

MATHEMATICAL LITERACY

GRADE 12

WINTER CLASSES

Topics: Scale, Maps, Plans & Measurement

TEACHER AND LEARNER CONTENT MANUAL

MATHEMATICAL LITERACY PROGRAMME FOR WINTER CLASSES

STRUCTURE OF EXAMINATION			
PAPER	TOPICS	TOTAL MARKS	WEIGHTING
PAPER 1: (FINANCE & DATA HANDLING)	Finance	±90	± 60 %
	Data Handling	±53	± 35 %
	Probability	7	5%
TOTAL		± 4	± 32%
PAPER 2: (MEASUREMENT, MAPS, PLANS & SCALES)	Measurement	± 83	± 55%
	Maps, Plans and Scale	± 60	± 40%
	Probability	7	5%
TOTAL		150	±100%
Pre-test and Post-test to be administered since it's a revision of Term 1 & 2.			

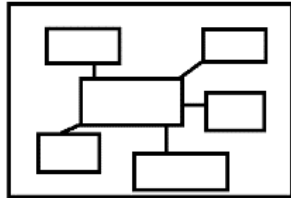


CONTENTS

PAGE

<u>TOPIC 4: Maps, Plans & other representations of the physical world</u>	
<ul style="list-style-type: none">○ Scale○ Maps○ Plans	05 - 34
<u>TOPIC 5: Measurement</u>	
<ul style="list-style-type: none">○ Perimeter○ Area○ Surface Area○ Volume	35 - 63

ICON DESCRIPTION



MIND MAP



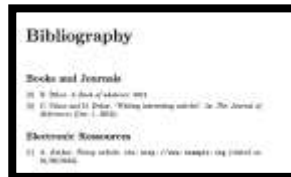
EXAMINATION GUIDELINE



CONTENTS



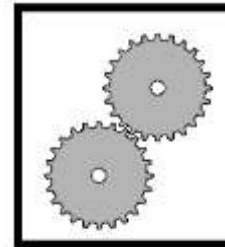
ACTIVITIES



BIBLIOGRAPHY



TERMINOLOGY



WORKED EXAMPLES



STEPS

LESSON OBJECTIVES

Scale

Learners must be able to:

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

Maps

Learners must be able to:

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

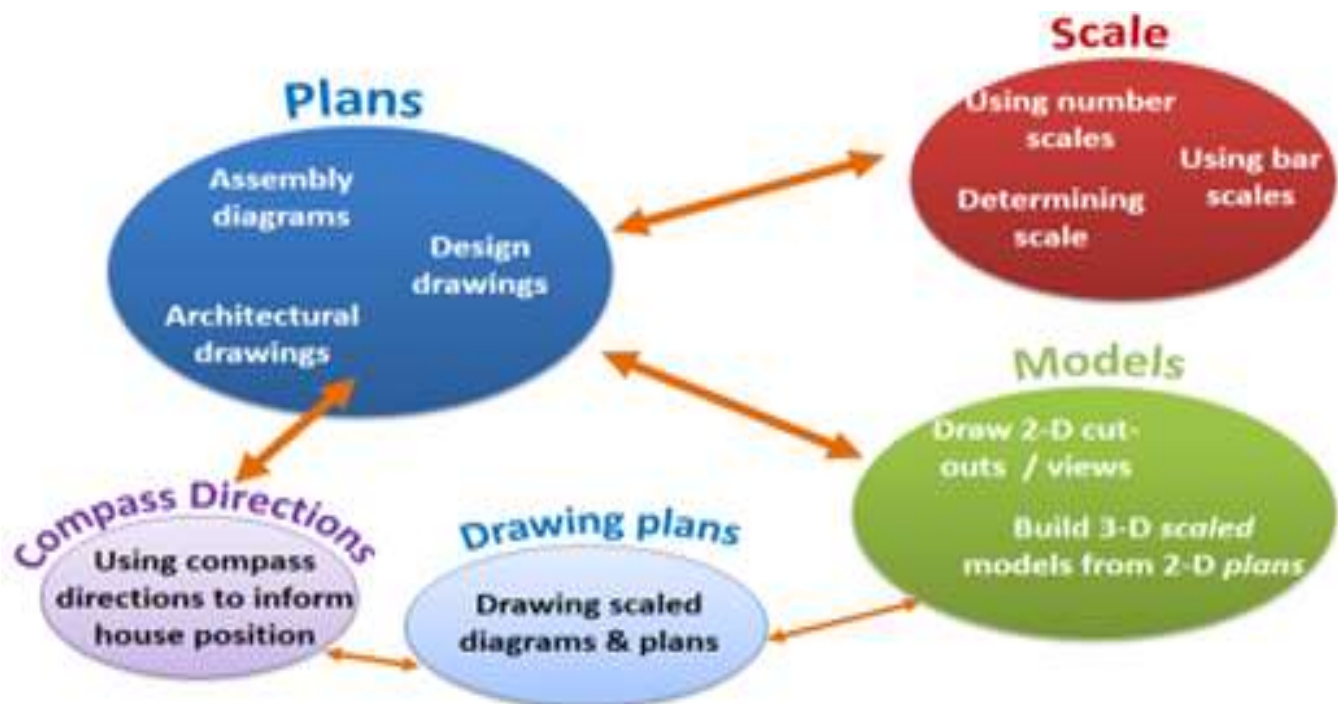
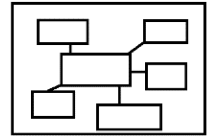
Plans

Learners must be able to:

1.	Different types of plans
2.	Seating plan/layout of a classroom
3.	Layout of buildings or sport fields at school
4.	Layout of stores in shopping centres
5.	Seating plans for cinemas and a sports stadium

Scale, Maps and Plans

How does the three sections link.





SCALE, MAPS AND PLANS: EXAMINATION GUIDELINE

Section	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Scale	<ul style="list-style-type: none"> Explain the meaning of a given scale, (e.g. explain what the scale 1 :100 means in terms of the measurements on a plan and actual dimensions). 	<ul style="list-style-type: none"> Use a given scale to determine actual measurements when given measured values, or measured values from given actual values. 	<ul style="list-style-type: none"> Use a given scale in conjunction with measurement on a plan/map to determine length/dimensions. Determine the scale of a map or plan. Use a given scale in conjunction with other content or skills to complete a project (e.g., use a given scale to determine the dimensions in which to draw a 2-dimensional plan of an object, and then draw the plan). 	<ul style="list-style-type: none"> Critique the scale in which an object has been drawn and offer an opinion as to a more appropriate scale. Decide on an appropriate scale to which to draw a picture or build a model, and then complete the project.
Maps	<ul style="list-style-type: none"> Identify the labels/names of national roads (e.g., N3) that must be travelled on to travel between two locations. Identify the names of the towns on the route between two locations. 	<ul style="list-style-type: none"> Identify the position of two locations on a map and use given distance values on the map to determine the travelling distance between the two locations. Interpret a given set of directions and describe 	<ul style="list-style-type: none"> Use a map in conjunction with a distance chart to determine the shortest route to travel between two locations. Identify a possible route between two locations on a map, measure the distance between the locations, and use a given scale to 	<ul style="list-style-type: none"> Critique a proposed travel route in relation to distance, estimated travelling times, etc. and suggest and justify possible alternative routes. Use maps in conjunction with other travel resources (e.g. exchange rate information; distance chart; bus timetable) and financial

	<ul style="list-style-type: none"> Identify the scale of a map. 	<p>what location the directions lead to.</p> <ul style="list-style-type: none"> Provide a set of directions to travel between two locations in a town using street names. 	<p>estimate the distance between the two locations.</p> <ul style="list-style-type: none"> Estimate travelling times between two or more locations based on estimated travelling speed and known or calculated distances. 	<p>information (e.g. fare tables; petrol price) to plan and cost a trip).</p> <ul style="list-style-type: none"> Make decisions regarding appropriate stopping points during a journey based on considerations of fatigue, petrol consumption travelling time, etc.
Plans	<ul style="list-style-type: none"> Identify the scale of a plan. Define terms (e.g. floor plan; elevation plan; layout plan; etc.). Read off the value(s) of given dimensions on the plan (e.g. the length of the wall is 4 m). 	<ul style="list-style-type: none"> Use a given key to identify the number of windows/doors/rooms shown on a plan for a building. Identify on which plan a particular structure is shown (e.g. the door is shown on the North elevation plan). 	<ul style="list-style-type: none"> Measure dimensions on a plan and use a given scale to determine actual dimensions. Use plans in conjunction with other content, skills or applications to complete a project (e.g. interpret plans to determine the dimensions of a room in order to establish the amount of carpet needed for the floor of the room). 	<ul style="list-style-type: none"> Describe an item represented in a plan. Critique the design of a structure shown on a plan. Decide on an appropriate scale in which to draw a plan and then draw the plan. Make connections between plans showing different views of the same structure (e.g. explain which wall shown on a floor plan is represented on a particular side view plan).




IMPORTANT TERMINOLOGY

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

SCALE

What is a Scale?

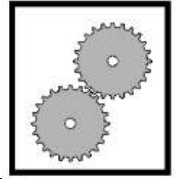
A scale represents the relationship between a measurement on a model and the corresponding measurement on the actual object.

Types of Scales	
Number Scale	Bar Scale
<p>Number Scales are always written in the form.</p> $\begin{array}{rcl} 1 & : & 100 \\ \text{Map} & : & \text{Reality} \end{array}$ <p>This means that 1 unit on the map equals 100 units in reality</p>	<p>Also known as a linear scale, it is a means of visually showing the scale of the map.</p> <p>Example of a bar scale</p> 

ADVANTAGES AND DISADVANTAGES OF EACH TYPE OF SCALE

Types of Scale	Advantages	Disadvantages
Bar Scale	<ul style="list-style-type: none">• Are quick and easy to use.• You may be able to determine actual lengths and distances without doing calculations.	<ul style="list-style-type: none">• Measurements (using a ruler, string or markings) obtained using bar scales tend to be less accurate.• Bar scales may still require calculation to determine the actual lengths and distances.
Number Scale	<ul style="list-style-type: none">• Are more accurate than bar scales.• Are more convenient to use when working with small scales.	<ul style="list-style-type: none">• Number scales require the use of calculators in determining actual distances.• With digital printing number scales become inaccurate and if there is resizing of the map or plan.

Worked Example



- 1.1 Mr. Moeketsi teaches his grade 10 Mathematical Literacy class about scales. He uses figure 1 and figure 2 in his teaching.

Figure 1

1:50

Figure 2



Use figure 1 and figure 2 above to answer the questions that follow.

- 1.1.1 Write down the name of each scale in figure 1 and figure 2.

Possible Answer:

Figure 1: Number Scale

Figure 2: Bar Scale

(2)

- 1.1.2 Which of the following statement best describe a scale in figure 2.?

(a) One segment of the scale measures 50 units in reality

(b) One unit on the map represent fifty units in reality

(c) If the map is resized the scale remains accurate

(2)

Possible answer

(c) If the map is resized the scale remains accurate

- 1.2 A numeric scale is given as 1: 100. Explain what the scale 1:100 means.

Possible answer

This means that every 1 unit on the plan is equivalent to 100 units in real life.

OR: The map is 100 times smaller than real life.

OR: Real life is 100 times bigger than on the map.

(2)

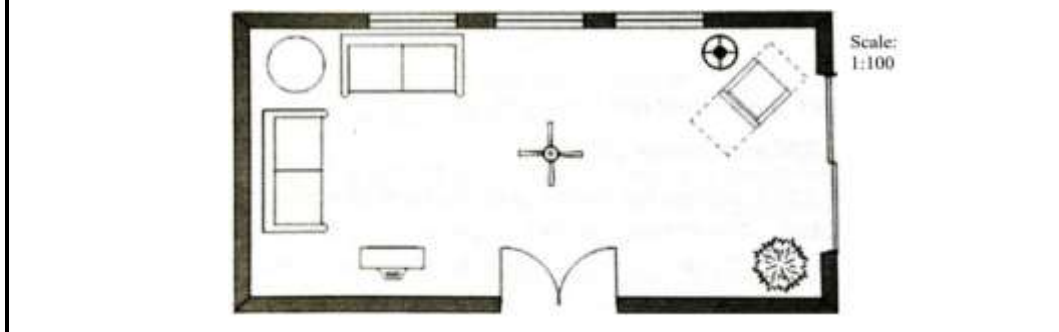
- 1.3 If the distance between Qwaqwa and Matatiele map is 15 cm on a map, determine the real distance in km between the two towns if the scale on the map is 1: 3 750 000.

Possible Answer

$$\begin{aligned}\text{Distance (in km)} &= 15 \text{ cm} \times 3\,750\,000 \\ &= 56\,250\,000 \div 100\,000 \\ &= 562,5 \text{ km}\end{aligned}$$

(3)

- 1.4 Mr Smith wants to renovate his living room by putting a new carpet. The area of the living room is 26,68 m². The floor plan of a living room is shown below. Use the plan to answer the questions.



- 1.4.1 What does the scale 1:100 mean?

Possible Answer

This means that every 1 unit on the plan is equivalent to 100 units in real life.

OR: The map is 100 times smaller than real life.

OR: Real life is 100 times bigger than on the map.

(2)

- 1.4.2 The length of the living room is 7,3 cm. Use the scale given to determine the actual length. Give your answer in meters.

