only one answer.- Not affected by outliers as strongly as it is the case with mean.	<ul style="list-style-type: none">- The data needs to be arranged in ascending first.- The median is not always representative of the, especially when the data is not spread evenly about the median.
Mode	<ul style="list-style-type: none">- It is not affected by the outliers.	<ul style="list-style-type: none">- Not unique, answers maybe more than one.- In case of more than one mode, it is difficult to compare the data

Measures of Spread

There are four (4) measures of spread: range, quartiles, inter-quartile range and percentiles, 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.

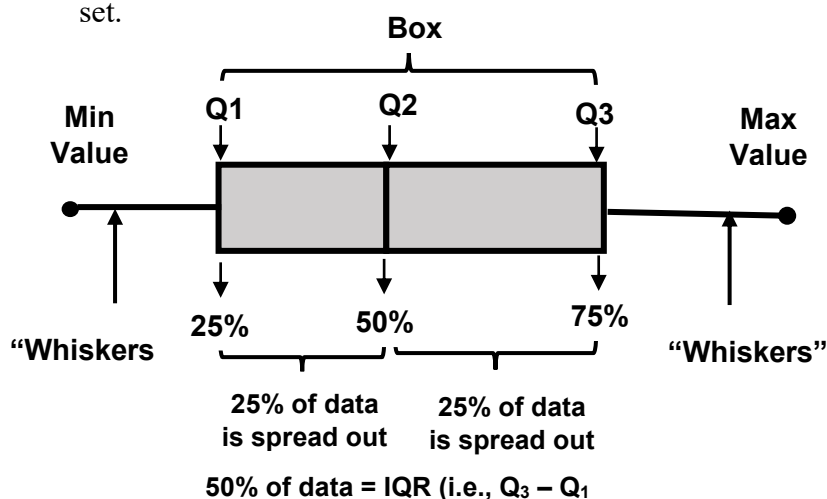
Interquartile Range (IQR)

- 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

Advantages and Disadvantages of the Measures of Spread

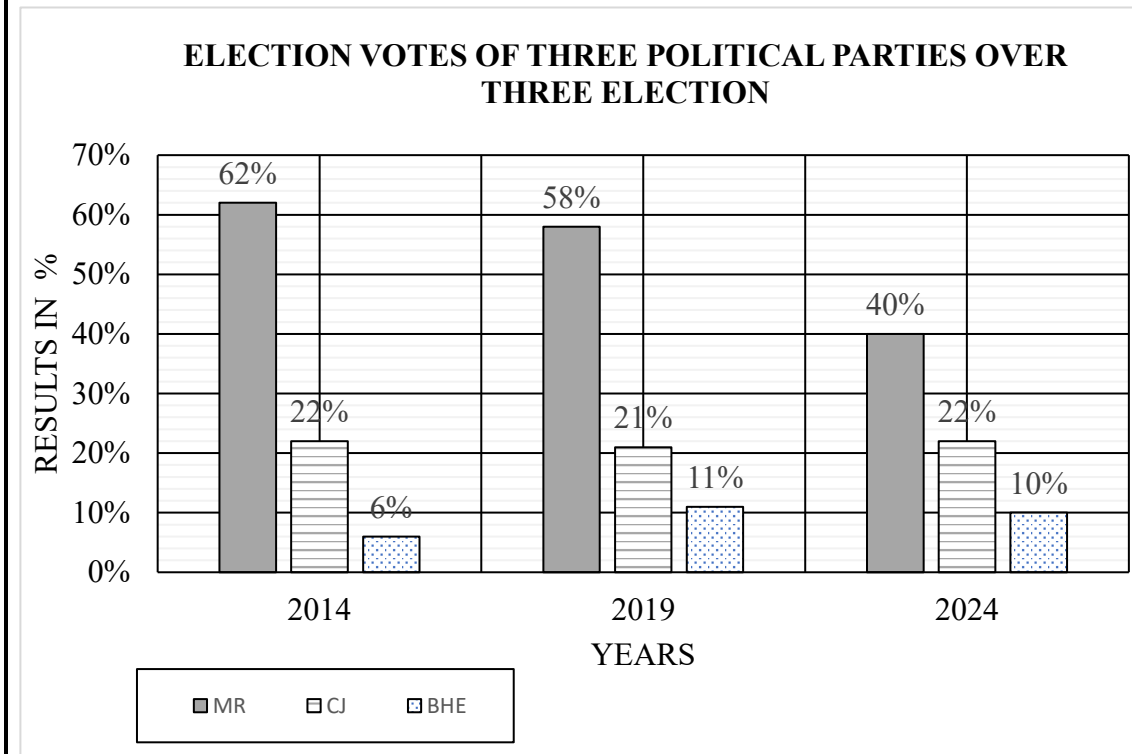
	Advantages	Disadvantages
Range	Quick and easy to calculate	Affected by outliers
Interquartile range	Gives you an indication of the spread of 50% of the data values. Not affected by outliers.	The data must be first arranged in ascending order. Time consuming to calculate, as you first need to determine Q_1 and Q_3 .

ACTIVITY 1: Data Handling

(19 marks: 20 minutes)



- 1.1 The graph below shows the votes (in %) for the national election of a certain country over a period of three (3) years.



Use the graph and the information above to answer the questions that follow.

