



eduresourceza.com

**MATHEMATICAL LITERACY
TRIALS PAPER 2**

Grade 12
Time: 3 hours

September 2022
Total: 150

Name/Exam no:	
----------------------	--

Questions	Q1a	Q1b	Q2a	Q2b	Q3	Q4	Q5a	Total
Total	25	5	32	3	31	23	31	150
Measurement								/90
Maps/Plans								/55
Probability								/5

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

- Please write your name (or exam number) in the block above.
- This question paper consists of a booklet of 28 pages (including this cover page and 4 pages of extra space at the end). Please check that your paper is complete.
- All questions are to be answered **on this question paper**. There is extra space provided at the back if required.
- Read the questions carefully.
- You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
- Round off your answers to **1 decimal place** where necessary, unless otherwise stated.
- All the necessary working details must be clearly shown
- Diagrams are not to scale unless otherwise stated.
- It is in your interest to write legibly and to present your work neatly.

Question 1

Europe is experiencing one of the worst droughts in their history with some rivers at a 500-year low.

In 2018, Cape Town had critically low water levels and residents and visitors were urged to reduce the amount of water they used. At that time, a group of farmers in the region pumped 10 million cubic meters of water into Cape Town's depleted reserves from their own network of dams. A news article reported:

"10 million cubic meters of water translates to 10 billion actual litres of water. With Cape Town's current consumption rate at just over 550 million litres a day, the donation has the potential to last for 18-20 days."

1.1 Write "550 million" using only digits.

(2)

1.2 One of the restrictions was to limit people to 50 litres of water per day.

- a. There were approximately 4 380 000 people in the greater Cape Town area in 2018.



If each person used exactly 50 litres per day, calculate the number of litres that these people would have used.

(2)

- b. Using your answer to questions 1.1 and 1.2(a), determine the percentage of Cape Town's water use that would be used by people (as opposed to business, etc) (3)

1.3 The news article stated that the 10 billion litres of water should have lasted from 18 – 20 days.

- a. Calculate the number of days that 10 billion litres of water would be expected to last for, if 550 million litres are being used per day. Express your answer as a decimal to 3 decimal places (e.g 21,457 days) (3)

- b. Convert your previous answer to days and hours rounded to the nearest hour. (e.g. 22 days 13 hours) (3)

- 1.4 Some residents in the Cape that wanted to drink rainwater, borehole water or wellpoint water needed to use purification tablets like those shown alongside to kill any harmful micro-organisms in the water.



25mg of the tablet is required to purify 10 litres of water and the tablets are available in various sizes (3,5 mg; 8,5 mg; 17 mg; 33 mg; 67 mg; 167 mg) depending on the volume and nature of water to be treated.

- a. How many litres of water is the 17 mg tablet designed to purify? (2)