Possible answer

$$\begin{aligned}7,3 \text{ cm} &\times 100 \\ &= 730 \text{ cm} \\ &= 7,3 \text{ m}\end{aligned}$$

(3)

- 1.4.3 Determine the cost of carpeting the living room, if the carpet cost R149,00 per m²

Possible answer

$$27 \text{ m}^2 \times \text{R}149,00 = \text{R } 4\,023$$

(3)

ACTIVITY 1: Bar and Number Scale



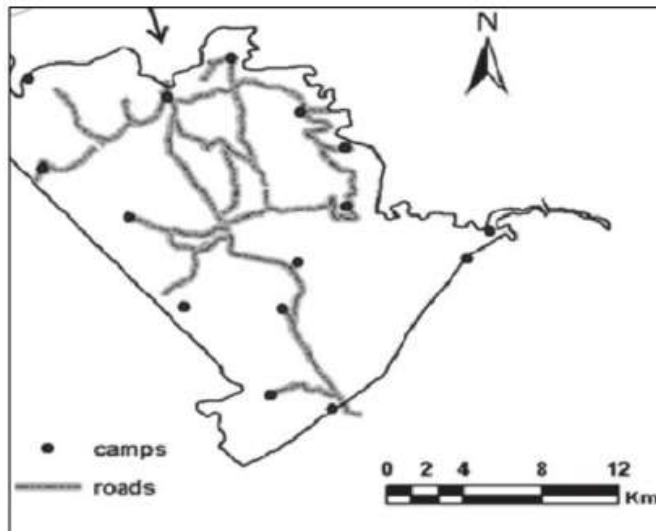
(22 marks: 20 minutes)

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

1.1.1 Write down the given scale in words. (2)

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

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



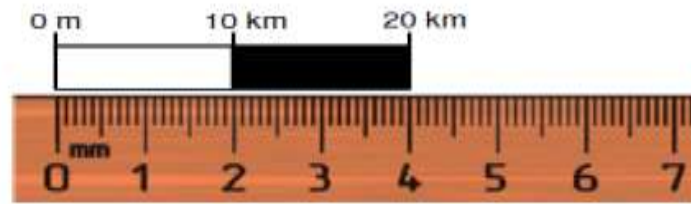
[Adapted from resource: researchgate.net]

1.2.1 Identify the type of scale used on the map. (2)

1.2.2 Explain the meaning of the scale. (2)

1.2.3 Determine the missing value:
... mm = 12 km (2)

- 1.3 Mr Stuart, Mathematical Literacy educator used the picture below to explain the advantage of using the scale below.



Use the information above to answer the questions that follow.

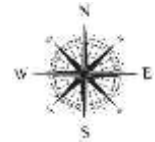
- 1.3.1 Name the type of scale illustrated above. (2)
- 1.3.2 Convert the given scale to number scale. (4)
- 1.3.3 Use your answer in QUESTION 2.1.2 to explain the meaning of the scale. (2)
- 1.3.4 Considering the given scale and a number scale. Which scale will be appropriate to build a model? Give a reason for your answer. (3)

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 is 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)**]



Types of Maps

National road maps



National and Provincial Road Map



Street Map with Grid reference



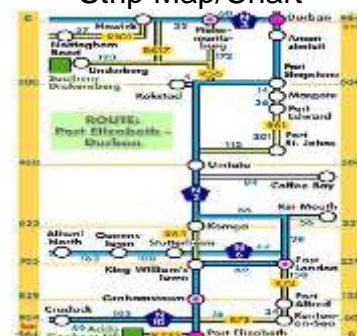
Residential or Housing maps



Rail Map



Strip Map/Chart



Elevation Map



Route Map



Regional Map

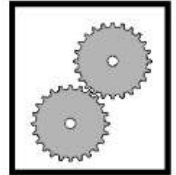
Regional map of Cyprus and the surrounding countries



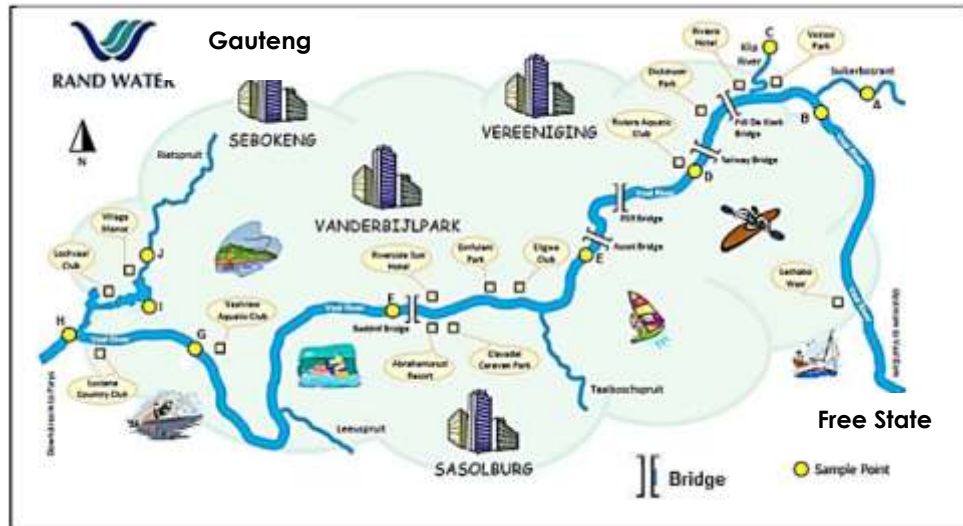
Points to consider when working with maps.

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

Worked Example



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



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

Possible answer:
Gauteng and Free State

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

Possible Answer: Two

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

Possible answer:

1 : 25 000

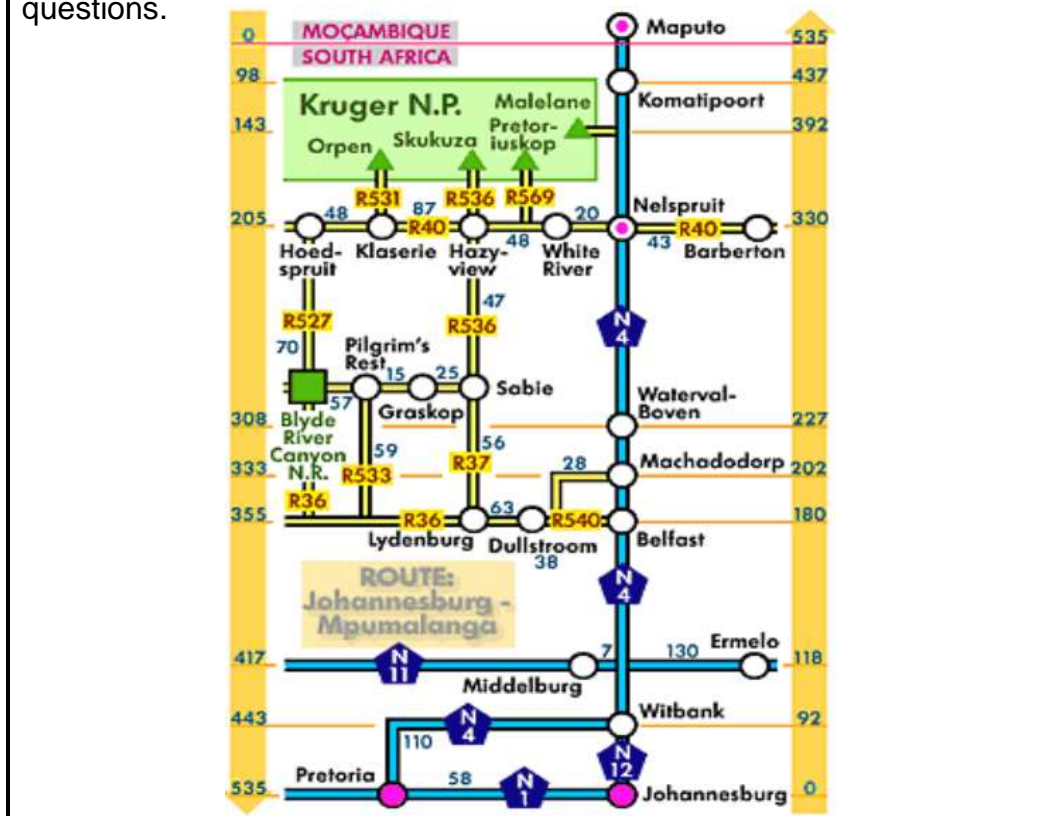
$$\text{Scaled length} = \frac{3}{25\,000} = 0,00012 \text{ km}$$

$$\text{In cm} = 0,00012 \times 10\,000 = 12 \text{ cm}$$

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

Possible answer:
South East

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



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

Possible answer
Strip Chart/Map

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

Possible answer
N1, N4, N12, N11,

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

Possible Answer
330 km

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

Possible answer
333km
OR
 $535 - 202$
 $= 333\text{km}$

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

Possible answer

Johannesburg to Belfast = 180km

Belfast to Dullstroom = 28km + 38km

Dullstroom to Lydenburg = 63km

Lydensburg to Sabie = 56km

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

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

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

Nelspruit to Maputo = 205km

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

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

Possible answer

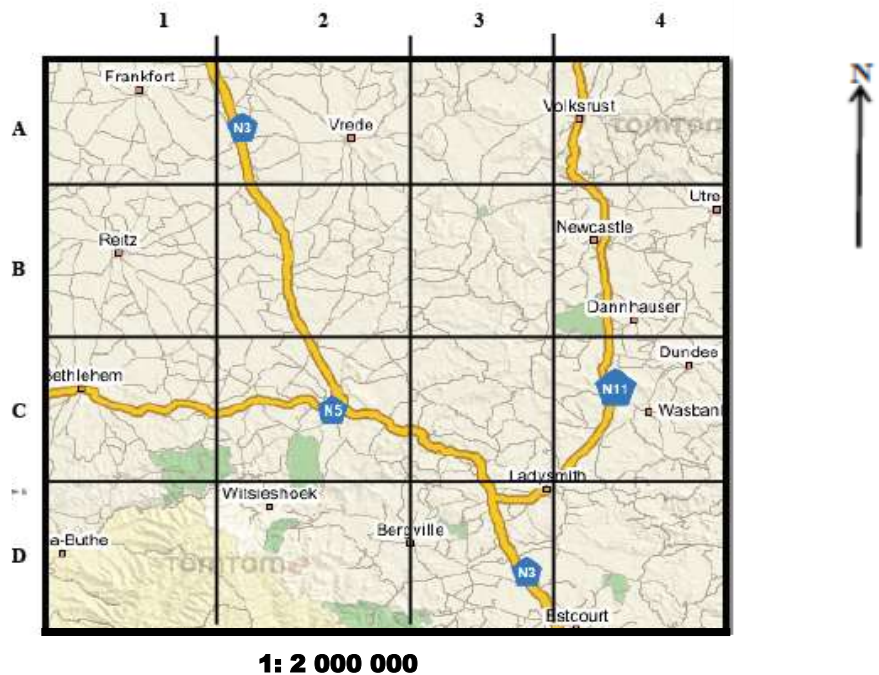
Sabie

ACTIVITY 2: Provincial and Strip Map/Chart

(35 marks: 30 minutes)



- 1.1 Ms Kekana is planning an excursion for her tourism learners. She found the map that shows parts of Free State, Mpumalanga and Kwa-Zulu Natal on the internet, to plan for the trip. Use the map below to answer the questions that follow.



- 1.1.1 Give the grid reference of Newcastle. (2)
- 1.1.2 Which National Road passes through Ladysmith? (2)
- 1.1.3 Give the compass direction of Vrede relative to Reitz. (2)
- 1.1.4 Use the given scale to calculate the actual kilometres if the distance on the map is 12 cm. (2)
- 1.1.5 The actual distance between Frankfort and Reitz is 68 km. Calculate the scaled distance (in mm) on the map between the two places. (2)

- 1.2 Mrs Heins and her husband are residing in Prince Albert. They plan to visit Cape Town for a week. On **ANNEXURE A** is the map that they use to plan their journey.

Use **ANNEXURE A** to answer the questions that follow.

- 1.2.1 Identify the type of a map that is indicated on ANNEXURE A. (2)
- 1.2.2 How many regional (provincial) roads are shown on the map? (2)
- 1.2.3 Write down the probability (as a common fraction) of randomly selecting Tsitsikamma National Park from the National Parks on a map? (2)
- 1.2.4 Calculate the total distance if the family travel via Ladysmith and Riversdale, then follow the N2. The family also pick up one relative in Hermanus. (3)
- 1.2.5 The family is travelling at an average speed of 100 km/h, if they left Prince Albert at 13:15, what time will the family arrive in Cape Town, after picking a family member in Hermanus. The total stopping time is 30 minutes.