- 1.1.1 Identify the type of graph drawn above. (2)
- 1.1.2 Write down the party that received the highest votes in 2019. (2)
- 1.1.3 Calculate the difference between the highest votes in 2014 and the highest votes in 2024. (3)

- 1.2 The enrolment of grade 12 Mathematical literacy learner across three circuits is shown on ANNEXURE B.

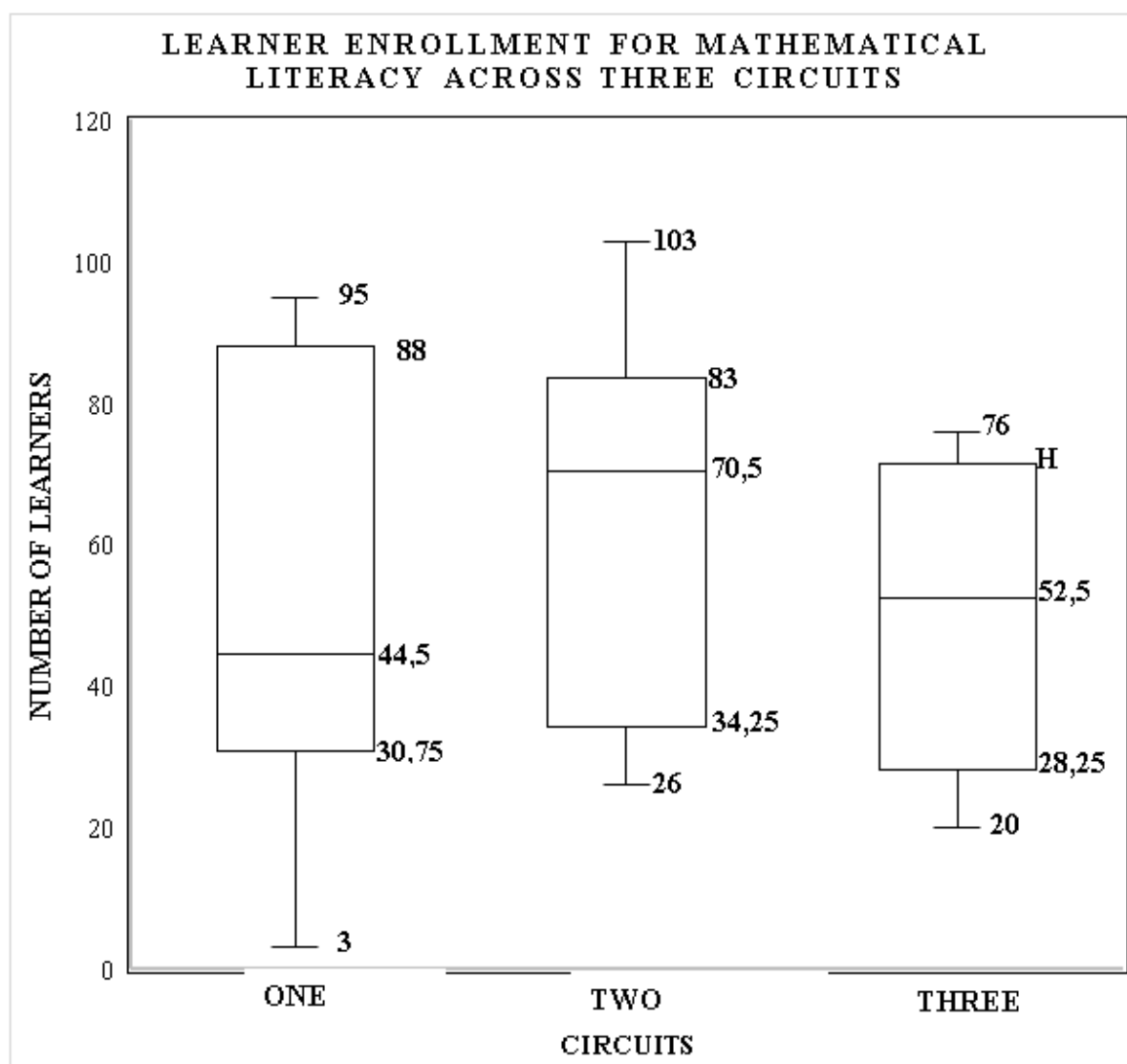
Use the information on ANNEXURE B to answer the questions that follow.

- 1.2.1 Write down the circuit with the highest learner enrolment. (2)
- 1.2.2 Identify the median number of learners for circuit 2. (2)
- 1.2.3 Determine the range of circuit 1. (3)
- 1.2.3 The director of the three circuits announced to the media that if the inter quartile range for the learner enrolment in circuit 3 is 43,25 then Q3 will be more than 70. Verify, showing all calculations, whether the statement is correct.

You may use the formula:

$$\text{IQR} = \text{Q3} - \text{Q1} \quad (5)$$

ANNEXURE B



ACTIVITY 2: Data Handling

(30 marks: 35 minutes)



- 1.1 Virginia Health and Fitness Centre gives Spinning organized classes by three different instructors, Mpho, Andrea and Eve.

PICTURE OF A PERSON ON A SPINNING BICYCLE



[Source: <https://m.media-amazon.com>]

- **Mpho:** The evening group
- **Andrea:** A day group with 20 registered participants and
- **Eve:** The morning group has 8 registered participants.

ANNEXURE A shows the attendance records for the three groups over 18 days, as well as corresponding graphs representing the attendance for Mpho and Andrea's groups.

Note: The spinning studio may also be accessed by non-group or any member of the fitness centre beyond organised classes with no instructor leading spinning.