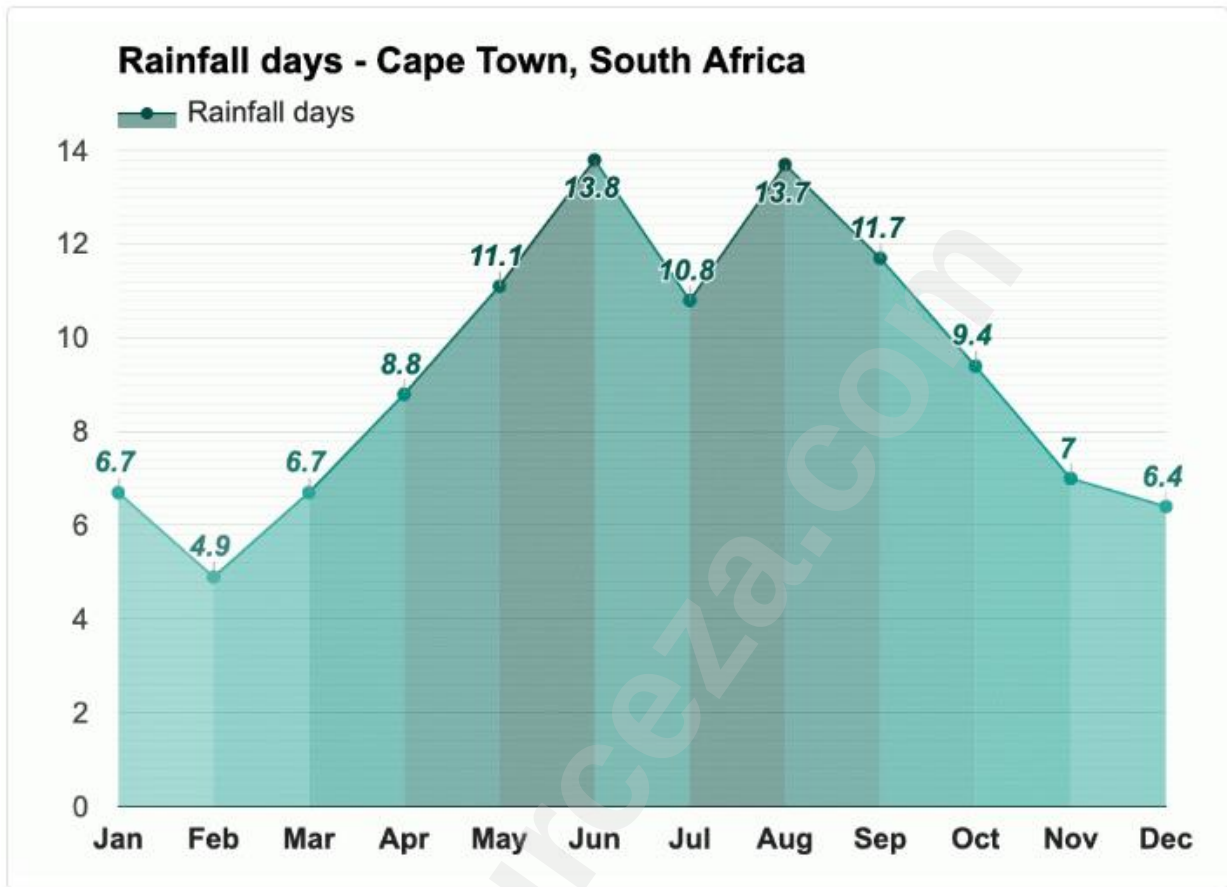
- b. A US-pint is equal to 473 millilitres. Convert your previous answers to US pints (rounded to the nearest pint) (4)

c. A person purchased the 8,5 mg tablets,

- i. How many 8,5mg tablets should you place in 10 litres of water to make sure that all harmful microorganisms have been killed? (3)

- ii. The box that they purchased had 5 strips of 10 tablets each. Using your previous answer, how many days will the box last if they needed to purify 10 litres of water each day for their household to drink? (3)

- 1.5 The graph below gives a summary of the average number of rainfall days (days on which it rained) in Cape Town. Use the information in the graph to answer the questions which follow.