The following formula may be used:

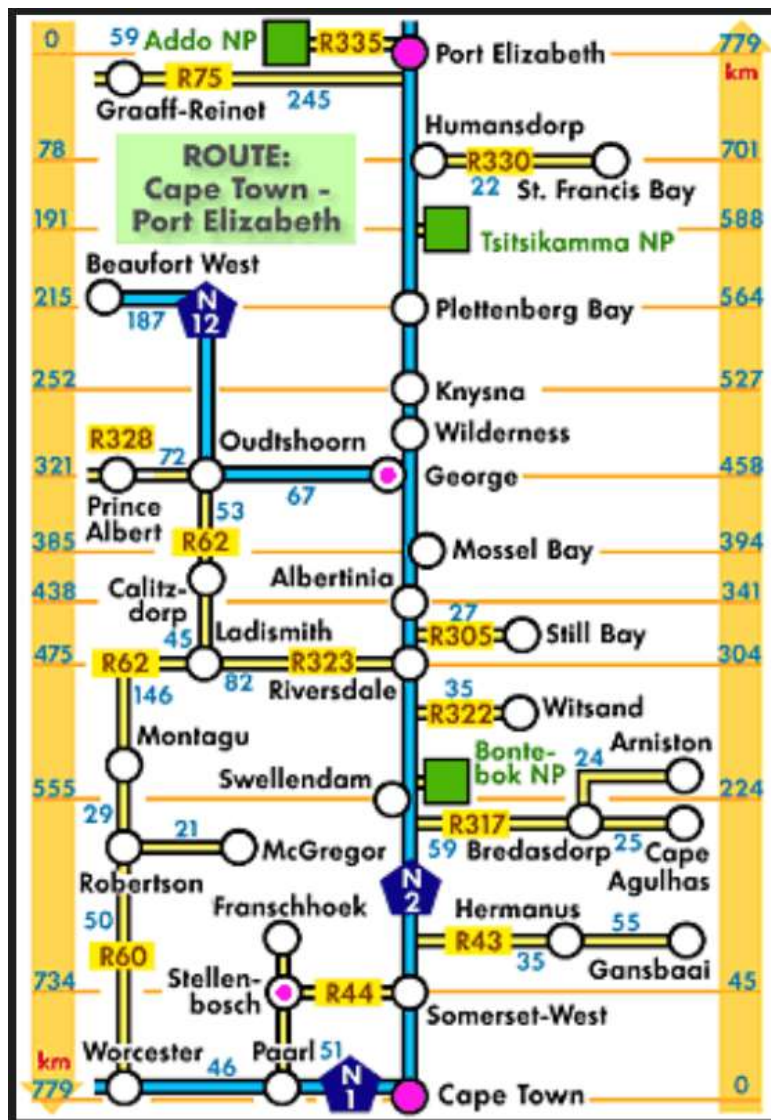
$$\text{Speed} = \frac{\text{Distance}}{\text{time}} \quad (5)$$

- 1.2.6 The distance from George to Oudtshoorn on the map is bigger than the distance from Oudtshoorn to Prince Albert but the kilometres that are indicated on the map from George to Oudtshoorn are smaller than kilometres from Oudtshoorn to Prince Albert. Give a reason for this. (2)
- 1.2.7 Write down all the roads that the family will use to travel on from their hometown following the route described in **Question 1.2.4** to Cape Town. (4)
- 1.2.8 The petrol consumption of Mrs Heins's car is 5,9 l per 100 km. Mrs Heins claims that for a single trip, it will cost her less than R800 for fuel if petrol cost is R19,79/l.

Verify, with calculations whether her statement is valid. (5)

ANNEXURE A

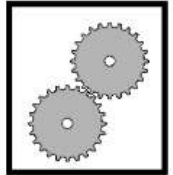
THE MAP USED TO PLAN THE TRIP FROM PRINCE ALBERT TO CAPE TOWN



[Source: docplayer.net]

NOTE: NP is a National Park

Worked Example



- 1.1 The Comrades Marathon is one of the World's most famous marathons. It is run between Durban and Pietermaritzburg in South Africa every year. The direction of the route alternates each year between these two cities. The elevation map of the 2021 Comrades Marathon is shown below.



Use the map and the given information to answer the questions that follow:

- 1.1.1 How long (in km) is the Comrades Marathon? (2)

Possible answer:
89km

- 1.1.2 From which city will the 2022 Comrades Marathon start? (2)

Possible Answer:
Durban

- 1.1.3 What is the height above sea level in km of the highest point of the marathon? (3)

Possible answer:
810 m ÷ 1 000
= 0.81km

- 1.1.4 The route from Pietermaritzburg to Durban is called a DOWN RUN. Give a reason for this name. (2)

Possible answer:
Because it starts at high altitude and end at low altitude.

- 1.1.5 Which place is situated approximately at the halfway point of the marathon?

Possible Answer:
Drummond

- 1.1.6 The Comrades Marathon starts at 05:30 in the morning. Tete Dijana won the 2021 marathon, from Pietermaritzburg to Durban, with the running time of 5:30:35. The results for the other four runners from position two to five are shown below. (2)

Position	Name	Finishing Time
1.	Tete Dijana	05:30:37
2.	Edward Mothibi	05:33:45
3.	Dan Matshailwe	05:36:24
4.	Bongmusa Mthembu	05:38:06
5.	Johannes Makgetla	05:41:35

Calculate how much longer did it take for Johannes Makgetla to get to the finishing line after Tete Dijana.

Possible answer:
05:41:35 – 05:30:37 = 00:10:58

- 1.2 Busisiwe participated in a Vhi Women's Mini Marathon. ANNEXURE A shows the route for the mini marathon.

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

- 1.2.1 Write down the total distance for the marathon in m. (2)

Possible Answer:
9K + 1K = 10K
10K x 1 000
10 000 m

- 1.2.2 Busisiwe started practising 65 days prior the marathon date. Use the 2022 calendar attached to the ANNEXURE to write down the exact date she started practising.

Possible answer: (3)
April = 29 days
May = 31 days
June = 5 days
Total = 65
Date = 02 April

- 1.2.3 Write down the starting time of the mini-marathon using the 24-hour format. (2)

Possible answer:

14:00

- 1.2.4 State which mode of transport is NOT allowed on the mini-marathon route. (2)

Possible answer

Bicycle

- 1.2.5 The distance of a standard marathon is 42,2 km.

- (a) Determine, in simplified form, what fraction of a standard marathon the Vhi Women's Mini Marathon is. (4)

Possible answer:

$$\begin{aligned}\text{Fraction} &= \frac{10}{42,2} \\ &= \frac{50}{211}\end{aligned}$$

OR

In metres

10 000 metres and 42 200 metres

$$\begin{aligned}\text{Fraction} &= \frac{10\,000}{42\,200} \\ &= \frac{50}{211}\end{aligned}$$

- (b) Give ONE reason why the Vhi Women's Mini Marathon is called a mini-marathon. (2)

Possible Answer:

The distance is less than a full marathon.

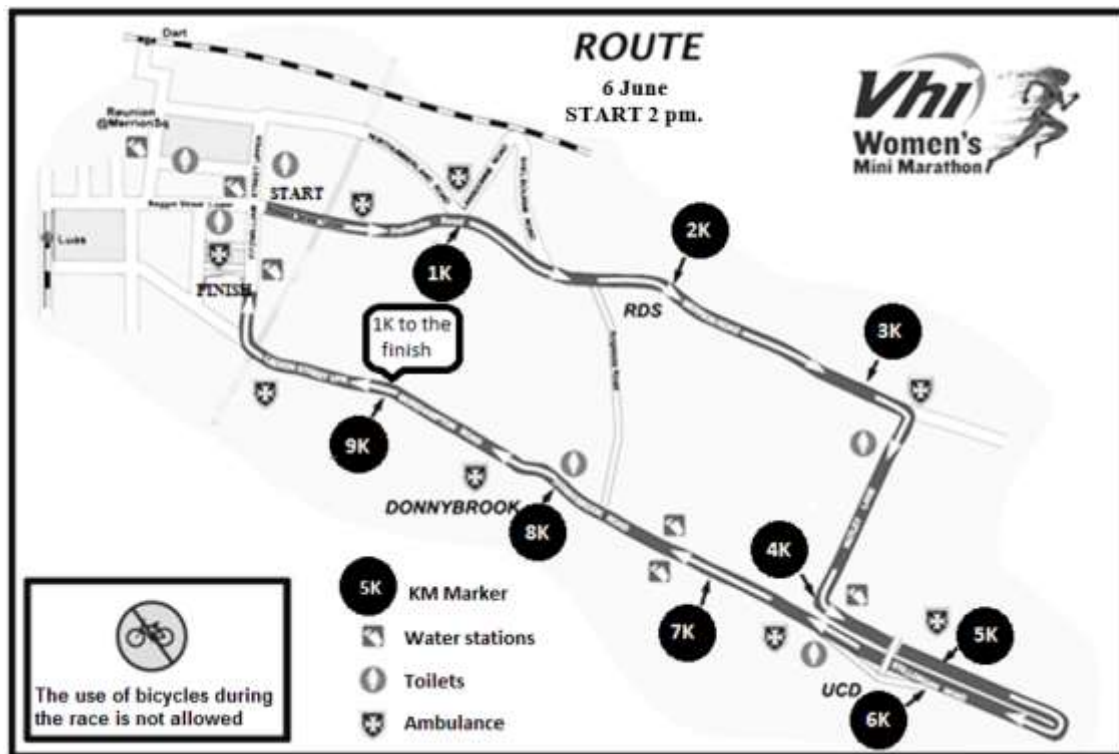
OR

It is shorter than a standard marathon.

OR

It is a fraction of a full marathon

ANNEXURE A



[Adapted from www.vhiwomensminimarathon.ie]

2022 Calendar

January							February							March						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
						1			1	2	3	4	5			1	2	3	4	5
2	3	4	5	6	7	8	6	7	8	9	10	11	12	6	7	8	9	10	11	12
9	10	11	12	13	14	15	13	14	15	16	17	18	19	13	14	15	16	17	18	19
16	17	18	19	20	21	22	20	21	22	23	24	25	26	20	21	22	23	24	25	26
23	24	25	26	27	28	29	27	28						27	28	29	30	31		
30	31																			

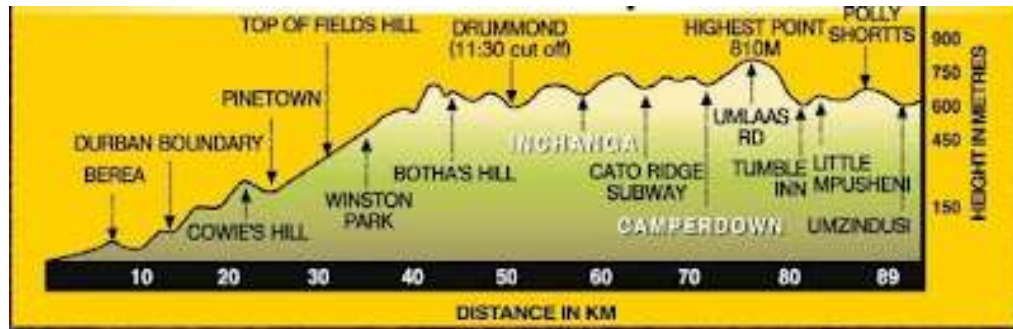
April							May							June						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
					1	2	1	2	3	4	5	6	7				1	2	3	4
3	4	5	6	7	8	9	8	9	10	11	12	13	14	5	6	7	8	9	10	11
10	11	12	13	14	15	16	15	16	17	18	19	20	21	12	13	14	15	16	17	18
17	18	19	20	21	22	23	22	23	24	25	26	27	28	19	20	21	22	23	24	25
24	25	26	27	28	29	30	29	30	31					26	27	28	29	30		

ACTIVITY 3: Elevation and Route Map

(22 marks:20 minutes)



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

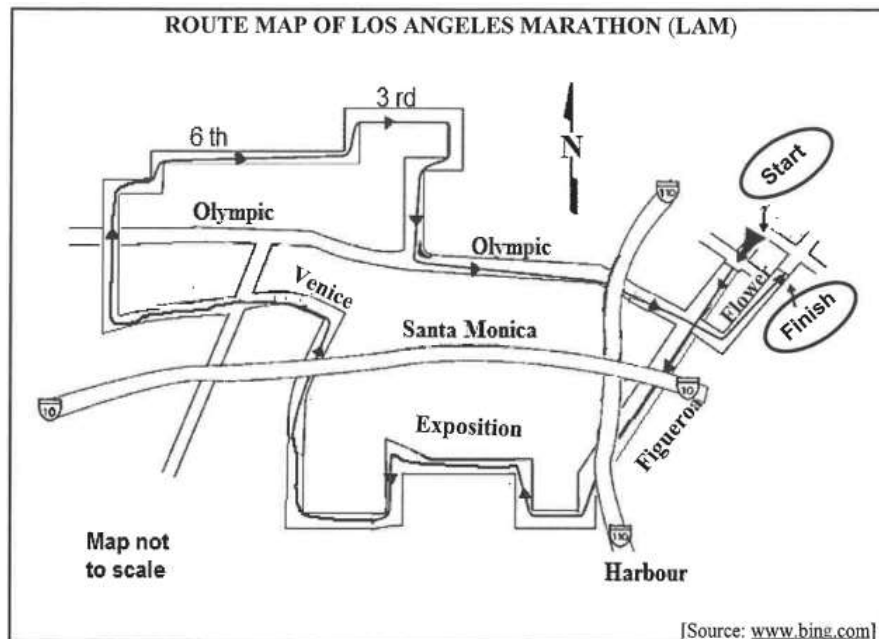


Use the information above to answer the questions that follow

- 1.1.1 Write down the total distance of the Marathon. (2)
- 1.1.2 Write down the name of the map shown above. (2)
- 1.1.3 A cut off point is a certain point which point the runners must reach within a prescribed time so that they may continue their participation in the Marathon
- (a) Write down the cut-off point and time for the marathon (2)
- (b) Calculate the distance from the cut-off point to the end of the marathon (2)
- 1.1.4 Tebogo participated in the marathon, and he finished the marathon in six and half hours. Calculate his average speed in km/h.