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

- 1.1.1 State the best tool to collect respective data for attendance for the spinning groups. (2)
- 1.1.2 Determine the missing value, R, if the mean attendance for Mpho's group is 16. (4)
- 1.1.3 Determine for Andrea's group the:
- (a) Median (3)
 - (b) Interquartile range (3)
- 1.1.4 Give ONE possible reason why Eve's group has full attendance on more days than Andrea's. (2)
- 1.1.5 Give ONE reason why on the box and whisker diagrams the attendance of Andrea's group only shows a lower whisker. (2)

- 1.2 The table below shows the number of children per province (in '000) living in the Republic of South Africa (RSA) in 2020 and 2021. Some values have been omitted.

TABLE 2: NUMBER OF CHILDREN IN RSA PER PROVINCE, 2020 and 2021

PROVINCE	Number of children (in thousands)		
	2020	2021	Percentage change
GP	A	4 417	– 4,08
WC	...	2 092	– 2,92
NW	...	1 439	– 0,96
LP	2 492	2 472	– 0,80
EC	2 569	2 554	– 0,58
KZN	4 300	4 302	0,05
NC	437	440	0,69
MP	1 710	1 722	0,70
FS	1 027	1 057	2,92
TOTAL	20 748	20 495	

[Adapted from www.childrencount.uct.ac.za]

NOTE

- The estimated population of RSA in 2021 is 60,14 million and children account for 34%.
- Children: a person under the age of 18.

Use the information above to answer the questions that follow:

- 1.2.1 Write down the province with the third-highest number of children in 2021. (2)
- 1.2.2 State whether the above provinces' percentage change for the number of children is arranged in *descending* or *ascending* order. {2}
- 1.2.3 Show with detailed calculation how the percentage change of 0,69% for NC was determined. (2)
- 1.2.4 Calculate the value of A, the number of children in GP in 2020 (4)
- 1.2.5 Determine, in millions, the difference between the number of children as shown in the table and the estimated population in 2021. (4)

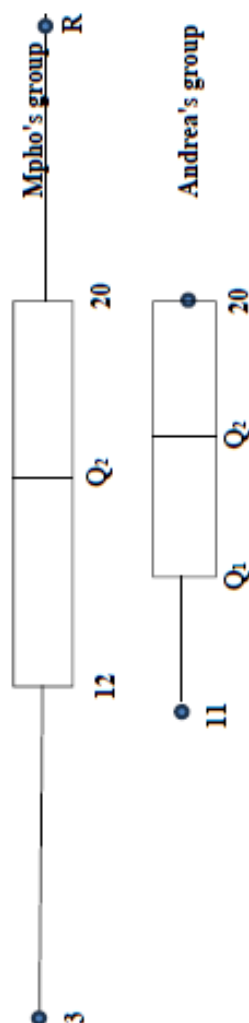
ANNEXURE A

RECORDS OF ATTENDANCE FOR THREE GROUPS OVER A PERIOD OF 18 DAYS (D1-D18)

Mpho's group																	
D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18
20	R	9	10	12	3	15	15	14	8	R	17	19	20	17	17	20	R
Andrea's group																	
D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18
12	20	14	20	16	15	19	20	18	20	19	15	20	11	18	12	20	19
Eve's group																	
D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18
7	8	8	6	8	6	7	8	8	6	6	7	8	8	8	8	7	8

[Adapted from www.emorycommunityswimming.com/]

BOX AND WHISKER DIAGRAMS REPRESENTING ATTENDANCE FOR MPHO and ANDREA GROUPS OVER 18 DAYS



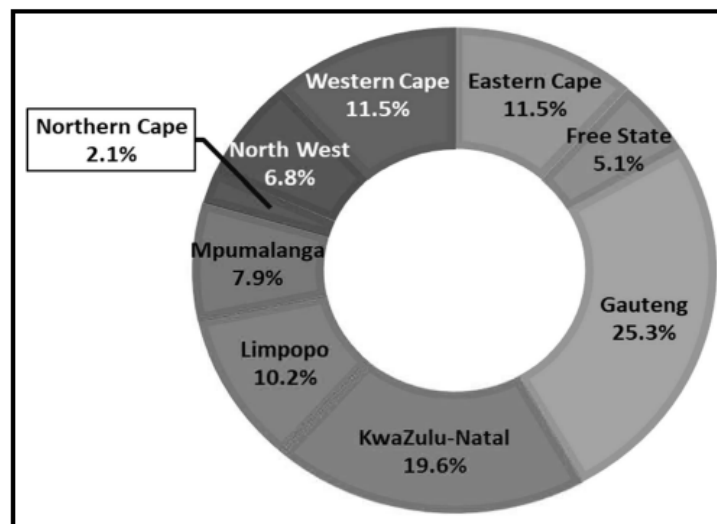
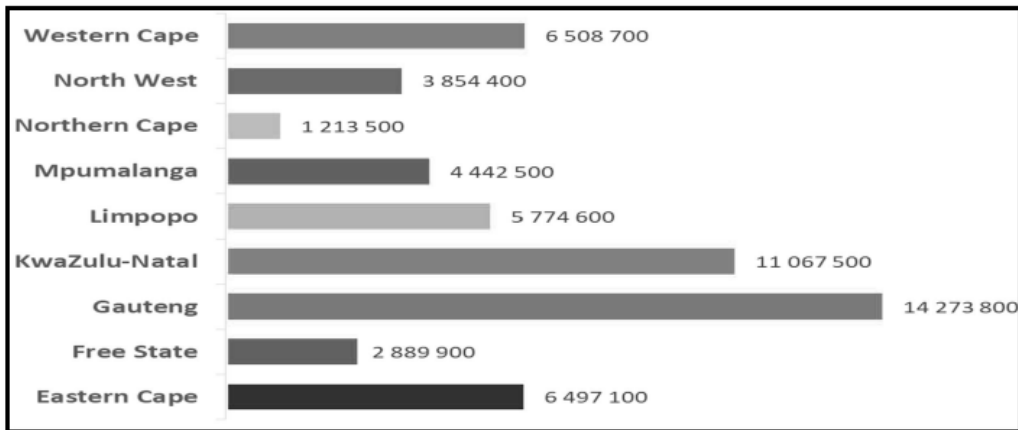
ACTIVITY 3: Data Handling

