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assessment matters

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TOTAL MARKS

NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2022

MATHEMATICAL LITERACY: PAPER II

EXAMINATION NUMBER

Time: 3 hours 150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of:
   - 28 pages which includes 2 additional pages at the end for rough work and calculations if necessary.
   - 5 questions.
2. Please check that your question paper is complete.
3. Answer ALL the questions.
4. **Answer ALL the questions on the question paper and hand it in at the end of the examination. Remember to write your examination number in the space provided.**
5. It is strongly recommended that all working details be clearly shown where necessary.
6. An approved non-programmable calculator may be used where necessary.
7. It is in your own interest to write legibly and to present your work neatly.
8. Maps and diagrams are not necessarily drawn to scale, unless otherwise stated.
9. TWO blank pages (page 27 to 28) are included at the end of the question paper. If you run out of space for a question, use these pages. Clearly indicate the question number of your answer should you use this extra space.

Question	1		2		3		4		5		Total	
	Marker	Mod	Marker	Mod	Marker	Mod	Marker	Mod	Marker	Mod	Marker	Mod
Mark												
Signature												
Total	30		28		34		30		28		150	

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QUESTION 1

Barbie (*Barbara Millicent Roberts*), a 12 inch (30,5 cm) tall plastic doll with the figure of an adult woman was introduced on 9 March 1959, by Mattel, Inc., a Southern California toy company.

Three original Barbie dolls from 1959 >>

[Source: <https://www.britannica.com/topic/Barbie>]

Use the above information to answer the questions that follow.

1.1 Determine how old Barbie is currently. (Ignore months and days)

_____

_____

(2)

1.2 Determine how many centimetres there are in an inch, by completing the following calculation and inserting the correct symbol (+, −, ×, ÷) rounding your answer to two decimal places:

30,5 cm ☐ 12 inches = _____ cm/inch (2)

1.3 More than 151 000 000 minutes of content has been watched on the Barbie YouTube channel.

1.3.1 Write the number of minutes in words without using number values.

_____

_____

(2)

1.3.2 151 000 000 minutes is equivalent to 41 944,44 hours. Write this in hours and minutes, rounded to the nearest minute.

_____

_____

(2)

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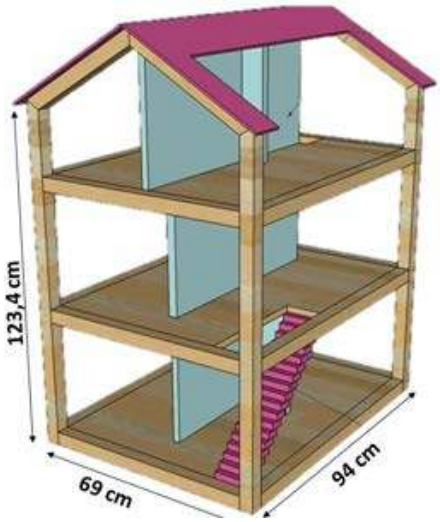
1.4 A Barbie house is sold globally every two minutes. Shown below is the design plan for a Barbie house with outer dimensions as follows: length = 94 cm, height = 123,4 cm and width = 69 cm. The outer width and length of each frame panel is 5 cm.



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

1.4.1 Determine how many floors are found in this Barbie house.

_____

_____ (2)

1.4.2 Calculate the inner length of this Barbie house.

_____

_____ (2)

1.5 A Barbie Princess doll is sold for R154,99 at Checkers. A picture of the box is shown alongside.

1.5.1 Round off R154,99 to the nearest R10.

_____ (2)

1.5.2 Using your answer in Question 1.5.1, calculate in dollars, the cost of the doll if R1 is equal to $0,066.

_____

_____ (2)

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1.5.3 Convert 320 mm (the height of this box) to cm by completing the calculation below:

320 mm ÷ [ ]

= _____ cm

(2)

1.5.4 The total surface area for the box can be calculated using the following formula: (Circle the letter of the correct option)

A. L × B × H

B. 2(L × B) + 2(L × H) + 2(B × H)

C. 6(L × B)

(2)

1.5.5 The total surface area of the box is 1 258 cm². It is also given that 7% of the box is made of plastic to display the doll. Calculate the total area covered by the plastic.