You may use the formula: **Average Speed = $\frac{\text{Distance}}{\text{Time}}$** (3)

- 1.2 Below is a simplified route map of the Los Angeles Marathon (LAM) in the United States of American. The LAM route is 26,2 miles.



Use the information above to answer the question that follow.

- 1.2.1 Explain the meaning of route map using the context above. (2)

- 1.2.2 Convert the total distance of the Marathon to km.

Note: 1 mile = 1,609344 km (3)

- 1.2.3 Write down the general direction in which the runners will face when they start in Flower Street (2)

- 1.2.4 The runners in the Los Angeles Marathon have to pass underneath a bridge at certain points during the marathon

(a) Explain how this is indicated on the route map. (2)

(b) Write down the number of times that a runner who completes the marathon will pass underneath the bridge. (2)

PLANS

ACTIVITY 4: Seating Plan

(23 marks:20minutes)



- 1.1 For 2021 National Senior Certificate examination, Samuel Johnson Secondary School used the seating plan shown below for learners who wrote their examination. The department of education provided each learner with the 12-digit examination number as indicated in the boxes.

2022 EXAMINANTION SEATING PLAN				
Chalkboard				
	Column 1	Column 2	Column 3	Column 4
Row 1	614262790021 Learner 22	614262790014 Learner 15	614262790007 Learner 8	614262790000 Learner 1
Row 2	614262790022 Learner 23	614262790015 Learner 16	614262790008 Mandla	614262790001 Learner 2
Row 3	614262790023 Learner 24	614262790016 Learner 17	614262790009 Learner 10	614262790002 Learner 3
Row 4	614262790024 Learner 25	614262790017 Learner 18	614262790010 Learner 11	614262790003 Learner 4
Row 5	614262790025 Learner 26	614262790018 Learner 19	614262790011 Learner 12	614262790004 Learner 5
Row 6	614262790026 Learner 27	614262790019 Learner 20	614262790012 Learner 13	614262790005 Learner 6
Row 7	614262790027 Learner 28	614262790020 Learner 21	614262790013 Learner 14	614262790006 Learner 7
DOOR (ENTRANCE)			Invigilator's table	

- 1.1.1 Write down the total number of learners who wrote the National Senior Certificate during the year 2022. (2)
- 1.1.2 Write down the examination number of the learner seating at column 3 row 5 (2)
- 1.1.3 Determine the general direction of the emergency exit from where Mandla sat. (2)

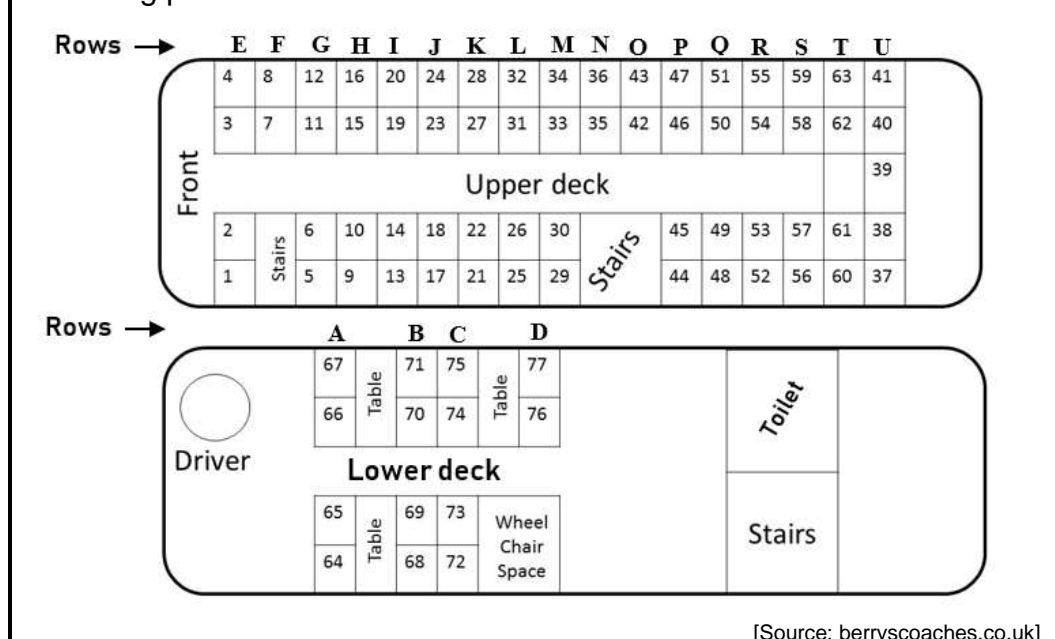
1.1.4 Mandla and learner 26 raised their hands simultaneously for the invigilator to attend to them.

- The invigilator moved from her desk, moved in front on learner 14 and 21, then turned to the north between learner 21 and 28.
- After passing learner 27, she managed to attend learner 26 on the west side.
- She then moved between learner 18 and learner 19 towards the west until she reached learner 11.
- She then turned towards the north direction passing learner 10. She managed to get to Mandla who was on her east side.

Use the ANSWER SHEET below to draw the route she will take from her table to get to the two learners.

(4)

1.2 A seating plan of a double decker tourist bus is shown below.



Use the information above to answer the questions that follow.

- 1.2.1 On which deck of the bus is the toilet located? (2)
- 1.2.2 Determine the total number of seats found on the upper deck. (2)
- 1.2.3 Calculate the percentage of seats marked with odd numbers. (3)
- 1.2.4 Identify a row that will have passengers seated at the front of the bus with total view of the road ahead and without any obstructions. (2)

ANSWERSHEET

2022 EXAMINATION SEATING PLAN

Chalkboard				
	Column 1	Column 2	Column 3	Column 4
Row 1	614262790021 Learner 22	614262790014 Learner 15	614262790007 Learner 8	614262790000 Learner 1
Row 2	614262790022 Learner 23	614262790015 Learner 16	614262790008 Mandla	614262790001 Learner 2
Row 3	614262790023 Learner 24	614262790016 Learner 17	614262790009 Learner 10	614262790002 Learner 3
Row 4	614262790024 Learner 25	614262790017 Learner 18	614262790010 Learner 11	614262790003 Learner 4
Row 5	614262790025 Learner 26	614262790018 Learner 19	614262790011 Learner 12	614262790004 Learner 5
Row 6	614262790026 Learner 27	614262790019 Learner 20	614262790012 Learner 13	614262790005 Learner 6
Row 7	614262790027 Learner 28	614262790020 Learner 21	614262790013 Learner 14	614262790006 Learner 7
DOOR (ENTRANCE)			Invigilator's table	

N
↑
EMERGENCY
EXIT

ACTIVITY 5: Seating and Layout Plans

(24 marks:20minutes)



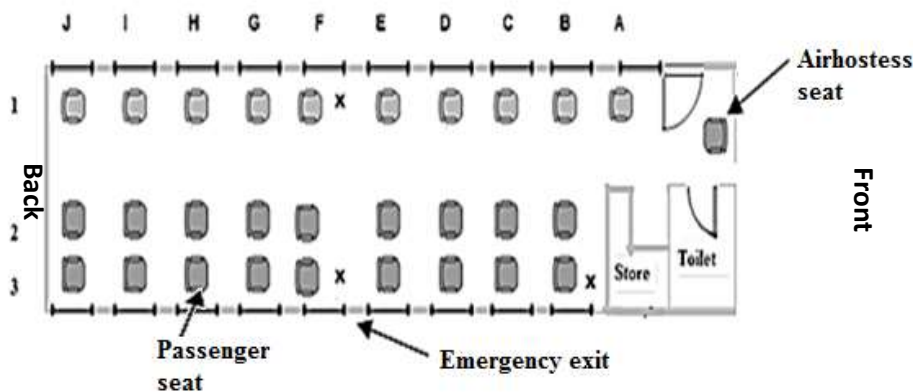
- 1.1 Nico and his friends visited Bloemfontein to watch a rugby match. While in Bloemfontein, they decided to go to Mimosa mall. The layout of Mimosa mall is shown on ANNEXURE A.

- 1.1.1 How many toilet areas are on the upper level? (2)
- 1.1.2 On which level are the food courts located? (2)
- 1.1.3 Name the isle that Nico and his friends will pass if they use the entrance on the Melville drive. (2)
- 1.1.4 In which general direction is the food area from the green level parking? (2)

- 1.2 Study the seating plan of an airplane on ANNEXURE B and answer the questions that follow.

- 1.2.1 How many exit doors are indicated on the seating plan? (2)
- 1.2.2 Write down the row numbers of the Economy Plus class seats that have in-seat power. (2)
- 1.2.3 The actual length of the airplane (from the cockpit to the end of the passenger cabin) is given as 50 m. If the scale of the seating plan is 1: 200, calculate the length of the airplane on the seating plan in mm. (4)

- 1.3 Below is the layout plan of the inside cabin of a small aeroplane. All the passenger seats face the front except the seat of the airhostess. On all flights there will be an airhostess.



[Adapted from www.airlink.com]

Use the information above to answer the questions that follow.

- 1.3.1 Explain the meaning of a *layout plan*. (2)
- 1.3.2 Calculate the maximum number of passenger seats available in this aeroplane (2)

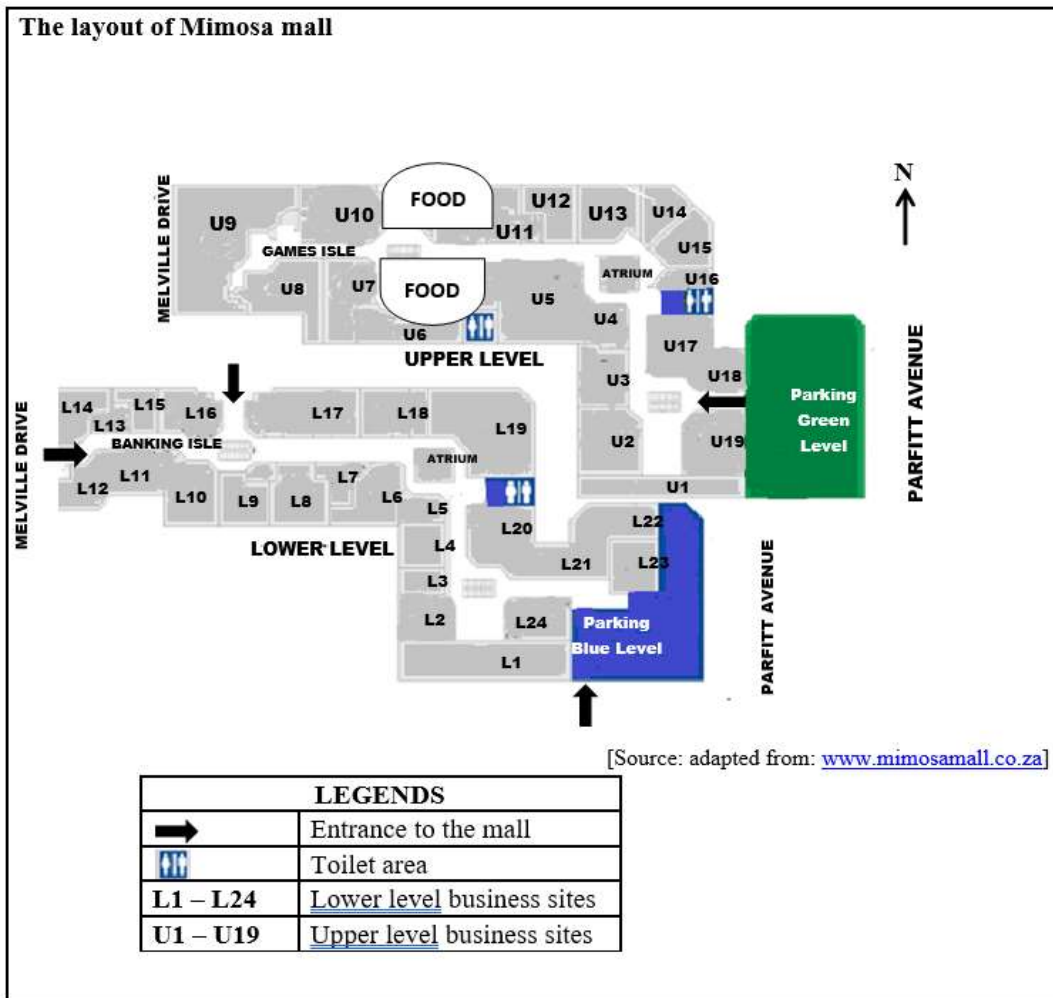
- 1.3.3 Stofile is seated in D1. He gets out of his seat and walks past his seat and two more seats towards the back to talk to his friend who is seated on Stofile's right-hand side.