(25 marks: 30 minutes)



1.1 Study the information below and answer questions that follow.

The population of South Africa's nine provinces



[Source: <https://southafrica-info.com/infographics/infographic-population-south-africas-nine-provinces/>]

- 1.1.1 Identify the province with the largest population. (2)
- 1.1.2 Show that the total population of South Africa is 56 522 000. (2)
- 1.1.3 Show how the population percentage for Mpumalanga was calculated. (3)
- 1.1.4 Neesah looked at the percentages and stated that there are two provinces with the same percentages, but with a different number of people for the provinces in terms of their population. Identify the TWO provinces and determine the population difference. Explain why the percentages can be the same but the population numbers are different.

- 1.2 The following two tables show the results for Grade 12 learners for their June Examination in Mathematical Literacy (Paper 1). Study the tables and answer the questions that follow. The results are given as a total out of 100.

Table 4: Class A

34	84	22	34	65	49	33	37	45	56
32	69	52	43	34	48	88	92	35	46
72	75	26	38	42	34	83	79	30	28

Table 5: Class B

24	46	85	32	30	67	51	89	73	44
26	21	66	49	A	54	36	92	20	48
33	39	43	31	25	69	78	81	18	60

- 1.2.1 Is this an example of DISCRETE or CONTINUOUS data? (2)
- 1.2.2 Determine the median for Class A. (3)
- 1.2.3 Calculate the value of A for Class B if the mean is 48,53. (4)
- 1.3 In a kickboxing class the learners were measured, and their heights (in metres) were recorded as follows:

Table 6: Height (in m)

1,44	1,85	1,62	1,48	1,23
0,88	1,38	1,82	2,04	0,82
1,75				

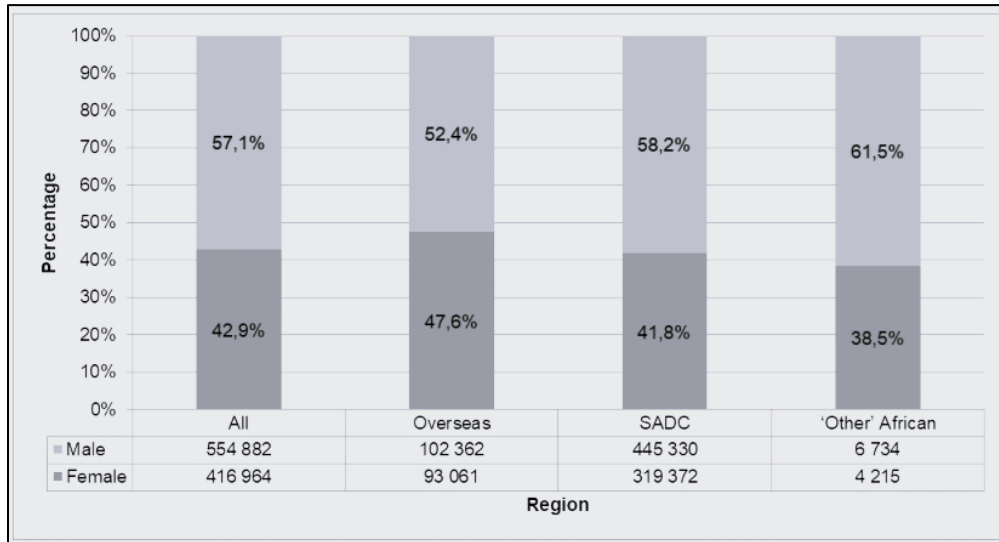
- Bruce Lee stated that the range height for this set of data is more than double the height of the shortest learner. Show, by means of calculations, whether his statement is correct. (5)

ACTIVITY 3: Data Handling

(26 marks: 30 minutes)