_____

_____

(2)

1.5.6 Convert 1 258 cm² to mm².

_____

_____

(2)

1.5.7 The correct unit of measurement for volume is (circle the letter of the correct option):

A.	cm
B.	cm²
C.	cm³

(2)

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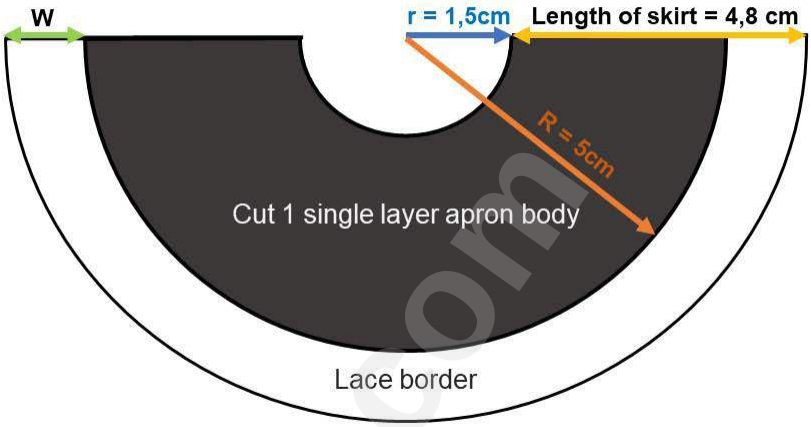
1.6 Below is a pattern for an apron skirt for a Barbie doll. Use the diagram below to answer the question that follows.



Calculate the width (W) of the lace border.

_____

_____

_____

(2)

1.7 Barbie has been portrayed with many careers. Each career is created to give children the option of exploring new careers and help them learn new things. There are 7 Barbie careers in the military.

- Army medic (1993)
- Paratrooper (2000)
- Air Force pilot (1991 2001)
- Air Force Thunderbirds pilot (1993)
- Army officer (1989, Desert Storm 1992)
- Marine Corps sergeant (1991)
- Navy petty officer QM1 (1991)

If a child is to select a Military Barbie at random, what is the probability that the child will select a pilot? (Select the correct probability).

A. $\frac{1}{7}$

B. $\frac{2}{7}$

(2)
[30]

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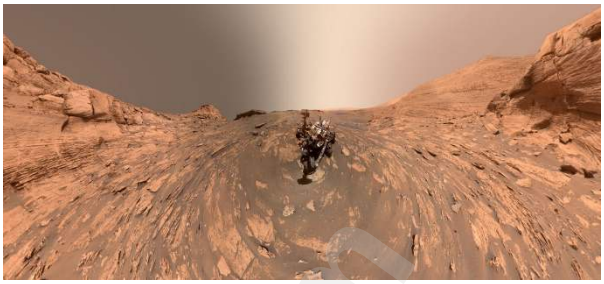
QUESTION 2

What do kale, carrots, lettuce, sweet potatoes, onions, dandelions, and hops have in common?

They could all potentially be grown in Martian soil by future colonists.

Mars is the fourth planet from the Sun and the second-smallest planet in the Solar System.



[Source: <https://mars.nasa.gov>]

2.1 An example of a possible soup that can be made with some of those ingredients is Nettle soup. Study the recipe below and answer the questions that follow:

Nettle Soup

Prep time: 20 mins
Cooking time: 30 mins

Serves 4

Ingredients

- 1 tsp olive oil, plus extra for drizzling
- 1 onion, chopped
- 1 carrot, diced
- 1 leek, washed and finely sliced
- 1 large floury potato, thinly sliced
- 1 litre of vegetable stock
- 400g stinging nettles, washed, leaves picked
- 50g butter, diced
- 50ml double cream

Method

STEP 1: Heat the oil in a large saucepan over a medium heat. Add the onion, carrot, leek and potato, and cook until the vegetables start to soften. Add the stock and cook for a further 10–15 minutes until the potato is soft.

STEP 2: Add the nettle leaves, simmer for 1 minute to wilt, then blend the soup. Season to taste, then stir in the butter and cream. Serve the soup drizzled with extra oil and scattered with dead nettle flowers, if you have them.

