education
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12



MATHEMATICAL LITERACY P2

SEPTEMBER 2023

Stanmorephysics

MARKS: 150

TIME: 3 hours

This question paper consists of 13 pages and an addendum with 4 annexures.

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INSTRUCTIONS AND INFORMATION

1. This question paper consists of **FIVE** questions. Answer **ALL** the questions.
2. Use the ANNEXURES in the ADDENDUM for the following questions:

   ANNEXURE A for QUESTION 2.1
   ANNEXURE B for QUESTION 3.1
   ANNEXURE C for QUESTION 4.1
   ANNEXURE D for QUESTION 4.2

3. Number the answers correctly according to the numbering system used in this question paper.
4. Start EACH question on a NEW page.
5. You may use an approved calculator (non-programmable, non-graphical), unless stated otherwise.
6. Show ALL calculations clearly.
7. Round off ALL final answers appropriately according to the given context, unless stated otherwise.
8. Indicate units of measurement, where applicable.
9. Maps and diagrams may not be drawn to scale, unless stated otherwise.
10. Write neatly and legibly.

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QUESTION 1

1.1 A 375 kVa electricity generator of 375 kVa with an output of 300 kW is used as a backup during an electricity outage (i.e. load shedding).

NOTE: kVa = Kilovolt-amps.
kW = Kilowatts
1 kW = 1 000 watts.

Use the information above to answer the questions that follow.

1.1.1 Convert the 300kW to watts. (2)

1.1.2 Determine the ratio of kW to kVa in a simplified form. (2)

1.1.3 Sam started the generator on Tuesday at the time shown on the watch below.



[Source:amazon.com]

(a) Identify the time format shown on the watch. (2)

(b) Determine the day and time of switching the generator off if it ran for 2 hours 15 minutes. (3)

1.2 The picture below shows a wheel for a motorbike.



[Source:Dreamsteam.com]

Use the picture of the wheel above to answer the questions that follow.

1.2.1 Convert the radius of the wheel to metres. (2)

1.2.2 Determine in meters, the diameter of the wheel. (2)

1.2.3 State the number of spokes that are on the wheel. (2)

1.3 A picture of the motorbike dashboard is shown below.



[Source:Dreamsteam.com]

Use the picture above to answer the following questions.