Using the same notation as Stofile's seat, write down the seat number of his friend. (2)

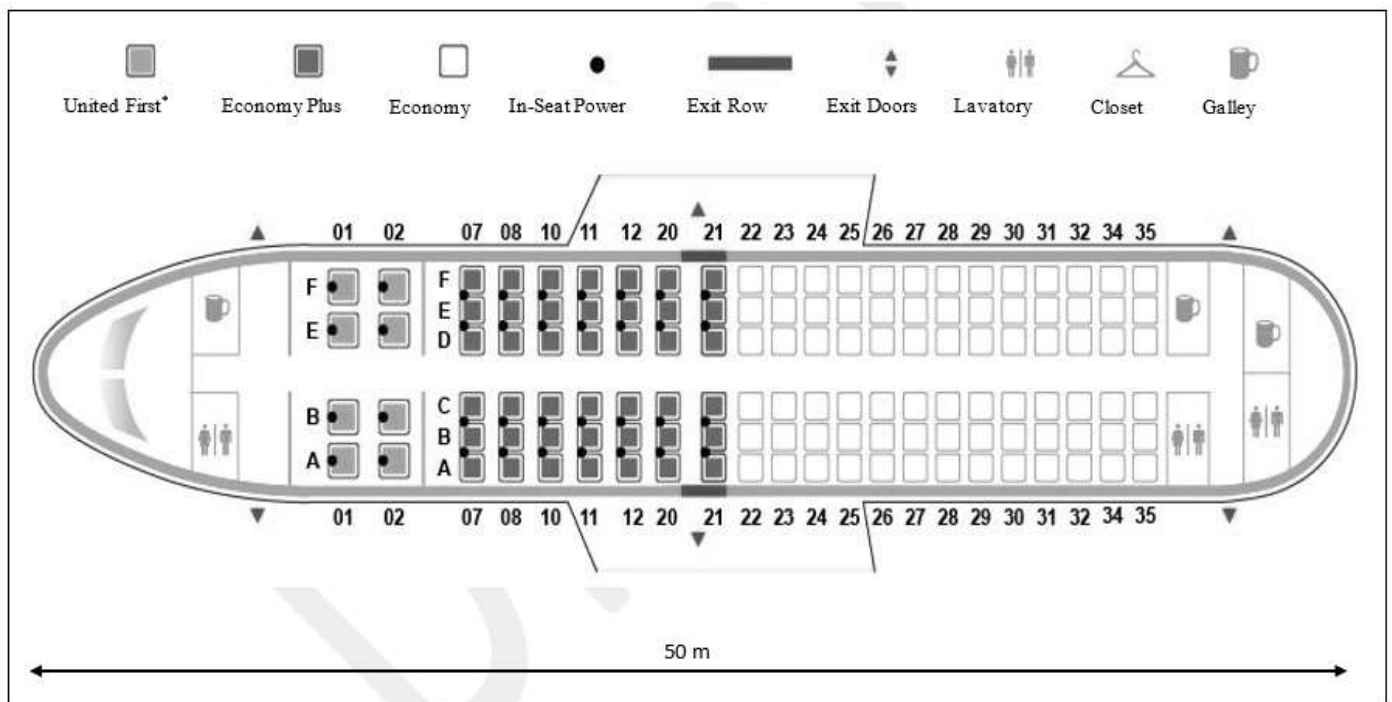
- 1.3.4 During the flight, passengers are allowed to choose a light snack and a drink. The choices are as follows: a muffin or a sandwich with a cola, a juice or bottled water.

Write down the number of options they can choose from. (2)

ANNEXURE A



ANNEXURE B

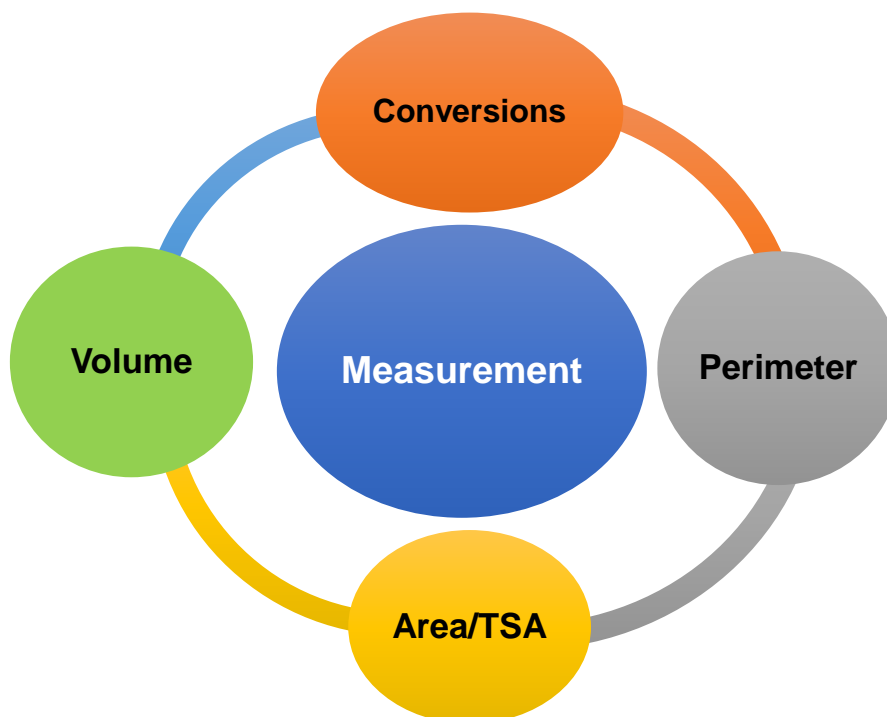
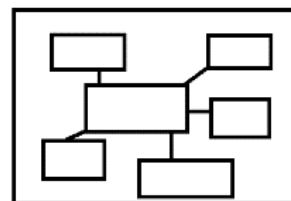


MEASUREMENT

LESSON OBJECTIVES

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

MEASUREMENT: LIST OF SECTIONS



MEASUREMENT: EXAMINATION GUIDELINES



Section	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Perimeter, area and volume	<ul style="list-style-type: none"> Define terms (e.g., 'area', 'perimeter', 'volume', 'radius'). Identify from a list of given formulae which formulae relate to perimeter calculations, which relate to area calculations, etc. Determine the radius of a circle from a given diameter. Know that area is expressed in units² (e.g., cm²) and volume in units³ (e.g., cm³). Know and use formulae for perimeter, area and volume. 	<ul style="list-style-type: none"> Calculate perimeter, area and volume by substituting given values into given formulae. Describe relationships between input and output values in a table of data concerning space, shape and measurement. 	<ul style="list-style-type: none"> Perform preliminary calculations to determine dimensions required in perimeter/area/volume calculations and then calculate perimeter/area/volume (e.g. when asked to determine the volume of concrete needed for the foundations of a house, interpret top view plans of the foundation trench of a house, use the plans to determine the dimensions of the trench, and then calculate the volume of the trench). 	<ul style="list-style-type: none"> Use perimeter, area and/or volume calculations to complete a project, where it is not stated specifically what type of calculation is required, (e.g. when asked to determine the amount of paint needed to paint a building, first interpret plans to determine dimensions of the walls, then calculate the surface area of the walls, then use the paint conversion ratio on the back of the paint tin to determine the required number of litres of paint required).

IMPORTANT TERMINOLOGY



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

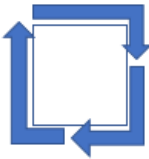
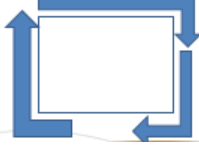
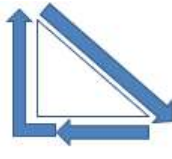

Perimeter

What is Perimeter?

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

Understanding Perimeter




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

Square	Rectangle	Triangle	Circle
			

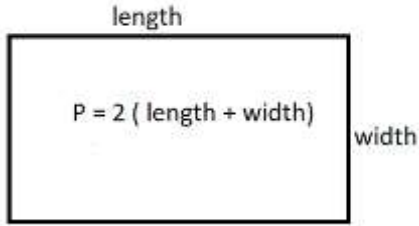
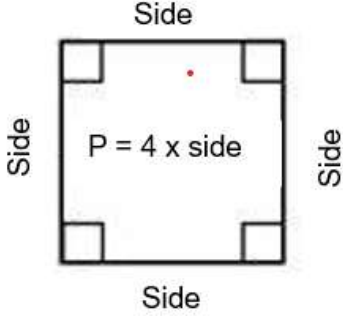
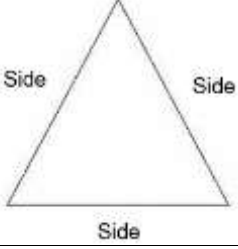
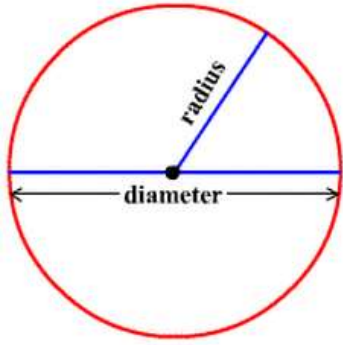
How to calculate Perimeter

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

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

<p style="text-align: center;">Rectangle</p> <div style="text-align: center;"><p style="text-align: center;">162 cm</p><p style="text-align: right;">800 mm</p></div>	
<p>Perimeter = 2 x (length + width)</p> <p> = 2 x (162 cm + 800 mm)</p> <p>= 1924 mm</p>	<p>Perimeter = 2 x (length + width)</p> <p> = 2 x (1620 mm + 800 mm)</p> <p>= 4840 mm</p>

Shapes involved when calculating Perimeter:

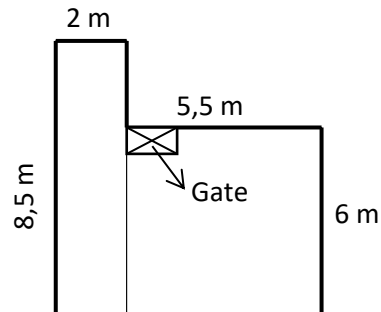
Shape	Perimeter Formula	
Rectangle	Perimeter = $2 \times \text{length} + 2 \times \text{width}$	
Square	Perimeter = $4 \times \text{length}$ OR Perimeter = $4 \times \text{sides}$	
Triangle	Perimeter = Length 1 + length 2 + length 3	
Circle	Perimeter (Circumference) = $\pi \times (2 \times \text{radius})$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

ACTIVITY 1: Perimeter

(25 marks:20 minutes)



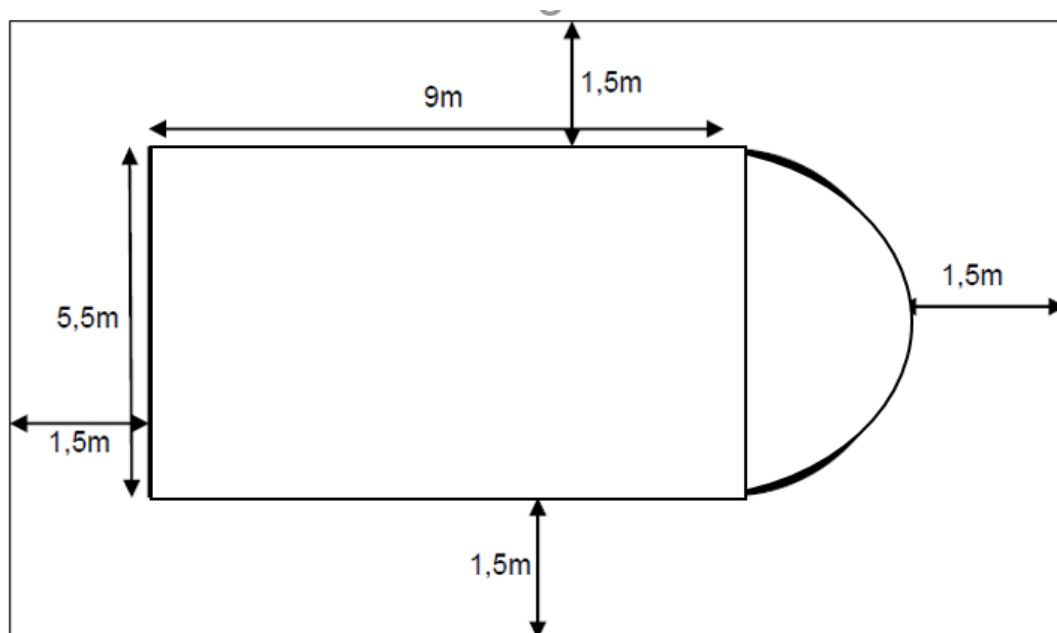
- 1.1 Sam would like to design a vegetable garden. The measurements (dimensions) of Sam's vegetable garden are given below:



Width of the gate = 1 m

Use the information above to answer the questions that follow.

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



- 1.2.1 Explain the term **perimeter** according to the context given above. (2)

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

Area

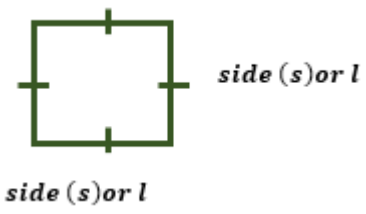
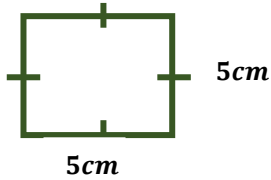
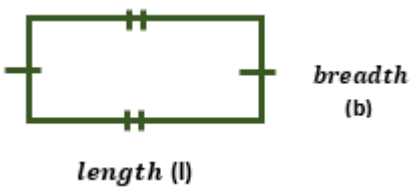
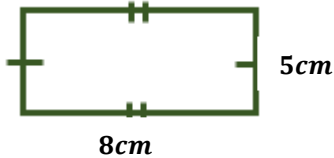
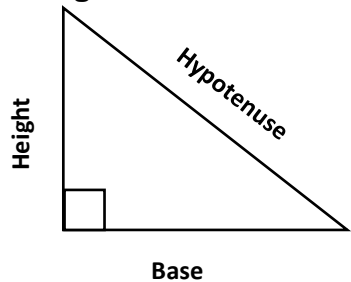
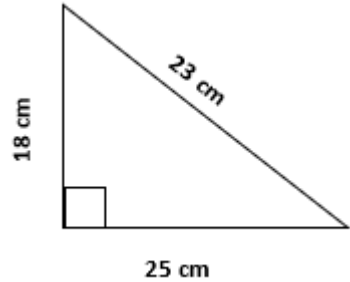
What is an area?