[Source: <https://www.bbcgoodfood.com/recipes/nettle-soup>]

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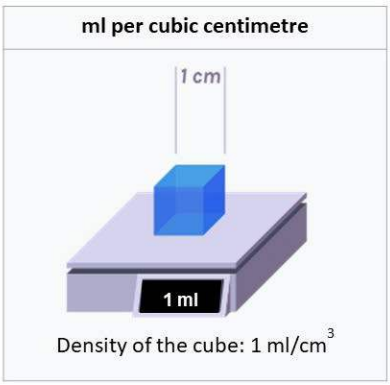
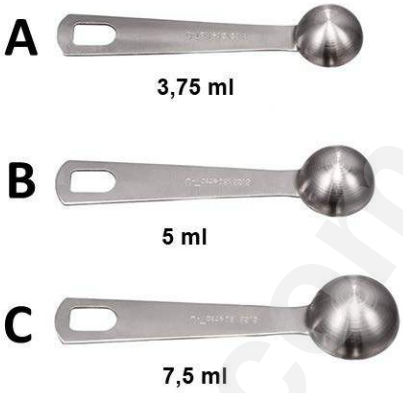
2.1.1 If 1 teaspoon (tsp) = 5 cm³ determine which teaspoon (A, B or C) below must be used to measure the olive oil needed for this recipe.





(2)

2.1.2 A space shuttle carries 7 astronauts to Mars. Determine how much double cream would be needed to adjust the menu for 7 people.

(2)

2.1.3 If the ingredients are increased to accommodate 7 people, the prep and cooking time increases by 12%. Determine how long it would now take to prepare and cook the soup.

(3)

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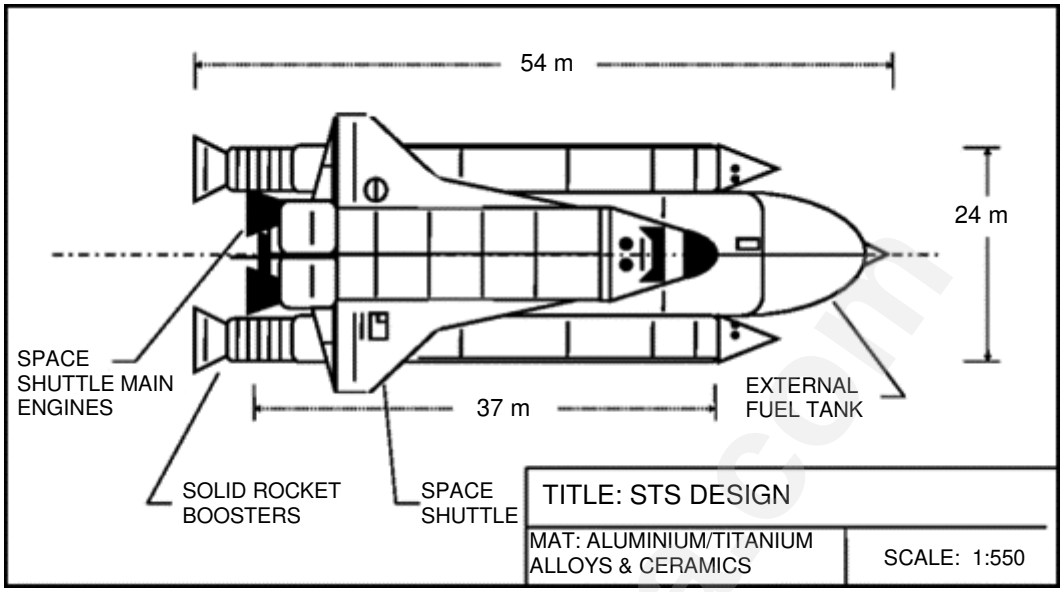
2.2 Below is a diagram of a space shuttle.



Use the above diagram to answer the questions that follow.

2.2.1 If the length of the space shuttle in real life is 54 m, use the scale provided on the diagram to determine in cm, the length on the diagram. (Do not measure the diagram with a ruler).

(3)

2.2.2 According to the website, www.mars.nasa.gov, a space shuttle will travel the 300 million miles distance to Mars at a speed of 24 600 miles per hour.

Calculate how long (in months) it would take a space shuttle to reach Mars. Assume there are 30 days in a month.

You may use the formula: Time = Distance ÷ Speed.