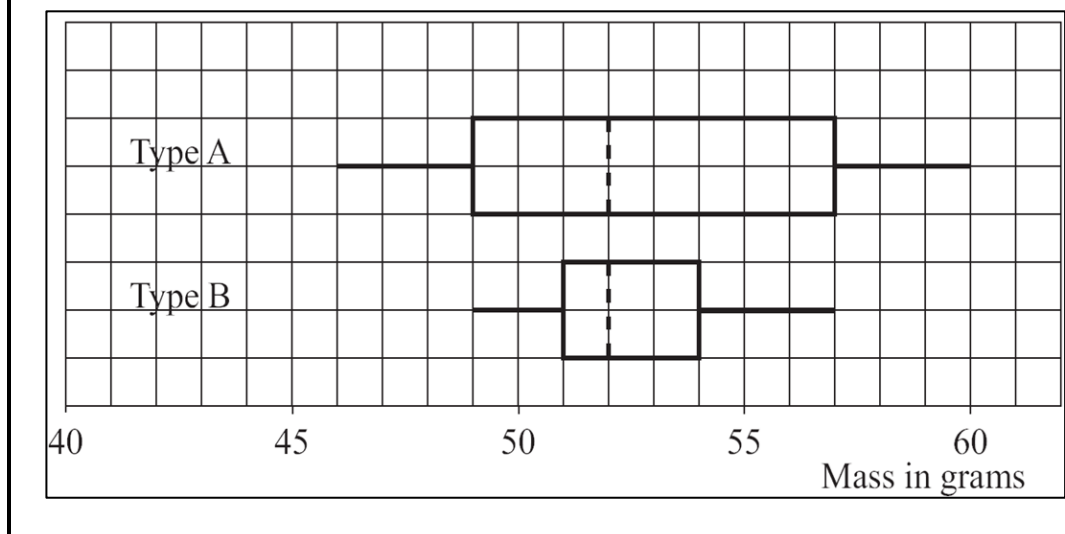
- 1.1 Tourism has always contributed a lot to the economy of South Africa. At the end of 2023 the total contribution was R268 billion (4,3% of total economy). The graph below shows the percentage distribution of tourists by region of residence and gender for January 2024.



Use the graph above to answer the questions that follow.

- 1.1.1 Name the type of graph shown above. (2)
- 1.1.2 Write down the gender that contributed the majority of tourists for all three regions (2)
- 1.1.3 Calculate the mean percentage of the female tourists in all three regions (Overseas, SADC and Other African). (3)
- 1.1.4 The estimated 2023 population for the SADC region was 389,4 million people. Calculate the percentage of both male and female tourists in the SADC region who visited South Africa. (5)

- 1.2 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.

- 1.2.1 Write down the 25th percentile for Type B tomato. (2)
- 1.2.2 Identify the median mass for the two types of tomatoes. (2)
- 1.2.3 Calculate the difference between the Range and Interquartile Range (IQR) for Type A tomato (5)
- 1.2.4 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)

Probability:

- A measure of the likelihood or chance of an event occurring. It's a number between 0 and 1 that represents the probability of an event happening.

Prediction:

- Probability can be used to predict future events based on the historical data of past events over a long period of time.

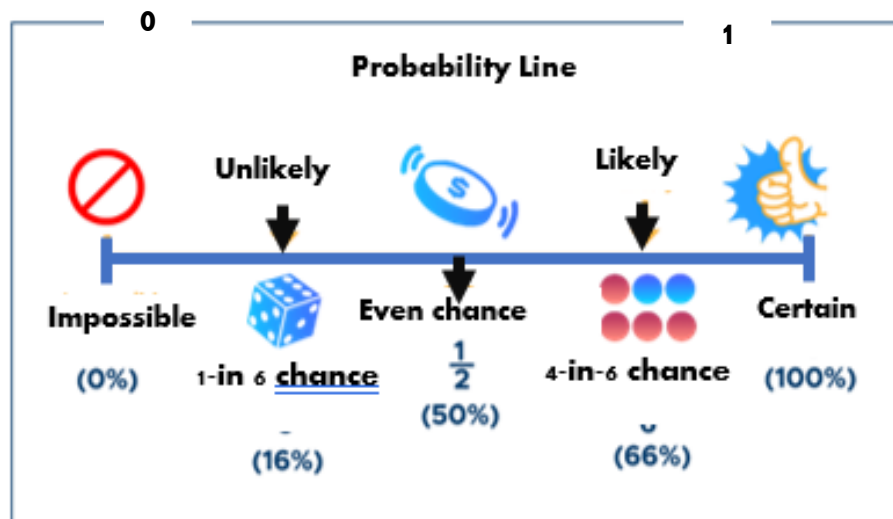
Application of Probability

- Understanding probability concepts and rules enables individuals to make informed decisions and analyse uncertain situations. Three examples are given in the table below.

Use of Probability in real life		
Risk Analysis <ul style="list-style-type: none">• Helps to assess risks• Make informed decisions	Insurance <ul style="list-style-type: none">• To calculate insurance premiums and payouts.	Games and Gambling <ul style="list-style-type: none">• Essential for understanding odds and chances of winning.

Key Aspects

- **Certain:** Probability of 1 (100% chance)
- **Impossible:** Probability of 0 (0% chance)
- **Uncertain:** Probability between 0 and 1 (chance of occurring)