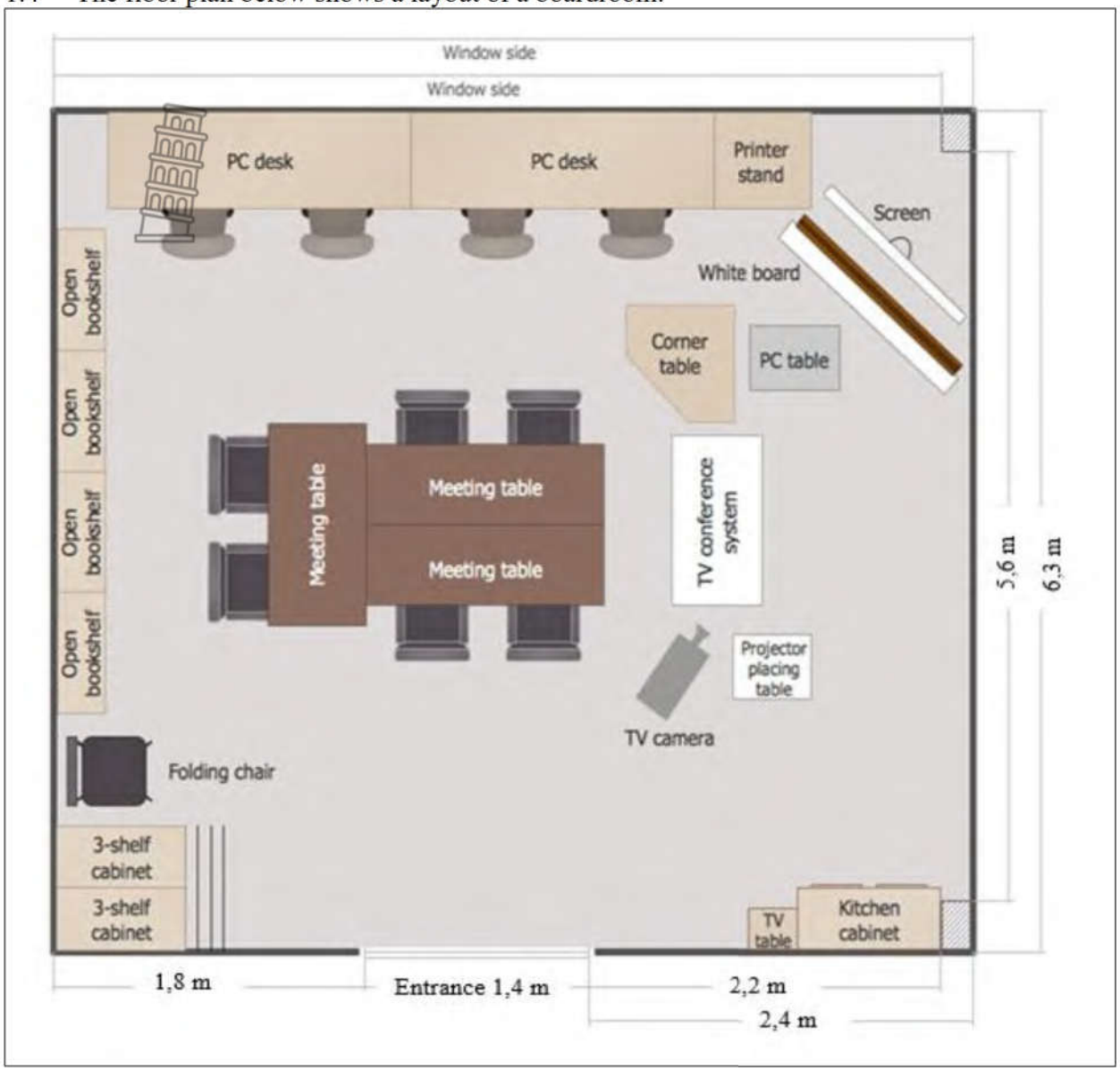
1.3.1 Identify the speed of the bike. (2)

1.3.2 State in full the unit of measuring temperature displayed on the picture. (2)

1.3.3 What was the distance traveled by a bike the time picture above was taken. (2)

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1.4 The floor plan below shows a layout of a boardroom.



NOTE: The entrance is on the South

[Source:Wikipedia]

Use the floor plan above to answer the questions that follow.

1.4.1 Determine the number of open bookshelves in the boardroom. (2)

1.4.2 How many types of chairs are in the boardroom. (2)

1.4.3 State the mathematical shape is the meeting tables. (2)

1.4.4 Measure the length of the white board in mm. (2)

1.4.5 Calculate the maximum length of the southern wall. (2)

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QUESTION 2

2.1 ANNEXURE A shows a route map of the TWO OCEANS marathon

Use ANNEXURE A to answer the questions that follow.

2.1.1 Explain the term "route map." (2)

2.1.2 Identify the number of refreshment stations shown on the map. (2)

2.1.3 Explain the purpose of the following:

(a) Refreshments stations at the marathon (2)

(b) Having medical points on average 2 – 5 km distance apart in a marathon. (2)

(c) Cut-off points in a marathon after certain distances. (2)

2.1.4 Identify the general direction of Noordhoek from the START. (2)

2.1.5 Identify the name of the place on the Two Oceans marathon after refreshment station 4 (2)

2.1.6 Why do you think the organizers have registrations dates for the Two Oceans marathon? (2)

2.2 The marathon starts at 05:00 and has a maximum of 7 hours' duration from start to finish.
Gerda Steyn 2022 women runner record breaker covered the marathon distance in 3:30:42.