https://www.weather-atlas.com/en/south-africa/cape-town-climate#rainfall_days

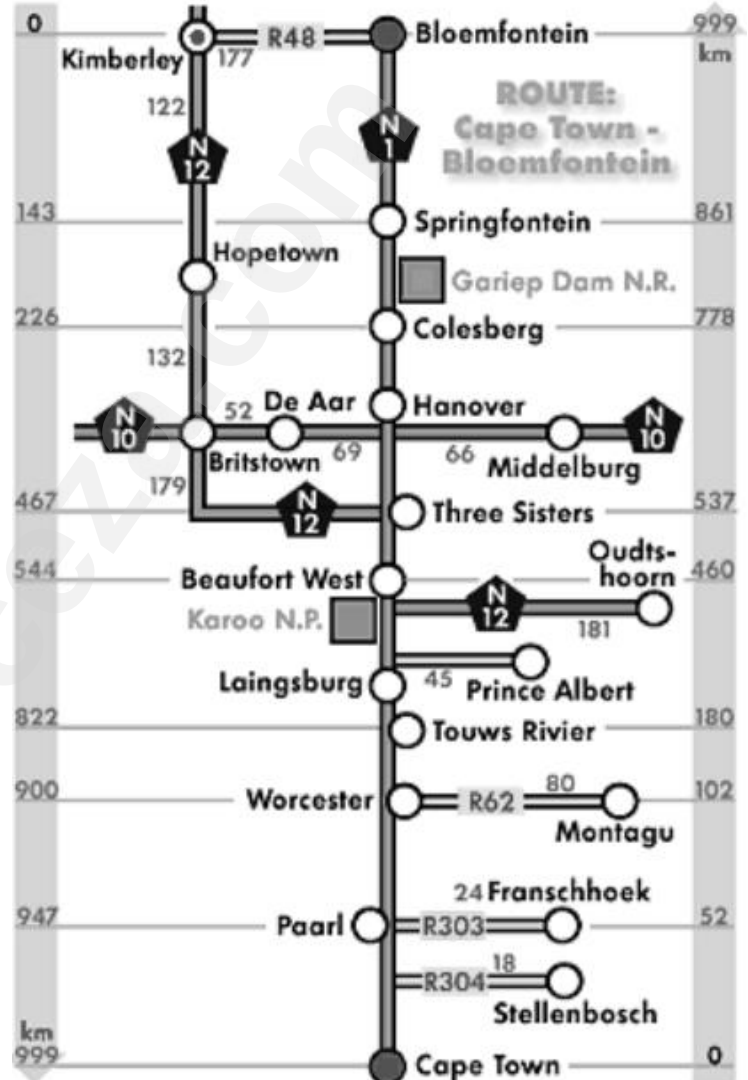
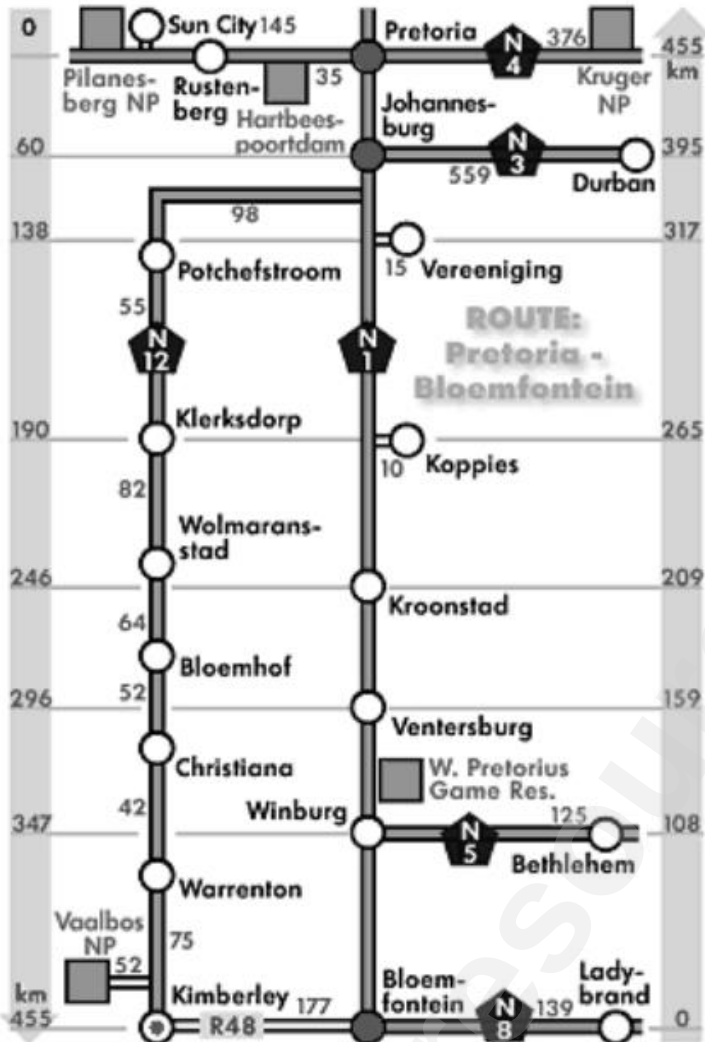
- a. Which is the least likely month for rainfall in Cape Town? (2)

- b. Calculate the probability of a day picked at random in July being a rainy day. Answer as a percentage. (3)

[30]

Question 2: The Road Trip

Palesa will be visiting a friend in Cape Town. She lives in Johannesburg. She uses the strip maps below to plan a trip from Johannesburg to Cape Town via Bloemfontein. Use them to answer the following questions:



2.1 Name the road that she will travel on for most of the trip. (2)

2.2 Besides travelling via Bloemfontein, Palesa could have travelled via another major city. Name the city **AND** the highway that she could have used. (2)

2.3 What is the total distance between Johannesburg and Cape Town, via Bloemfontein?

(3)

2.4 Palesa's car can travel 14,5 km per litre of petrol. The average fuel price is now R24/litre of petrol. Using your answer to question 2.3, calculate how much the fuel should cost her to travel from Johannesburg to Cape Town.