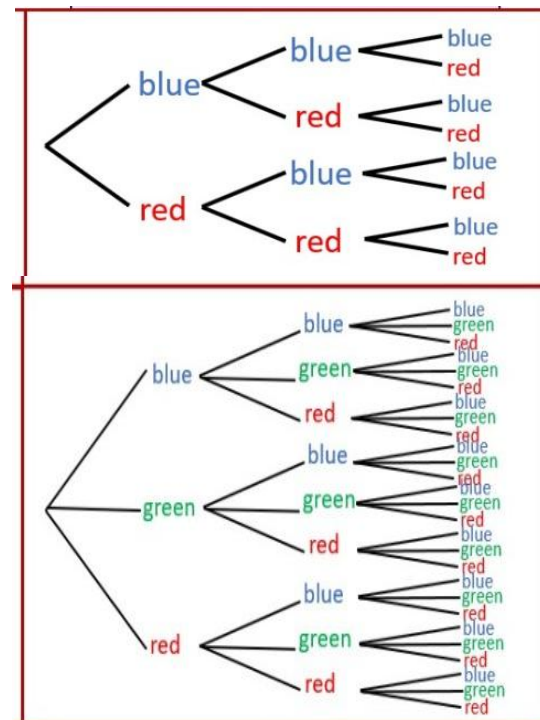
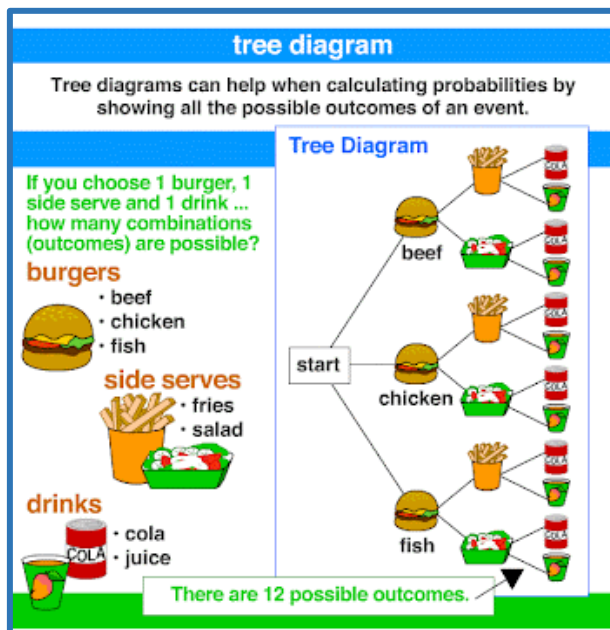


Tree Diagram:

- A tree diagram is a visual representation of a probability problem, showing all possible outcomes and their associated probabilities.

Purpose or Use of tree diagram:

- Helps illustrate all possible outcomes and their probabilities.
- Assist in decision-making by showing potential outcomes and their likelihoods.
- Enables comparison of different scenarios and their associated probabilities.
- Provide a clear and concise way to visualize and analyse probability problems.

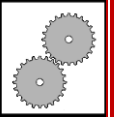


Key Components of Tree Diagram:

- **Root:** Starting point of the diagram
- **Branches:** Representing different outcomes or events
- **Leaves:** Endpoints of the branches, showing final outcomes

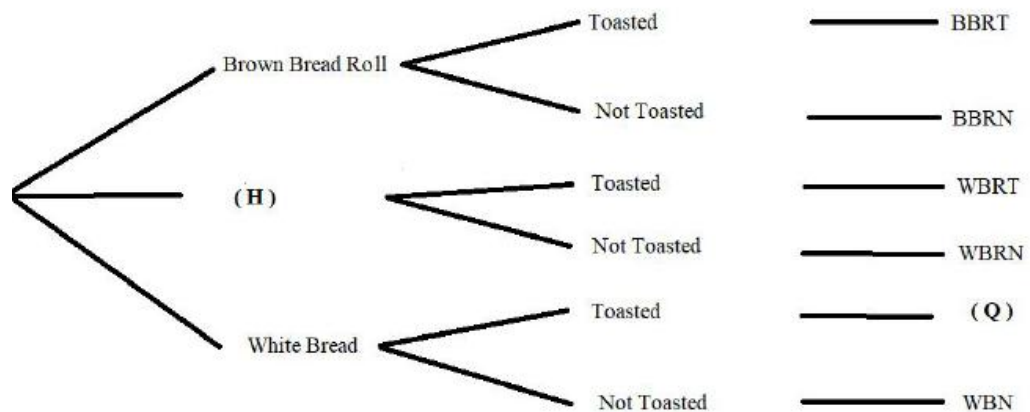
IMPORTANT TERMS AND DEFINITIONS	
PROBABILITY	
Probability	A measure of the likelihood of an event occurring, ranging from 0 (impossible) to 1 (certain).
Experiment	A situation or trial that can produce a set of outcomes.
Outcome	A specific result of an experiment.
Event	A set of one or more outcomes.
Impossible	No chance of an event to happen
Unlikely	A greater chance of an event not to happen
Likely	A greater chance of event to happen
Certain	A situation where an event will definitely happen
Tree Diagram	A useful way to show all possible outcomes in a tree shaped like diagram. It provides visual representation of probability scenarios.

Worked Example 1



- 1.1 Keitumetse's catering lunch pack has the following bread rolls (either white or brown) and white bread options to choose from:

- White Bread Roll (WBR)
- Brown Bread Roll (BBR) and
- White Bread (WB)
- Where EACH being either Toasted (T) or Not Toasted (N)



Use the information above to answer the questions that follow.

- 1.1.1 Identify the type of diagram illustrated above. (2)

Possible Solution
Tree diagram

- 1.1.2 Complete the missing labels (H) and (Q). (4)

Possible Solution
H = White Bread Roll
Q = White Bread Toasted

- 1.1.3 Write down the total number of outcomes. (2)

Possible Solution
Six (6)

- 1.1.4 Determine the number of bread rolls outcomes. (2)

Possible Solution
Four (4)

1.2 Unathi bought a house and two of the walls in one of the bedrooms were not plastered. She was advised to choose a specific brand of ready-mix plaster to prevent dampness in the walls.