The marathon organizers claimed that she was running at an average speed of 20 km/h.

Use calculations to verify if the organisers claim is CORRECT.

The following formula may be used: $\textbf{Time} = \frac{\textbf{Distance}}{\textbf{Speed}}$ (4)

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QUESTION 3

3.1 A car manufacturer wants to design new fuel tanks for a Micra 66 Kw Turbo Visia. Their options were to build a rectangular or cylindrical fuel tank.

On ANNEXURE B are pictures and diagrams of rectangular and cylindrical fuel tanks with dimensions for the designs.

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

3.1.1 Determine the volume of the rectangular prism fuel tank in litres.

You may use the formula: **Volume = length × width × height** (5)

3.1.2 The manufacturer mentioned that the capacity of the cylindrical fuel tank is 10 litres more than the capacity of the rectangular prism fuel tank.

Verify, showing all calculations, whether the statement is CORRECT.

You may use the formula: **Volume = 3,142 × radius^2 × height** (7)

3.1.3 (a) Calculate (in m^2) the surface area of cylindrical fuel tank due to receive ONE coat of paint, if:

- The spread rate of the paint is 4 m^2 per litre.
- The cylindrical fuel tank has two openings with an area of 12,568 cm^2 each.

The following formula may be used:

Surface area of cylinder = 2 × π × radius^2 + 2 × π × radius × height, where **π** is **3,142**

(5)

(b) Determine the total surface area to be painted with two layers of paint. (2)

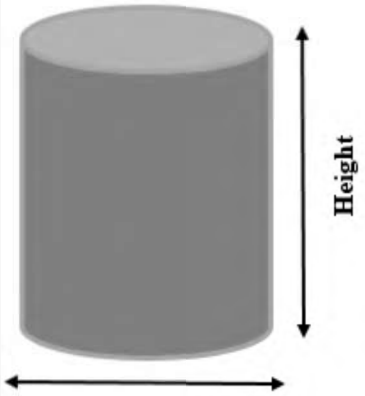
(c) Give the amount of paint (to the nearest litre) needed to paint the outside of the cylindrical fuel tank. (2)

(d) Give one reason why the fuel tank must be painted. (2)

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3.1.4 The paint is filled to 90% of the capacity of the tin.

The diagrams and dimensions of the paint tin are given below.

PICTURE OF PAINT TIN	DIAGRAM OF PAINT TIN WITH DIMENSIONS
	

[Source: Alibaba.com]

Use the information above to answer the questions that follow.

Determine:

(a) The radius of the paint tin. (2)

(b) The highest level reached by paint in the tin.

You may use the following formula: **Volume = 3,142 × radius^2 × height** (4)

(c) In litres, the amount of empty space in the tin. (3)

3.2 The garage sells three brands of Nissan Micra cars which are Micra 66 Kw Turbo Visia, Micra 66 Kw Turbo Acenta and Micra 66 Kw Turbo Acenta Plus.

The colours on each are white, silver grey or metallic blue.

The pictures of the cars are shown below.

PICTURES OF NISSAN MICRA CARS

MICRA 66 Kw TURBO VISIA	**MICRA 66 Kw TURBO ACENTA**	**MICRA 66 Kw TURBO ACENTS PLUS**
		

[Source:nissancars.com]

Use information above to answer the questions that follow.

3.2.1 State the number of possible combinations when buying any of the Micra cars. (2)

3.2.2 Determine the probability of a buyer randomly choosing a white coloured car. (2)

3.2.3 Calculate the probability (to the nearest percentage) of a buyer randomly selecting a Micra Turbo Acenta or Micra Turbo Visia. (3)

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QUESTION 4

4.1 Mercy intends taking a ride in her car Micra 66 Kw from Bloemfontein to visit her family who lives in Paarl. On her way to Paarl she will visit a friend in Britstown.