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

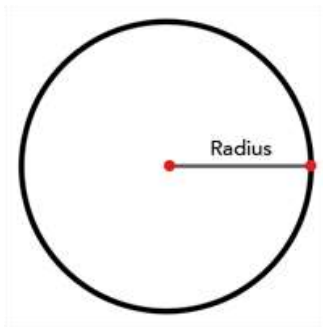
Understanding Area

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

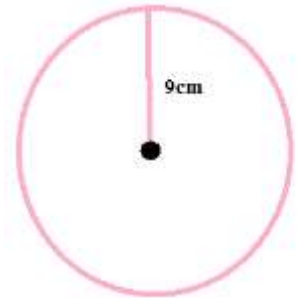
Area of a square, rectangle, triangle, and circle.

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

Circle



$$\begin{aligned}\text{Area} &= \pi \times \text{radius}^2 \\ &= \pi \times r^2\end{aligned}$$



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

Working with Area

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

Surface Area

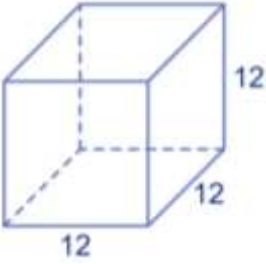
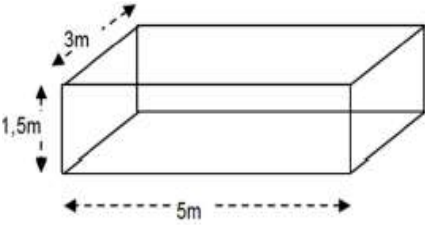
What is Surface Area?

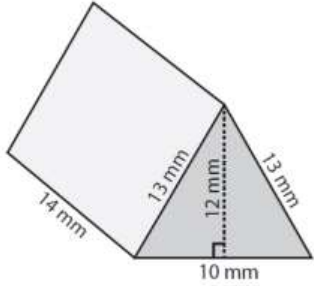
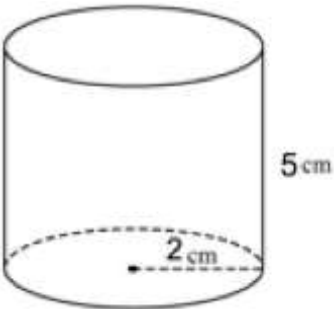
- The total exterior area of all the exposed surface area a 3D object.

Understanding Area

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

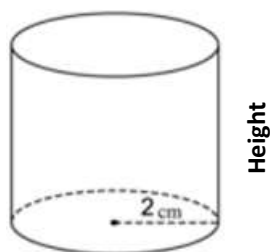
Total Surface Area of a rectangular prism and cylinder.

Shape	Total Surface Area (TSA)	Worked Examples
<p>Cube</p> 	<p>Total Surface Area (TSA) $= 6 \times \text{side}$</p>	<p>Total Surface Area (TSA) $= 6 \times \text{side}$ $= 6 \times 12$ $= 72 \text{ units}^2$</p>
<p>Rectangular Prism</p>  <p>Length = 5m Breadth = 3m Height = 1,5m</p>	<p>Total Surface Area (TSA) $= (2 \times \text{length} \times \text{breadth}) +$ $(2 \times \text{length} \times \text{height}) +$ $(2 \times \text{breadth} \times \text{height})$</p>	<p>Total Surface Area (TSA) $= (2 \times 5\text{m} \times 3\text{m}) + (2 \times 5\text{m} \times 1,5\text{m}) + (2 \times 3\text{m} \times 1,5\text{m})$ $= 54 \text{ m}^2$</p>

<p>Triangular Prism</p>  <p>Breadth = 10 mm height = 12 mm side = 13 mm Height = 14 mm</p>	<p>Total Surface Area = $2 \times \left(\frac{1}{2} \times \text{breadth} \times \text{height}\right)$ + (side + side + side) x Height</p>	<p>Total Surface Area = $2 \times \left(\frac{1}{2} \times 10 \times 12\right) +$ $(13 + 13 + 10) \times 14$ = 624 mm²</p>
<p>Cylinder</p> 	<p>Total Surface Area = $2 \times (\pi \times \text{radius}^2) + (2 \times \pi \times \text{radius}) \times \text{height}$ Where $\pi = 3,142$</p>	<p>Total Surface Area = $2 \times (3,142 \times 2^2) + (2 \times 3,142 \times 2) \times 5$ = 87,976cm²</p>

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

Total surface area = 87,976cm²



$$\text{T.S.A} = 2 \times (\pi \times \text{radius}^2) + (2 \times \pi \times \text{radius}) \times \text{height}$$

$$87,976 \text{ cm}^2 = 2 \times (3,142 \times 2^2) + (2 \times 3,142 \times 2) \times \text{Height}$$

$$87,976 \text{ cm}^2 = 17,5952 \times \text{Height}$$

$$\frac{87,976 \text{ cm}^2}{17,5952 \text{ cm}} = \text{Height}$$

$$\therefore \text{Height} = 5 \text{ cm}$$

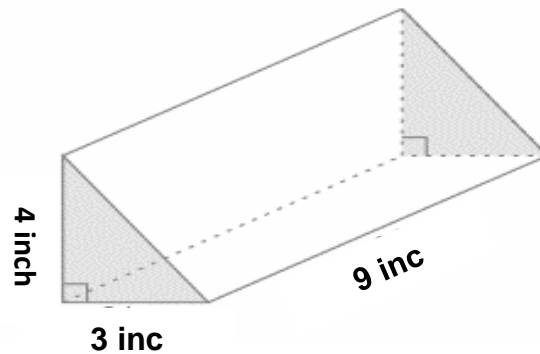
ACTIVITY 2: Area and Surface Area

(27 marks:25 minutes)



1.1

Joel's father is a carpenter, and he was given a quotation with imperial units by a client. Study the diagram below and answer the questions that follow.



1.1.1 Write down the unit of measurement used in diagram above in full. (2)

1.1.2 Calculate the area of the front view of the shape.

You may use the following formula:

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{perpendicular height} \quad (3)$$

1.1.3 Calculate the surface area of the following solid shape.
(slanted side = 5 inc)

You may use the following formula:

$$\text{SA} = 2 \left(\frac{1}{2} \text{base} \times \text{height of triangle} \right) + (S+S+S) \times H \quad (7)$$

1.1.4 In order to understand the dimensions clearly, Joel's father requested him to convert the measurement to cm. He gave his father the following measurements.

Height = 22,86 cm

Base = 7,88 cm

height = 10,16

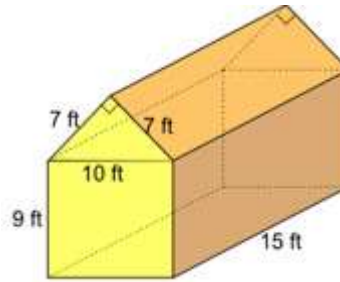
Slanted side = 10,1

Use the conversion factor given below to verify his answer.

1 inc = 2,54 cm

(5)

- 1.2 The diagram below is an illustration of a barn. A barn is normally a structure used on farms to store farming equipment.
(Not drawn to scale)
The area of each triangle is given as:
 $A = 24,5 \text{ ft}^2$



- 1.2.1 Calculate the surface area of the roof barn.

You may use the following formula:

$$\text{SA} = 2 \left(\frac{1}{2} \text{ base} \times \text{height of triangle} \right) + (S + S + S) \times h \quad (7)$$

- 1.2.2 Convert this measurement to square metres using the following: $1 \text{ ft}^2 = 0.09 \text{ m}^2$ (3)

- 1.2.3 Use the converted measurements to calculate the area of the bottom part of the barn.

You may use the following formula:

$$\text{Area} = \text{length} \times \text{breadth} \quad (3)$$

- 1.2.4 The walls of the barn will be painted a different colour to the roof. Calculate the amount of paint that will be needed if the spread rate of the paint is 0,25 litres per 2 m^2 (10)

Volume

What is a Volume?

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

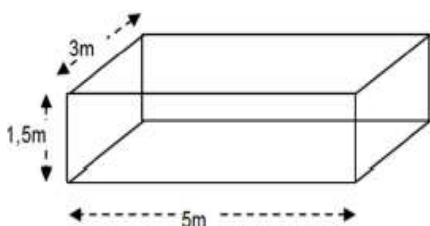
What is Capacity?

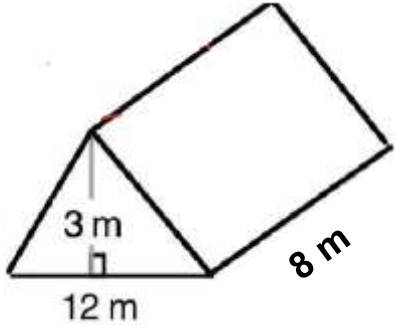
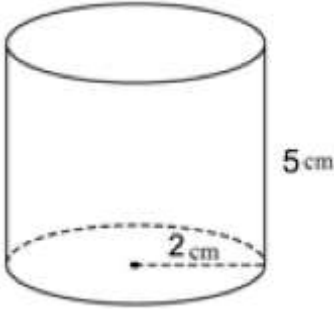
- The amount an object can hold.
E.g., the capacity of the stadium is how many spectators it can hold, whereas the volume is the space they occupy.

Understanding Volume

- It is also known as Capacity.
- Shapes are three dimensional (3D).
- Units of a volume include m³, l and k^l
- Units of a solid volume include: mm³, cm³, m³, km³

Total Surface Area of a rectangular prism and cylinder.

Shape	Volume (V)	Worked Examples
<p>Rectangular Prism</p>  <p>Length = 5m Breadth = 3m Height = 1,5m</p>	<p>Volume = length x breadth x height</p>	<p>$V = 5\text{m} \times 3\text{m} \times 1,5\text{m}$ $= 22,2 \text{ m}^3$</p>

<p>Triangular Prism</p>  <p>Base = 12m height = 3m Height = 8m</p>	<p>Volume = $\frac{1}{2} \times b \times h \times H$</p>	<p>$V = \frac{1}{2} \times b \times h \times H$ $= \frac{1}{2} \times 12\text{m} \times 3\text{m} \times 8\text{m}$ $= 144\text{m}^3$</p>
<p>Cylinder</p>  <p>Radius = 2cm Height = 5 cm</p>	<p>Volume = $\pi \times \text{radius}^2 \times \text{height}$</p> <p>Where $\pi = 3,142$</p>	<p>$V = 3,142 \times (2 \text{ cm})^2 \times 5\text{cm}$ $= 62,84 \text{ cm}^3$</p>

Calculating Volume

- Make sure that units are the same before substituting into the given formula.
- When the diameter is given, divide it by two to get the radius before substituting into the formula.
- (radius)² does not mean “multiply by 2”.

e.g. $5^2 = 5 \times 5 = 25$ ✓

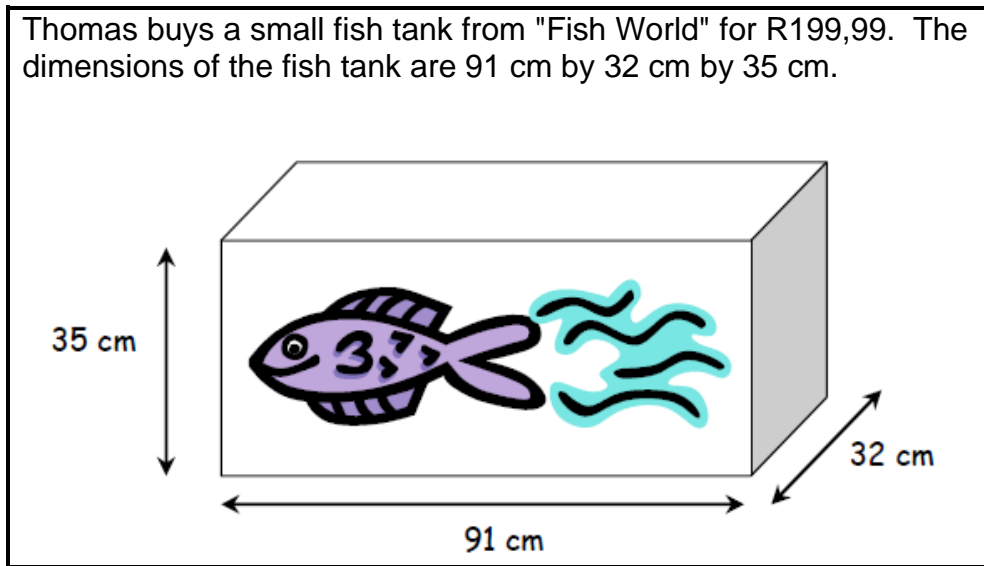
$5^2 \neq 5 \times 2$ ✗

ACTIVITY 3: Volume

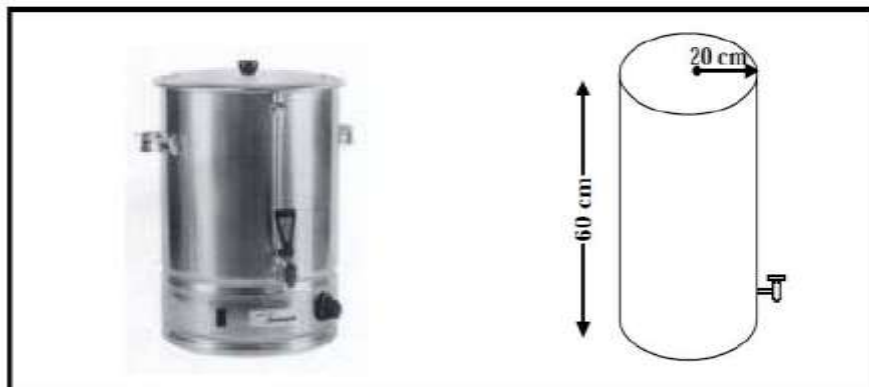
(13 marks:10 minutes)



- 1.1 Thomas buys a small fish tank from "Fish World" for R199,99. The dimensions of the fish tank are 91 cm by 32 cm by 35 cm.