(4)

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2.2.3 If 1 mile = 1,609344 km, determine the speed of the space shuttle in km/h.

(2)

2.2.4 On 20/02/2022, the temperature on Mars ranged from –4 °F (maximum) to –98 °F (minimum). During that day, John, a budding young astronaut, calculated the difference between the maximum and minimum temperature to be 52,2 °C when the minimum temperature at that point was –72,2°C. Show with calculations if John's calculations were correct.

You may use the following formula: °F = 1,8 × °C + 32°

(4)

2.2.5 Mars is 142 million miles from the sun and 51 000 000 miles away from Earth. Calculate how far Earth is from the sun. (You may assume that the sun, Earth and Mars are aligned in order on a straight line)

(2)

2.3 Johnny (10 years old) wants to build a simple space shuttle that flies. Match the instructions given in Column A with the diagrams in Column B (on page 10). Complete the table below by writing the letter of the correct illustration in Column B.

COLUMN A	COLUMN B
2.3.1	
2.3.2	
2.3.3	
2.3.4	
2.3.5	
2.3.6	

(6)

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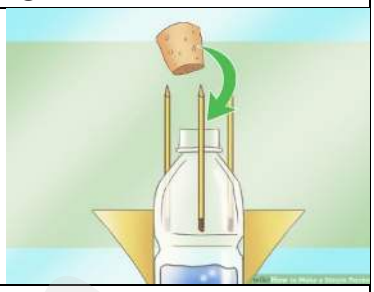
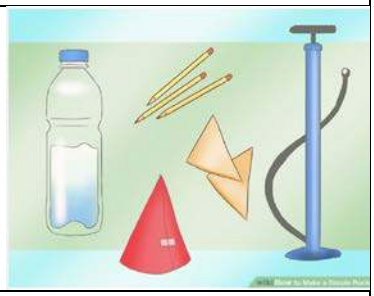
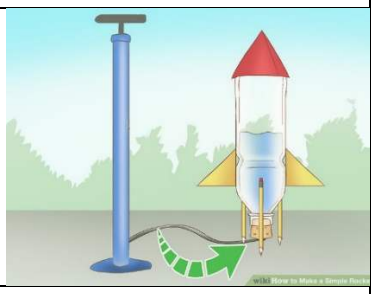
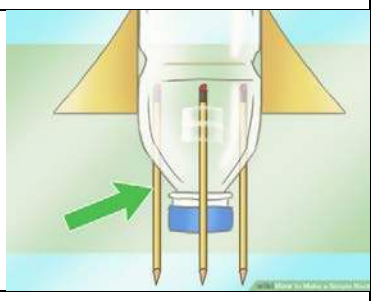
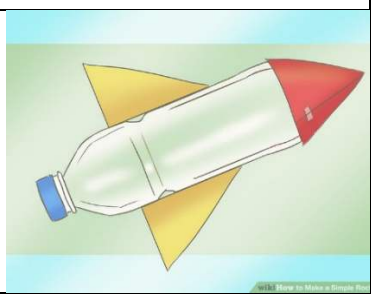
COLUMN A		COLUMN B	
2.3.1	**Gather your materials.** The body of your rocket will be made from a plastic water bottle, a paper cone, and two paper or cardboard triangles. You will use three pencils to make a stand. You will also need water, and a bicycle pump to pressurize the bottle.	**A**	
2.3.2	**Make a rocket from a bottle.** Reduce the drag of the water bottle by taping a paper cone to the top of the rocket (the bottom of the bottle). Tape paper or cardboard triangles on either side of the bottle to act as fins. The triangles should come about halfway up the bottle.	**B**	
2.3.3	**Build a rocket stand.** Tape pencils around the sides of the bottle to make a stand. Make sure that the pencils are pointing down. This stand will allow you to point your rocket up (or at an angle if you wish). Without a stand, your rocket will likely just flap around near the ground instead of lifting off.	**C**	
2.3.4	**Put water in the bottle.** You should fill the bottle half full of water. The water will provide the mass needed to propel the rocket during the launch. You can add food colouring for a colourful blast off.	**D**	
2.3.5	**Cork the bottle.** Throw away the bottle's original cap and replace it with a cork that fits into the opening of the bottle. The cork will allow pressure to build inside the bottle. The cork will also pop out allowing the contents to shoot out rapidly and propel the bottle.	**E**	
2.3.6	**Pump air into the bottle.** Use a bicycle pump with a needle. Insert the needle into the bottle through the cork and pump. Once enough air has been pumped into the bottle, the pressure will force the cork out and launch the rocket into the air.	**F**	