ANNEXURE C is a strip map showing distances and towns on part of Cape Town and Bloemfontein.

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

4.1.1 Determine the distance from Bloemfontein to Paarl in context above. (3)

4.1.2 Show that the distance from the right off ramp at Hanover using **N10**, **N12** and back to **N1** is 300 km. (3)

4.1.3 On her way back from Paarl, Mercy left at 5:30.

Determine her arrival time if she was travelling at an average speed of 110 km/h.

You may use the following formula: $\textbf{Time} = \frac{\textbf{Distance}}{\textbf{Speed}}$ (6)

4.1.4 (a) The petrol consumption of the Micra 66 Kw is 5,1 litres per 100 km and its fuel capacity is 46 litres.

Mercy filled the fuel tank of the car to capacity in Paarl on her way back to Bloemfontein as it was empty. She stated that, she will have to refuel in Springfontein.

Verify, using calculations if the statement is CORRECT. (5)

(b) Determine the amount, in Rands, spent to fill up the car in Paarl if the cost is R21,60 per litre. (2)

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4.2 Mercy needs to buy a house for her parents in Paarl. The elevation and floor plan of the house she is interested to buy is shown on ANNEXURE D.

Use ANNEXURE D to answer the questions that follow.

4.2.1 Determine the total number of doors on the floor plan. (2)

4.2.2 Mercy decides that the floor of bedrooms 1 and 2 must be carpeted while the rest of the house will be tiled.

Each bedroom has a built-in cupboard of 0,9 m × 0,6 m, the carpet will not be put on the floor in the cupboards.

Determine the total area to be carpeted.

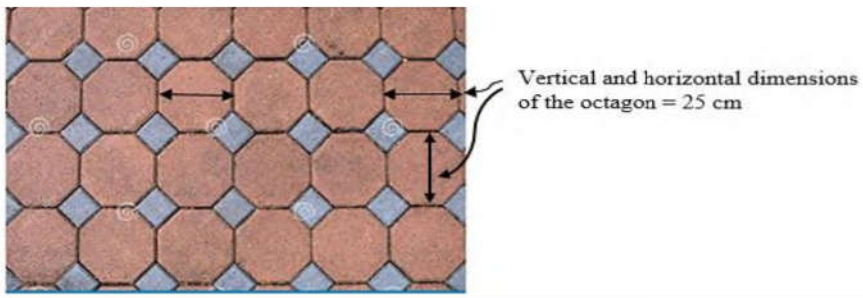
You may use the formula: **Area = length × width** (6)

4.2.3 Study the floor plan and suggest if it is an open plan or not an open plan. Explain the term "Open Plan". (4)

4.3 The builder wants to pave the carport using octagonal shaped pavements bricks. The dimensions of the carport are **500 cm × 300** cm.

The picture below shows octagonal shaped paving bricks to be used as pavement.

PICTURE OF OCTAGONAL SHAPED PAVING BRICKS.



[Source: Adapted from dreamstime.com]

4.3.1 Determine the number of octagonal shaped pavements bricks to be used on the length of the carport. (2)

4.3.2 Hence, determine the total number of octagonal shaped pavements bricks to be used on the carport. (3)

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QUESTION 5

5.1

South Africa has been experiencing daily power cuts on electricity supply. The South African households need 207,10 billion kWh of electricity per year.

An average household uses approximately 3,449 kWh - 9,5 kWh of electricity per day.

NOTE: 1kWh = 1000 watts

[Source adapted from www.worlddata.info & Mg.co.za 9 Nov 2022]

Use the information above to answer the questions that follow.

5.1.1 Calculate, in kWh, the annual maximum amount of electricity needed by each South African household. (2)

5.1.2 Determine the number of households that can be supplied with electricity per year. (2)

5.2

Linda a resident of Emalahleni decides to buy a generator because of the power cuts. The generator consumes 1,5 litres of fuel per kilowatt per hour. A household with six appliances uses 2 kW per hour.