- 1.2.1 At the store, there are five available brands. Unfortunately, Unathi forgets the name of the specific brand.
If she randomly selects one of the available brands, determine the probability that she will select the specific brand (2)

Possible solution

$$P = \frac{1}{5}$$

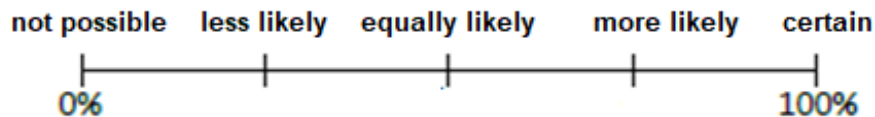
- 1.2.2 There is a 0,75 probability that the dampness will appear if the incorrect brand of ready-mix plaster is used.

Determine the probability that the dampness will NOT appear if the incorrect ready-mix plaster is used. (2)

Possible Solution

$$\begin{aligned} P(\text{not appear}) &= 1 - 0,75 \\ &= 0,25 \end{aligned}$$

- 1.2.3 The probability scale below shows the likelihoods for various probabilities.



Write down the likelihood that best describes your answer given to QUESTION 1.2.2. (2)

Possible solution

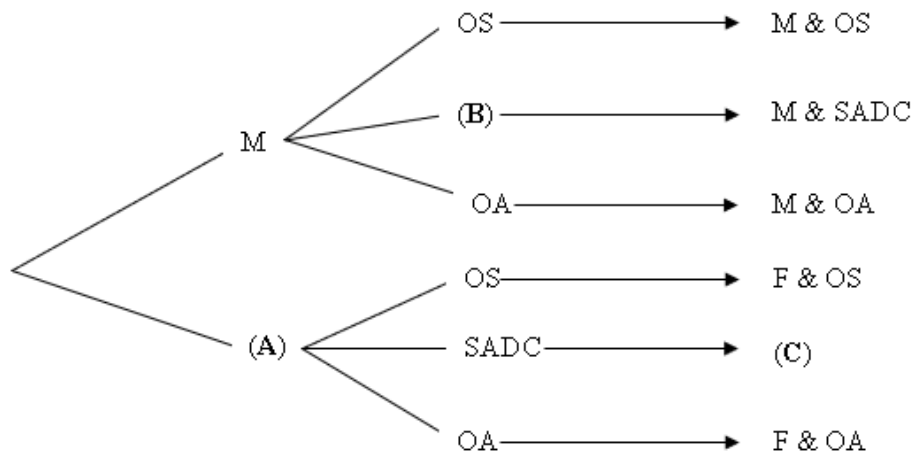
Less likely

ACTIVITY 1: Probability

(11marks: 10 minutes)



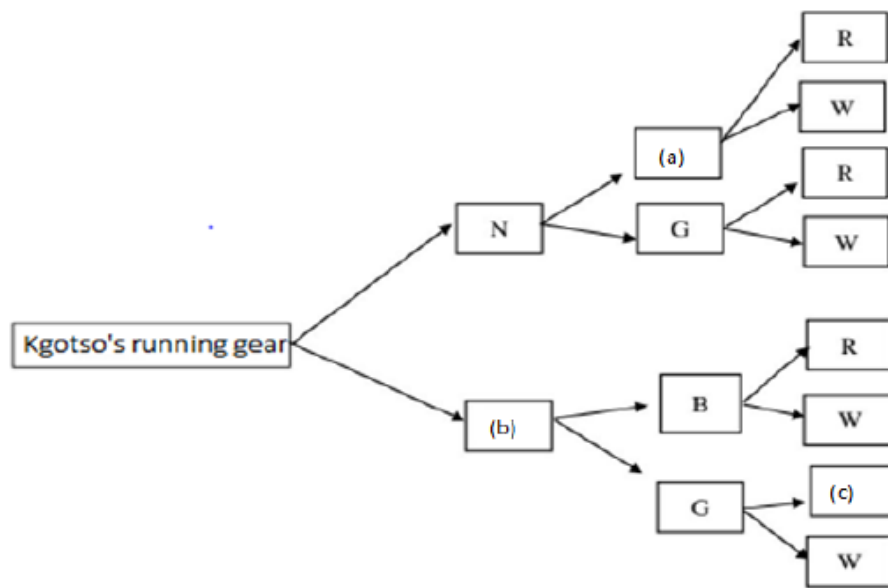
- 1.1 The tree diagram below shows all the combinations of tourists visiting the country in January 2024.



M: Male F: Female OS: Overseas OA: Other Africans
SADC: Southern African Development Community

Use the tree diagram above to answer the questions that follow

- 1.1.1 Complete the tree diagram by writing down the missing information for **A, B and C**. (3)
- 1.1.2 Determine the probability, as a simplified fraction, of randomly choosing a tourist from SADC (3)
- 1.2 Kgotso and his friends travelled from Pretoria to Durban to participate in the Comrade's marathon on 9 June 2023. He packed 2 sets of running gear to choose from on the day of the marathon.
- Running shoes: Nike (N) or Asics (A)
Running shorts: Black (B) or Green (G)
Running vests: Red (R) or White (W)
- 1.2.1 Complete the tree diagram below by filling in the correct letters in the place of (a), (b) and (c). (3)



- 1.2.2 Determine the probability that Kgotso will use Nike shoes, Black running short, and a White vest on the day. Write down your answer as a common fraction. (2)











ACTIVITY 2: Probability

(10 marks: 10 minutes)



- 1.1 Kimberley experienced heavy thundershowers on 11 March 2019. Celeste, a resident of Kimberley, studied the weather forecast below relating to the following day to determine whether it was necessary to take an umbrella to work.