- 1.1.1 Calculate the volume of the tank in cm^3 (3)
- 1.1.2 Convert the volume of the tank into m^3 . (3)
- 1.1.3 Determine how many litres of water will the tank hold when full. (3)
- 1.2 Lebo purchased a cylindrical urn in which she can boil water. The height of the urn is 60 cm and the radius is 20 cm, as shown below.



Calculate the volume of the water urn.

You may use the following formula:

Volume of cylinder = $\pi \times (\text{radius})^2 \times \text{height}$ using $\pi = 3,142$. (4)

ACTIVITY 4: Perimeter and Area

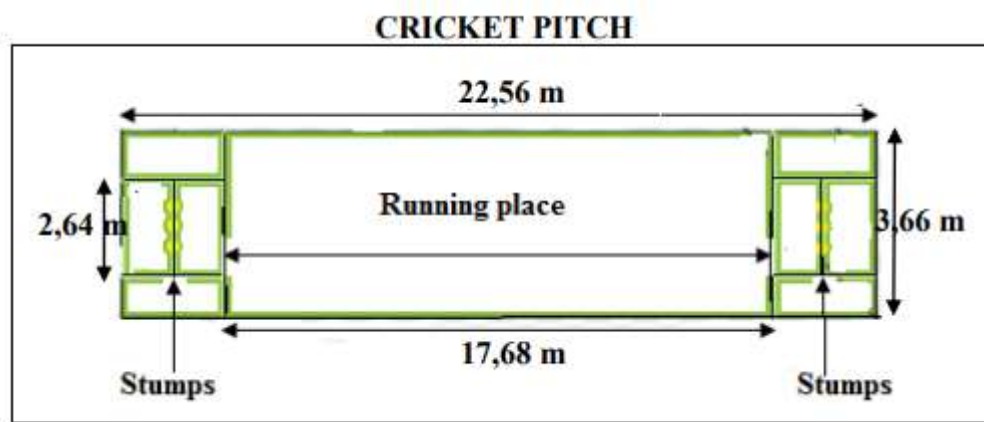
(20 marks:15 minutes)



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

- 1.1.1 Calculate the perimeter of the gate. (2)
- 1.1.2 Calculate the area occupied by the gate. You may use the following formula: **Area = length × height** (2)

- 1.2 A diagram of the cricket pitch is shown below. Study the diagram and answer the questions that follow.



- 1.2.1 Explain the term 'perimeter'. (2)
- 1.2.2 Calculate the perimeter of the area where the players run during cricket overs.

You may use the following formula:

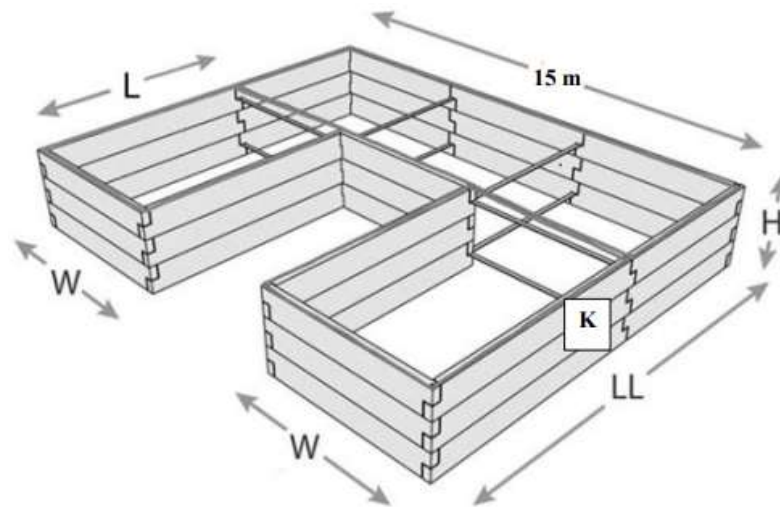
$$\text{Perimeter} = 2 (\text{length} + \text{width}) \quad (2)$$

- 1.2.3 Calculate the area (m^2) of the cricket pitch.

You may use the following formula:

$$\text{Area} = \text{Length} \times \text{Width} \quad (3)$$

- 1.3 Mr Phopa intends building an all-round rectangular flower garden bed made of wood sheets as shown on the plan below.



Source:www:bin.com

KEY:

L = 5 m

LL = 7,5 m

W = 5 m

H = 500 mm

Use the information above to answer the questions that follow.

- 1.3.1 Calculate the perimeter of the garden bed above. (2)

- 1.3.2 Determine the area (in square meters) of side labelled K.

You may use the following formula:

$$\text{Area} = \text{Length} \times \text{Width} \quad (4)$$

- 1.3.3 The volume of soil that will be used to fill the flower bed to capacity is 95 m^3 . Calculate the area of the area occupied by the soil in the garden bed.

You may use the following formula:

$$\text{Area of the base} = \text{Volume} \div \text{Height} \quad (3)$$

ACTIVITY 5: Perimeter and Area

(25 marks:20 minutes)



- 1.1 Funza Primary School learners grow and sell vegetables from the school's food garden. The food garden is shown on **ANNEXURE A**.

Use the information on **ANNEXURE A** to answer the questions follow:

- 1.1.1 Determine the perimeter of the food garden.

You may use the following formula:

$$\text{Perimeter of a rectangle} = (2 \times \text{length}) + (2 \times \text{breadth}) \quad (3)$$

- 1.1.2 Determine the Area (in m²) of the strawberry plot.

You may use the following formula:

$$\text{Area of a rectangle} = \text{length} \times \text{breadth} \quad (3)$$

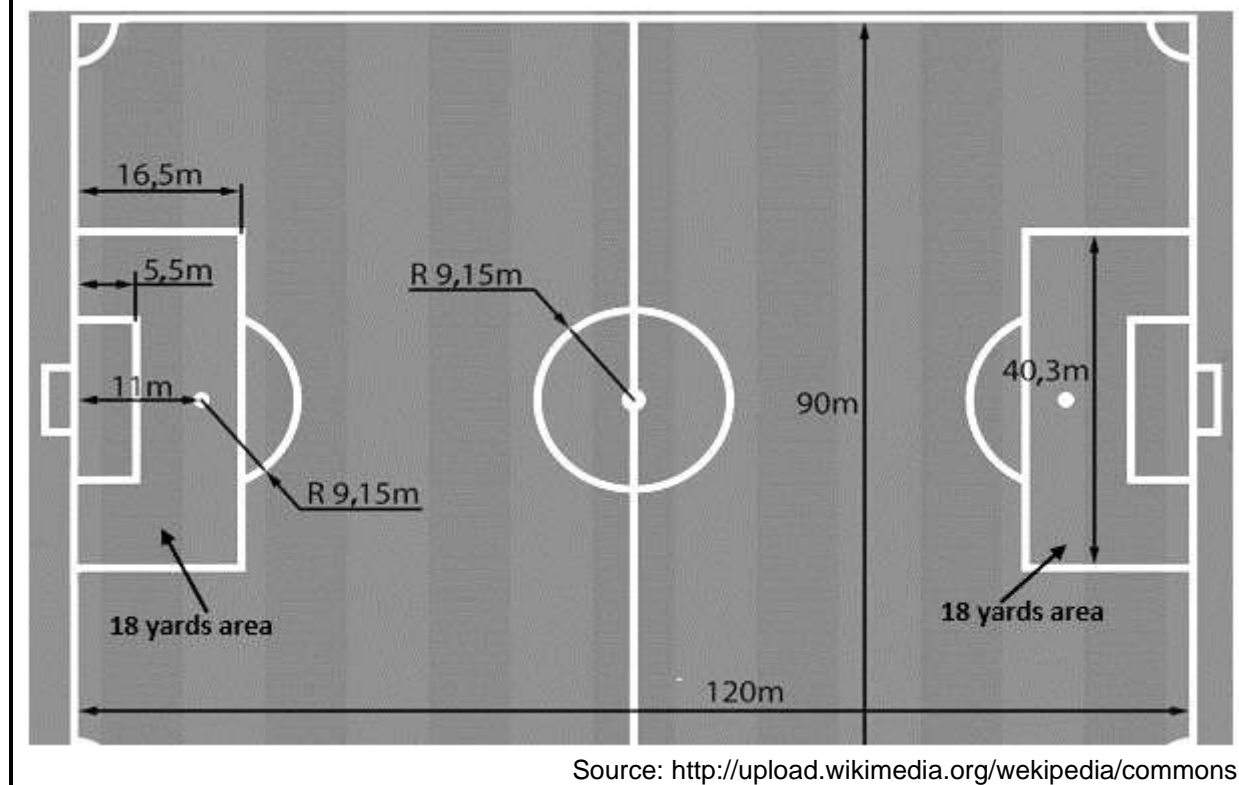
- 1.1.3 The learners intend to pour organic compost over the strawberry plot. One bag of compost costing R60,50 can cover an area of 3,5 m².

Determine the total cost to buy the compost to cover the strawberry plot. (5)

- 1.1.4 Potatoes are consumed by humans as biofuel, if 50kg of potatoes are produced every season and 10kg can feed a family of 10 persons.

How many people/persons can be fed from the seasonal production? (3)

1.2 A diagram with dimensions of a municipal soccer field is shown on below.



Use diagram above to answer the questions that follow.

1.2.1 Explain the meaning of the term *perimeter*. (2)

1.2.2 Determine the perimeter of the soccer field.

You may use the following formula:

$$\text{Perimeter} = 2 (\text{Length} + \text{Width}) \quad (2)$$

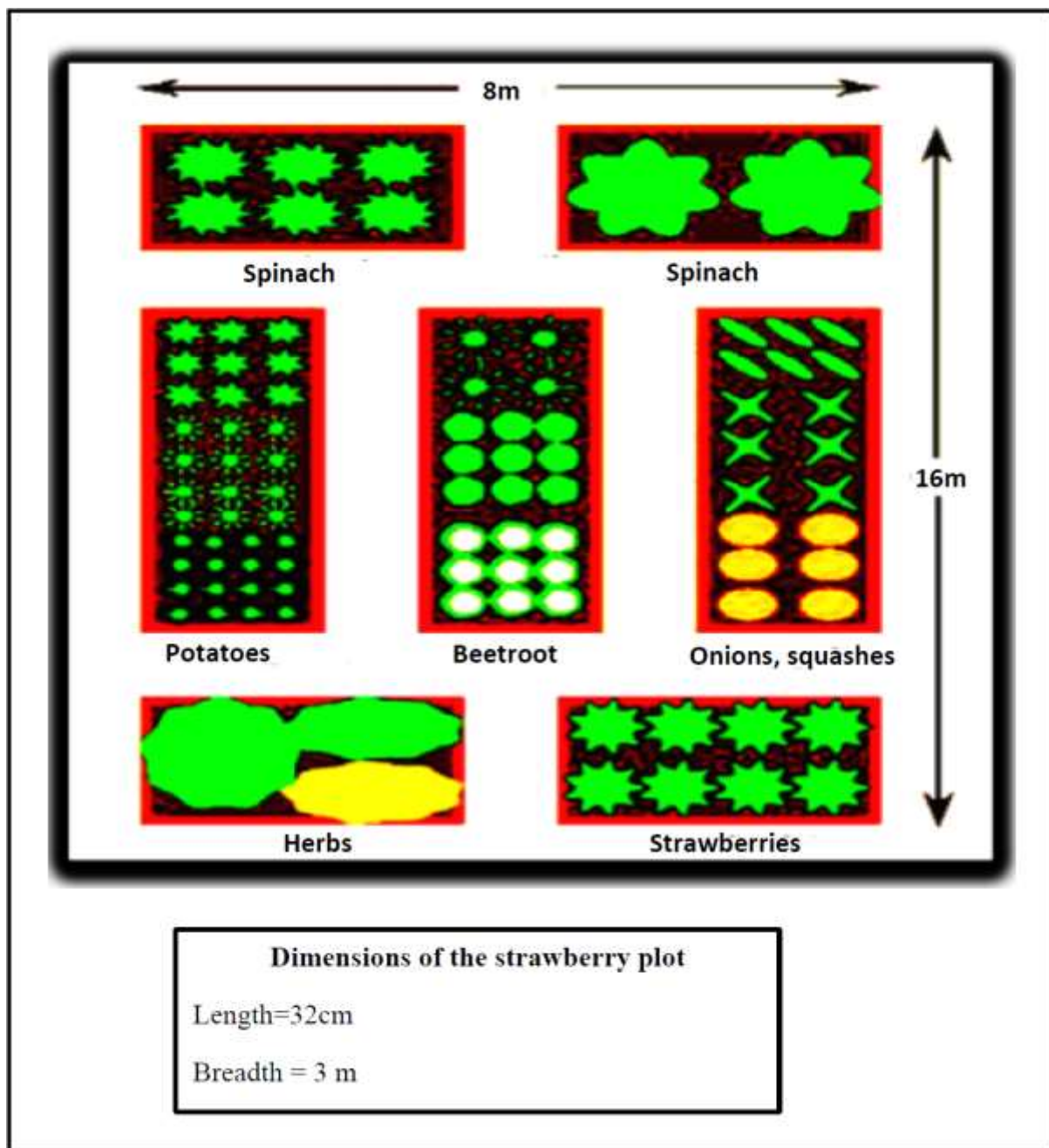
1.2.3 The municipality intends to put fertilizer on the lawn of both 18 yards areas. Calculate the total area to be fertilized.