NOTE: 1 gallon = 3,785 litres

[Source: https://mybroadband.co.za> energy]

Use the information above to answer the questions that follow.

5.2.1 Calculate the amount of fuel needed by a household on a 4-hour load reduction experienced in a day. (2)

5.2.2 Linda claimed that he needs more than 20 gallons of fuel for a 4-hour load reduction experienced each day for 5 days.

Verify, using calculations if the claim is VALID. (5)

5.2.3 Linda buys the fuel in litres from a supplier in Pounds (£). The price of the fuel is £1,6605 per litre.

You may use the exchange rates: £1: R21,97.

Use the information above to determine, in Rands, the amount spent on fuel used on 4-hour load reduction experienced each day for 5 days. (4)

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5.3 Linda decides to buy a generator to be used during when electricity is cut-off. This generator will be transported on the rectangular trailer.

The picture and actual dimensions of the generator bought are given below.



[Source: Adapted from classicindustries.com]

Use the information above to answer the questions that follow.

5.3.1 Determine the area of the trailer if the area of the trailer is 2% more than the area of the base of the generator.

You may use the formula: **Area of a rectangle = length × width** (4)

5.3.2 Use the actual length of the generator to determine the scale used on the drawing. (Round off you answer to the nearest whole number). (5)

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ADDENDUM

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ANNEXURE A : ROUTE MAP OF TWO OCEANS MARATHON

QUESTION 2.1

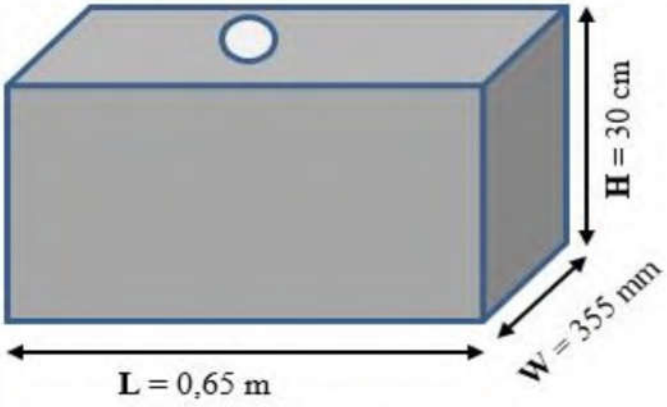
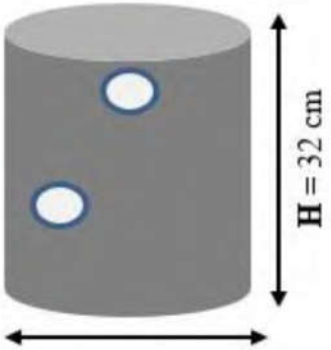


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ANNEXURE B

QUESTION 3.1

THE PICTURES AND DIAGRAMS WITH DIMENSIONS OF RECTANGULAR AND CYLINDRICAL FUEL TANKS MODELS

DIAGRAM OF RECTANGULAR PRISM FUEL TANK	**DIAGRAM OF CYLINDRICAL FUEL TANK.**
	
DIMENSIONS OF A RECTANGULAR PRISM FUEL TANK	DIMENSIONS OF A CYLINDRICAL FUEL TANK
	
Where **L** = length **W** = width and **H** = height	Where **D** = diameter and **H** = height
	[Source: adapted from classicindustries.com]