(4)

Note: Fuel does **NOT** have to be bought in whole numbers of litres.

2.5 Palesa is going to spend a night in Colesberg on the way to Cape Town. She has promised her mom that she will take a rest break approximately every $2\frac{1}{2}$ hours and she will always stop in a town or city. Use an average speed of 95 km/h to calculate where Palesa should take her two-and-a-half-hourly stops, when travelling from Johannesburg to Colesberg. (6)

This image shows a blank sheet of white paper with horizontal black ruling lines. The lines are evenly spaced and run across the width of the page. A faint, diagonal watermark reading "source2d.com" is visible across the center of the page.

2.6 Palesa leaves Colesberg at 8:30 am the next morning and again averages 95 km/h. She makes two 30-minute stops on her way from Colesberg to Cape Town.

a) What distance did she travel on the second day? (2)

- b) Using your previous answer, calculate her total travelling time, including stops, to the nearest minute, from Colesberg to Cape Town? (e.g. 5 hours 43 minutes) (5)

- c) Using your previous answer, at what time can she expect to arrive in Cape Town? Answer in 12-hour time. (3)

- 2.7 She was thinking of dropping off a parcel at a friend in Montagu on the way to Cape Town on the same day that she was travelling down. What extra distance would have been added to her journey if she had done so? (2)

- 2.8 Palesa's friend stays in Claremont, which is halfway between Rondebosch and Newlands. Use the map below to answer the following questions.



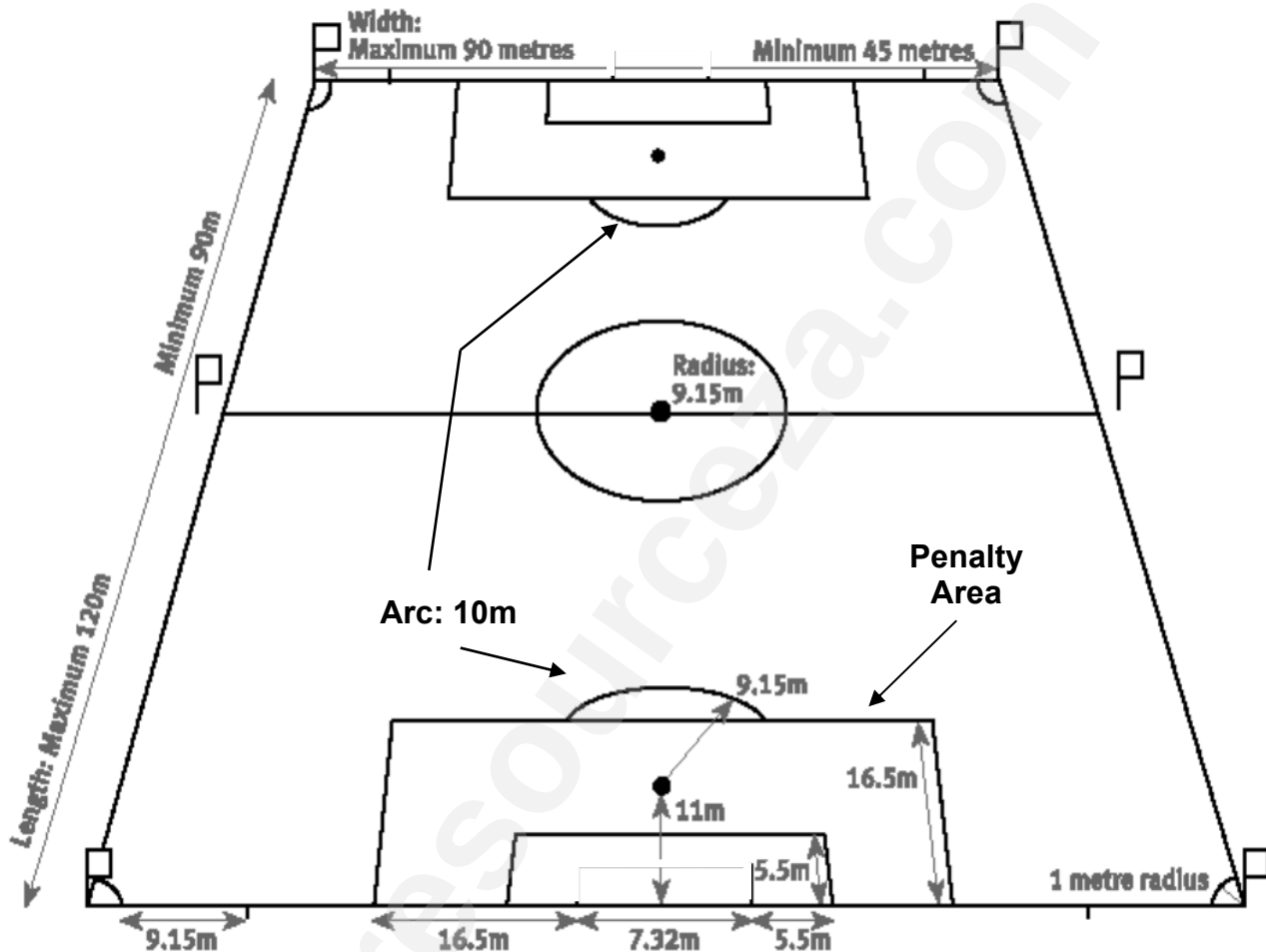
- a. Indicate the approximate location of Claremont on the map with a dot and the letter A (2)
- b. Use the bar scale on the map to determine the distance between Stellenbosch and Claremont as the crow flies (i.e. in a straight line). (4)