The following formula may be used:

$$\text{Area} = \text{Length} \times \text{Width} \quad (4)$$

1.2.4 One bag of fertilizer can cover an area of 10m^2 . Determine the number of bags of fertilizer needed for the area specified in 1.2.3. (3)

ANNEXURE A

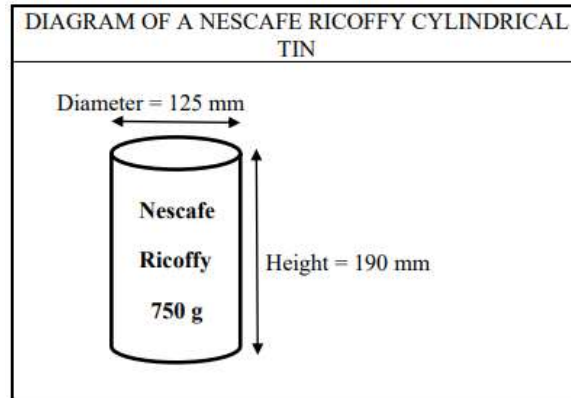


ACTIVITY 6: Volume

(27 marks:25 minutes)



- 1.1 Lethabo bought a 750 g tin of Nescafe Ricoffy for his family during lockdown. Study the diagram below and answer the questions that follow.



- 1.1.1 Write down the dimension of the radius. (2)
- 1.1.2 Explain the meaning of the term 'volume'. (2)
- 1.1.3 Calculate the volume (in cm^3) of the cylindrical Nescafe Ricoffy coffee tin.

You may use the following formula:

Volume = $\pi \times \text{radius} \times \text{radius} \times \text{height}$, where $\pi = 3,142$ (3)

- 1.2 Roseville College erects a Jojo water tank on a stand in order to save water for Agricultural Science students. The photo of a Jojo water tank and prices of stands are

PHOTO OF A JOJO WATER TANK



The dimensions of the water tank are:

Diameter = 2 230 mm

Height = 3 130 mm

ALL PRICES OF STANDS EXCLUDE 15% VAT

Height	Primed	Galvanised
1,5 m	R7 800,00	R8 900,00
3,0 m	R8 300,00	R9 700,00
4,5 m	R9 500,00	R12 500,00

Source: www.rainharvest.co.za

- 1.2.1 Determine the radius in metres. (3)

- 1.2.2 Calculate the volume of the tank in kilolitres (to the nearest kilolitre). Show all calculations.
You may use the following formula:
Volume of a cylinder = $\pi \times \text{radius}^2 \times \text{height}$ use $\pi = 3,142$
NOTE: 1m³ = 1 kl (5)
- 1.2.3 The side length of the square platform is 5% more than the diameter of the water tank. Calculate the area in m² of the square platform on which the tank stands. (5)
- 1.2.4 The College will buy a galvanized stand with a height of 4,5 m. Calculate the VAT inclusive price of the stand. (2)
- 1.2.5 Calculate the common difference in heights of the three stands. (2)
- 1.2.6 Water is pumped at a rate of 1 kilolitre per 5 minutes into the tank. How long will it take in hours to fill the tank with capacity of 2 500 kilolitres? (3)

ACTIVITY 7: Area and Total Surface Area

(27 marks:25 minutes)



- 1.1 A cardboard box is used to pack a telescope. Study the diagram below and answer the questions that follow.



1.1.1 Convert the length of the box to cm. (2)

1.1.2 Calculate the surface area in cm^2 of the box in which they will pack the telescope.

You may use the following formula:

$$SA = 2(l \times b) + 2(b \times h) + 2(l \times h)$$

(5)

1.1.3 Write down the geometric shape of the box. (2)

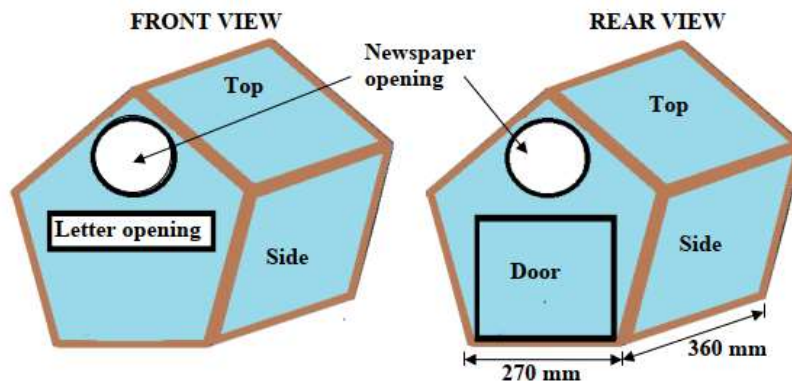
1.1.4 The surface temperature of the planet Mars is -67°F . Convert -67°F to $^\circ\text{C}$.

You may use the following formula:

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

(2)

- 1.2 Koos lives in Pelican Road in Port Elizabeth. He is making a pentagonal post box for a house as shown in the diagrams below:



The front and rear ends of the post box are regular pentagons with side lengths equal 270mm. The bottom, the top and sides of the post box are rectangles with a length 360mm and a breadth of 270mm.

Use the information above to answer the questions that follow:

- 1.2.1 Calculate the perimeter of ONE of the pentagonal ends of the post box. (2)
- 1.2.2 Calculate the total surface area (in m^2) of the post box (excluding the openings for the newspaper and letter), if the following are given:

SHAPE	AREA
Pentagon	$0,13\text{m}^2$
Letter opening	$0,017\text{m}^2$
Newspaper opening	$0,013\text{m}^2$

You may use the following formula:

Area of a rectangle = length \times breadth

Total surface area of post box = 5 \times areas of rectangles (side) + area of front + area of back (5)

- 1.2.3 A newspaper folded into a cylindrical shape has a diameter of 12 cm. The area of the newspaper opening of the post box is $0,013 \text{ m}^2$. Show, with calculation, whether the folded newspaper will fit in the newspaper opening of the post box.

You may use the following formula:

Area of a circle = $\pi \times \text{radius}^2$ and $\pi = 3,142$ (5)

ACTIVITY 8: Perimeter, Area, Total Surface Area and Volume

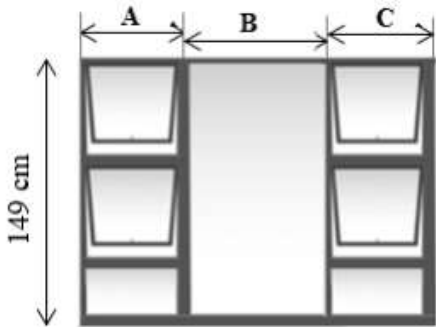
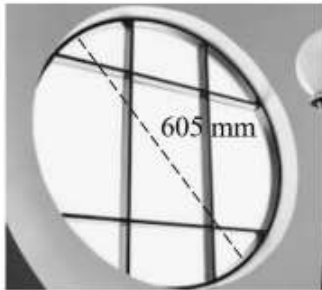


(50 marks:45 minutes)

- 1.1 Tshego is renovating her home. She is removing the wooden-framed windows and is replacing them with aluminium-framed windows.

The dimensions and the shape of two of the window frames are given below. In the rectangular window frame, four windows can open.

It has three sections: A, B and C. The circular window frame has no windows that can open.

RECTANGULAR WINDOW FRAME	CIRCULAR WINDOW FRAME
 <p>Outer dimensions of the window frame: Length A = 55 cm, B = 99 cm and C = 55 cm. Width = 149 cm</p>	 <p>Inner diameter = 605 mm</p>

[Source: www.premiumaluminium.co.za]

The following formulae may be used:

Area of a rectangle = length \times width

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

Perimeter of a rectangle = $2(\text{length} + \text{width})$

Circumference of a circle = $3,142 \times \text{diameter}$

Use the information above to answer the questions that follow.

- 1.1.1 Determine the perimeter of the rectangular window frame. (3)
- 1.1.2 Calculate the inner area in cm^2 of the circular window frame. (4)
- 1.1.3 Calculate the area of the rectangular window frame. (3)

1.2 Tshego also intends tiling the dining room and lounge floors.

The dimensions of the lounge floor are 4 m by 5 m and of the dining room floor 3 m by 4 m.

Information and cost:

- Tshego intends using tiles that are 35 cm by 35 cm.
- One box of 4 tiles costs R143,84.
- Tile cement costs R99,90 per 20 kg bag, which covers 3 m².
- She needs 4 bags of tile grout at R89,90 per 5 kg bag.
- The cost of labour is R2 500.
- Tshego's total budget for the tiling project is R15 000.

Use the information above to answer the questions that follow.

1.2.1 Show that the total floor area to be tiled is 32 m².

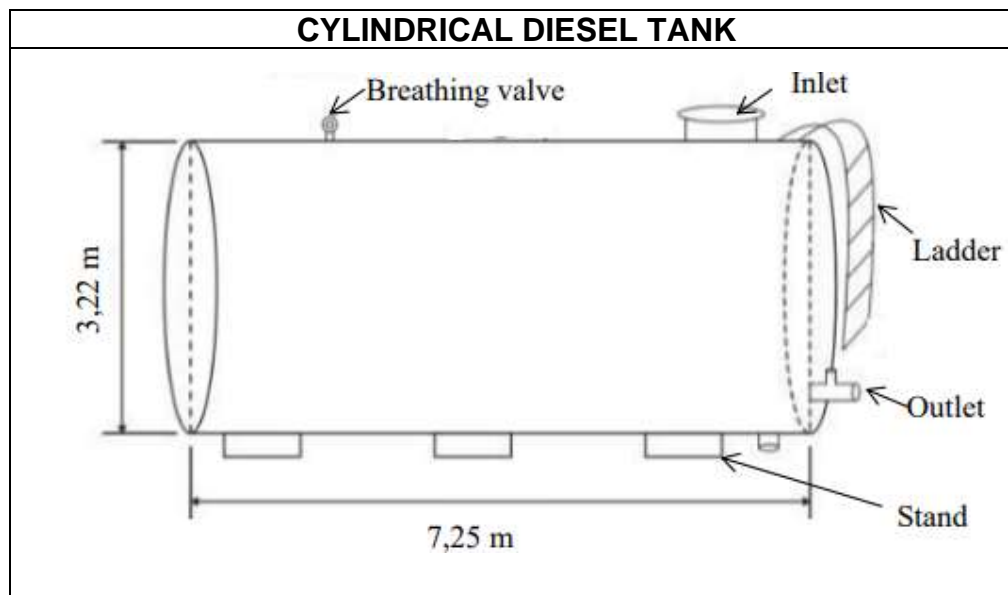
You may use this formula:

Area of a rectangle = length × width (2)

1.2.2 Determine how many boxes of tiles Tshego will need if an extra 10% of the number of tiles must be added for cutting and breakages. (9)

1.2.3 Show by means of calculations if Tshego's budget is enough to finish the tiling project. (8)

- 1.3 Tshego owns a company which manufactures the generators. Most of the cinemas buy the generators so that they can continue showing the movies during loadshedding. The diesel for the generator is stored in a cylindrical diesel tank shown below.



[Source: abovegroundstoragetanks.com]

INFORMATION:

- The stand and all external attachments are made of stainless steel and will not be painted.
- The base area of these external attachments is 1 m^2 .
- $1 \text{ m}^3 = 1\,000 \text{ l}$
- All dimensions shown are outer measurements

Use the information above to answer the questions that follow.

1.3.1 Calculate the perimeter of the diesel tank (3)

1.3.2 The steel used to make the tank is 5 mm thick all around. For safety reasons, the tank is filled to 95% of its capacity.

(a) Show that the inner diameter of the tank is 3,21 m. (2)

(b) Calculate the maximum litres of diesel that this tank can hold according to safety regulations.

You may use this formula:

$$\text{Volume of a cylinder} = 3,142 \times (\text{radius})^2 \times \text{height} \quad (8)$$

- 1.3.3 The external surface area of the tank, excluding the base area of the external attachments, needs to be painted. The spread rate of the paint is $3 \text{ m}^2 / \ell$. The manager states that he would need less than 30 litres of paint to complete the task. Verify, by showing ALL calculations, whether the manager is CORRECT.

You may use this formula:

**Surface area of a cylinder (in m^2) = $2 \times 3,142 \times r (r + h)$,
where r = radius and h = height. (8)**

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