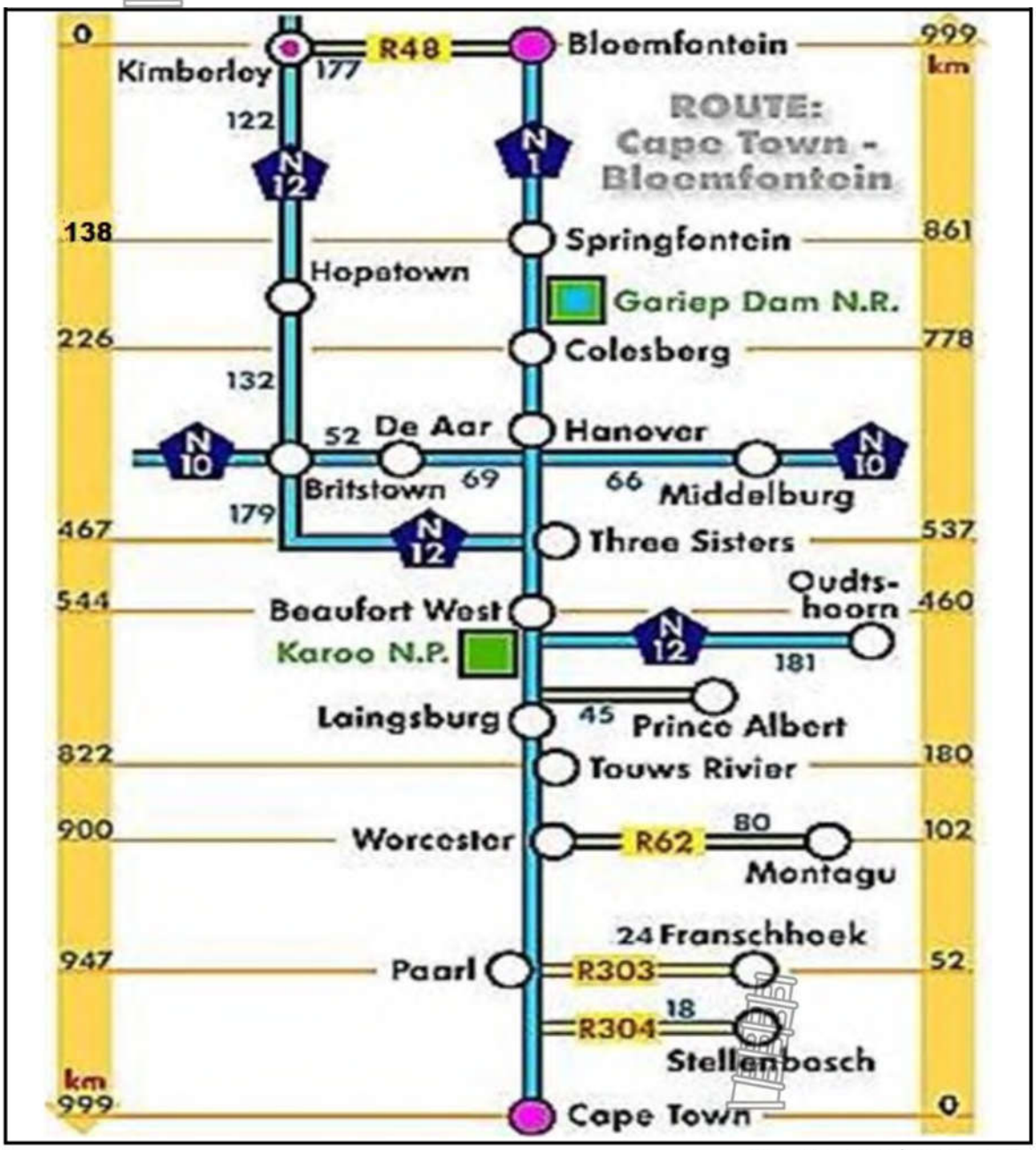
NOTE: 1 litre = 1000 cm^3

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ANNEXURE C

QUESTION 4.1

STRIP MAP SHOWING DISTANCES AND TOWNS BETWEEN CAPE TOWN AND BLOEMFONTEIN.



[Source: www.pinterest.com]

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ANNEXURE D

QUESTION 4.2

FLOOR AND ELEVATION PLAN OF A HOUSE.



[Source: www.pinterest.com]

NOTE:

- The front of the house is facing north.
- All measurements are in meters.
- Door =

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