HOURLY WEATHER FORECAST FOR KIMBERLEY – 12/03/2019

13:00	14:00	15:00	16:00	17:00
				
29°C	29°C	29°C	28°C	26°C
N	NNW	NNW	NNW	NW
 20%	 20%	 20%	 37%	 64%

[Adapted from www.rainboo.co.za]

Use the information above to answer the questions that follow.

- 1.1.1 At what time of the day is the temperature expected to be 28 °C? (2)
- 1.1.2 Determine the probability that it will rain when Celeste leaves work at 2:30 p.m. (2)
- 1.2 The weather forecast predicts a 0,625 chance of rain for the day of the final of the High School's Rugby 7s Series.

Use the information above to answer the questions that follow.

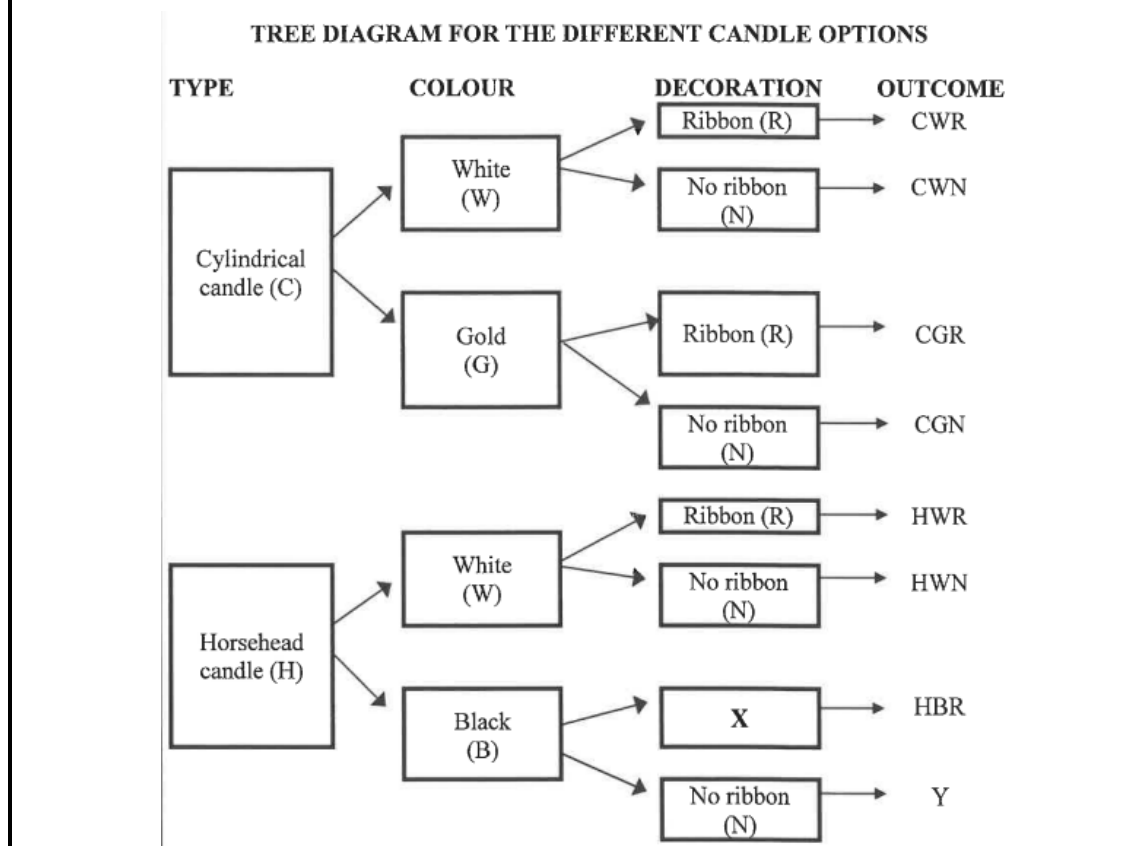
- 1.2.1 Write down the weather forecast prediction as a simplified fraction. (2)
- 1.2.2 Write down the probability for rainfall as a percentage. (2)
- 1.2.3 Does this mean that it will rain on that day? Explain your answer. (2)

ACTIVITY 3: Probability

(16 marks: 20 minutes)



- 1.1 The tree diagram below shows the different options available for the candles that will be sold.



Use the tree diagram above to answer the questions that follow.

- 1.1.1 Write down the description for:

(a) X

(2)

(b) Y

(2)

- 1.1.2 Write down the probability of buying:

(a) Any candle with a ribbon, as a percentage.

(3)

(b) A gold horse candle, with a ribbon.

(2)

1.2 A CD-pouch contains the following genres (types) of music:

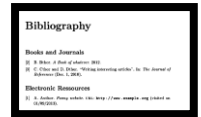
- 6 CDs with jazz music,
- 2 CDs with opera music,
- 4 CDs with classical music and
- 12 CDs with instrumental music

Use information above to answer the following questions.

1.2.1 Express the CD-genre with the highest probability (as a percentage) of randomly being picked in this CD-pouch. (2)

1.2.2 Determine the probability of randomly selecting a CD with hip-hop music (2)

1.2.3 Determine the probability (as a decimal fraction) that one will randomly pick a CD with jazz music in the pouch. (3)



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5	DBE May/June: 2023 - 2025