[35]

Question 3: The World Cup

With the FIFA World Cup in Qatar this year, the playing surfaces of the stadiums need to conform to the strict guidelines of the world body.

- 3.1 One of the stadiums will be in Education City (yes, really). Use the diagram of a FIFA regulation soccer field (pitch) and the formulas shown below to answer the questions that follow.



Useful Formula

Area of rectangle = $l \times b$ **Area of triangle** = $\frac{1}{2} \times b \times h$ **Area of circle** = $\pi \times r^2$
Theorem of Pythagoras: $a^2 = b^2 + c^2$ **Perimeter of circle** = $2 \times \pi \times r$ $\pi = 3,142$
Volume of prism = Area of base $\times$ length of prism
Surface Area of closed prism = $2 \times$ Area of base + perimeter of base $\times$ length of prism

- a) Show that at least 10 800 m² of grass will be required if the field has a maximum width and a maximum length. (2)

- b) The grass is sold in rolls with a length of 8 m that are 150 cm wide. Calculate the number of rolls of grass that will be used for the field having an area of 10 800 m².

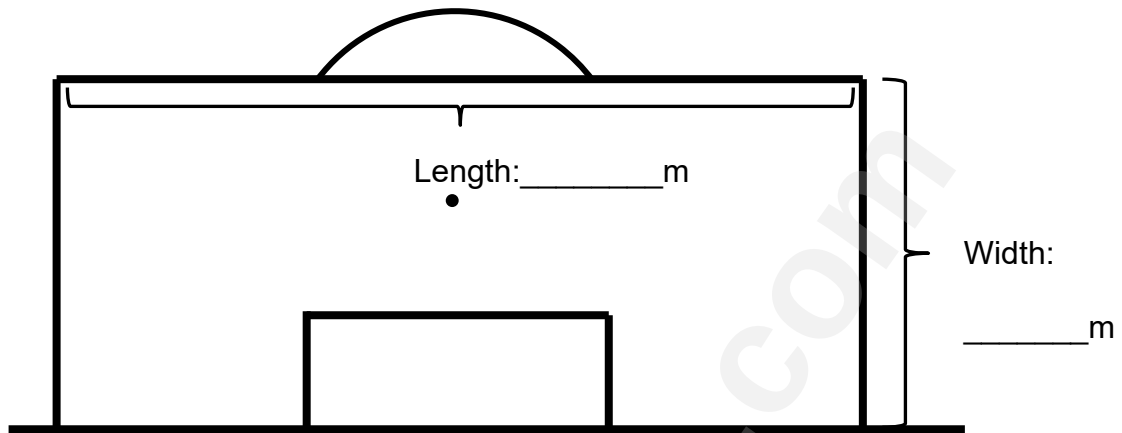


(5)

eduresourceza.com

c) Once the grass is laid, the field had to be marked with a particular type of paint.

- i. The penalty area for the soccer field is shown below. Use the diagram for the soccer field on the previous page, determine the missing dimensions of the penalty area. (3)



- ii. Using your working from the above and the diagram for the soccer field, calculate the total length of all of the lines on the field, using the maximum lengths of the lines. (13)

Note: the arc on the top of the penalty area has a length of 10m.

- iii. The lines have a width of 10 cm. In order to paint the lines, the total area covered by the lines needs to be calculated. Explain why you would simply multiply your previous answer by 0,1 to calculate the total area covered by the lines in square metres.

(3)

- iv. The paint comes in 20-litre buckets and has a spread rate of $4 \text{ m}^2/\ell$. Use the information from the previous two questions to calculate how many buckets of paint would be required to paint the lines of 1 soccer field.

(5)

[31]

Question 4: The fans

The fans are an important part of the experience in any World Cup. A group of soccer fans flew to Russia for the Soccer World Cup 2018.

- 4.1 The fans arrived in Russia at Sheremetyevo Airport and then travelled into Moscow, Red Square, by train. The following information was included in the pack given to them by their travel agent:

Day trains (08:00 – 23:59)

Weekdays: 6 trains leave every hour – at 15 minutes; 22 minutes; 29 minutes; 45 minutes; 52 minutes and 59 minutes past every hour.

Saturdays and Sundays: 8 trains leave every hour – at 6 minutes; 15 minutes; 22 minutes; 29 minutes; 36 minutes; 45 minutes; 52 minutes and 59 minutes past every hour.

The group landed at Sheremetyevo Airport at 15h10 on a weekday. They took 1 hour 22 minutes in total to disembark, go through passport control, collect their luggage and get to the airport train station.

They took the first available train to Red Square which took them 1 hr 37 minutes to get to Red Square.

They hoped to see the changing of the guard at the tomb of the unknown soldier (which happens on the hour every hour (e.g. 7:00 am, 8:00 am, etc)).

How long did they have to wait for the next changing of the guard once they got to Red Square?

(7)

4.2 After they watched the changing of the guard, they caught a taxi to their hotel (the Sheraton Palace Hotel). The distance was 6,3 km and the journey took 16 minutes.

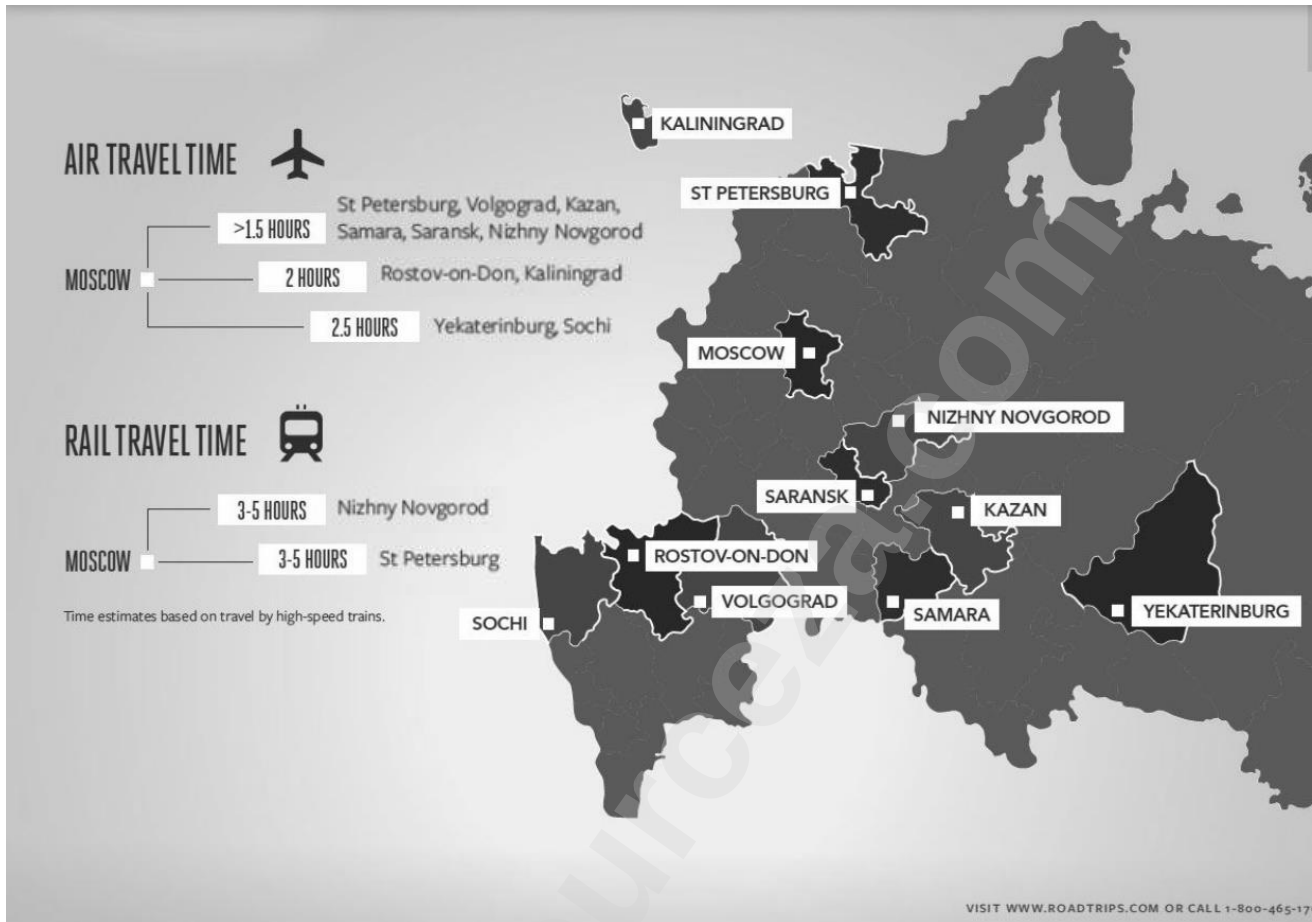
Use the average speed of the taxi (in km/h) on that route to discuss the traffic conditions in that section of Moscow.

(6)

A map of central Moscow showing a walking route from the Sheraton Palace Hotel to Red Square. The route is highlighted in dark grey and passes through Mayakovskaya, Tverskaya, and Arbat. A callout box indicates a distance of 6.3 km and a walking time of 16 minutes. Landmarks like Skyview City and Denkmal für Peter I are also marked.

[illegible]

- 4.4 The matches were played in 11 towns and cities across in Russia. Some of the travel times shown on the map below are given for air travel and others are for rail travel.



- a) Give **two** reasons for soccer fans would travel from Moscow to Yekaterinburg by air instead of by train.

(2)

- b) Give **two** advantages for using rail to travel from Moscow to St Petersburg instead of by air. (2)

[23]

Question 5: Water harvesting

The water rates in the local area have recently increased dramatically and therefore people have been looking into water harvesting from rainwater.

5.1 Jane is investigating installing a 5 kℓ tank.

According to rototank.co.za, it has a diameter of 1800 mm and a height of 2150 mm.

- a. Explain how the formula for the area of a circle (πr^2) would be used to calculate the volume of this water storage tank.

(2)

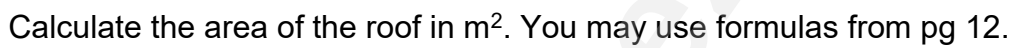


- b. You know that $1\text{cm}^3 = 1\text{ ml}$, so explain why the measurements of the tank should first be converted to cm if we are calculating the volume.

(2)

- c. Using the given dimensions, calculate the volume of the 5kl tank as if it were a perfect cylinder. Answer in litres. You may use formulas from pg 12. (5)

- d. Give TWO reasons why your answer to the previous question should be larger than 5kl. You may NOT use "I made a calculation error" or similar. (2)



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. A faint, diagonal watermark reading "edureson" is visible across the center of the page. There are no margins or other markings present.

- 5.3 The main reason for Jane's decision to harvest rainwater is the increase in the rates at which water usage is charged. Below is a table of the new water rates. Use it to answer the questions which follow.

Water Usage	2022/2023 Rate (R/kℓ) Excl. VAT
0 – 6	22,04
7 – 15	42,57
16 – 25	50,88
26 – 35	70,65
36 – 60	99,11
60+	121,80

- a. In the previous year, the rate for 26-35 kℓ category was R47,10 / kℓ (excluding VAT). Calculate the percentage increase in the rate for this year. (3)

- b. Calculate the total that Jane will pay for the 24 kℓ of water that she uses per month using the new rates (above). (9)

[31]

Total: [150]

Downloaded from eduresourceza.com
EXTRA LINED PAPER IN CASE YOU NEED MORE SPACE. Number your answers clearly.

Lined area for writing answers.

eduresourceza.com

eduresourceza.com

eduresourceza.com