[Source: <www.wikihow.com/Make-a-Simple-Rocket>]

[28]

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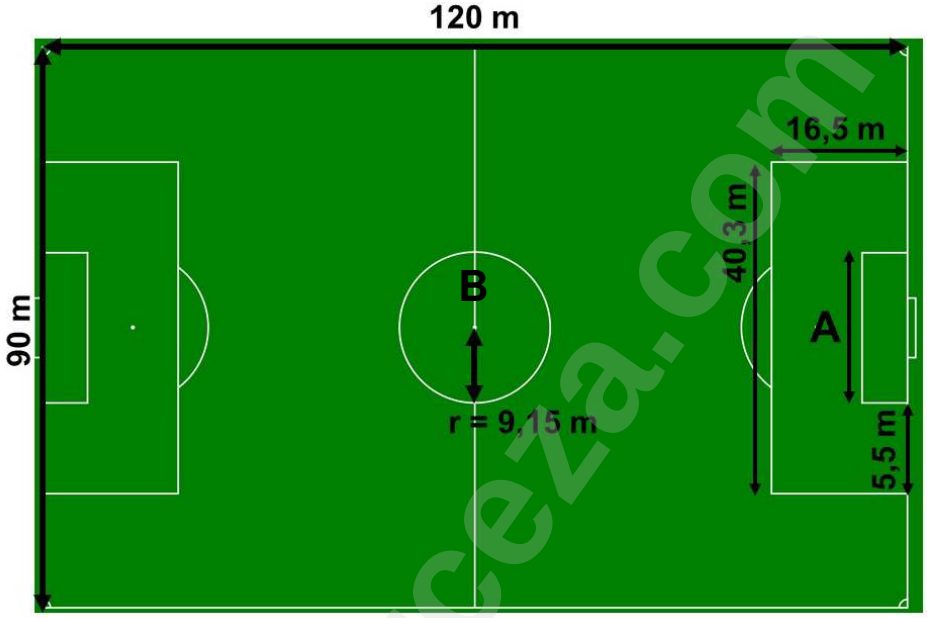
QUESTION 3

Mohamed Salah is a professional footballer from Egypt who plays as a forward for Premier League club Liverpool and captains the Egyptian national team. Considered one of the best players in the world, he is known for his finishing, dribbling, and speed.

The diagram below shows a standard soccer field with dimensions of the playing areas.



3.1 Study the soccer field above and answer the questions that follow:

3.1.1 As part of his training, Salah runs the total perimeter of the soccer field 5 times. Determine, in kilometres, the total distance Salah runs during training.

(4)

3.1.2 Calculate the length of the penalty box marked **A**.

(2)

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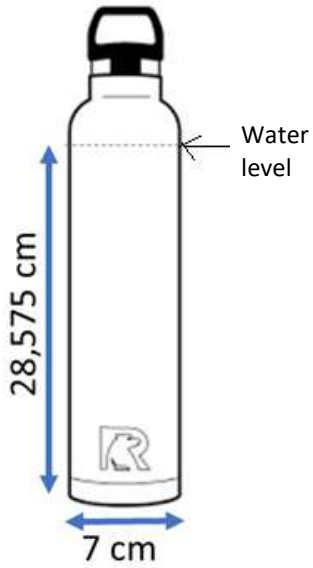
3.1.3 Determine what percentage of the soccer field's area is taken up by the centre circle (**B**).

You may use the following formula: Area of circle = 3,142 × r^2
Area of rectangle = L × W

(4)

3.1.4 The players drink water from water bottles shown alongside. The maximum water level in the bottle is shown by the dotted line.



(i) Calculate, in litres, the capacity of the water in the water bottle.
You may use the following information:

Volume of cylinder = 3,142 × radius^2 × height

1 cm^3 = 1 ml

(4)

(ii) If the total height of the bottle is 13% more than the given height, calculate, to the nearest cm, the total height of the bottle.

(3)

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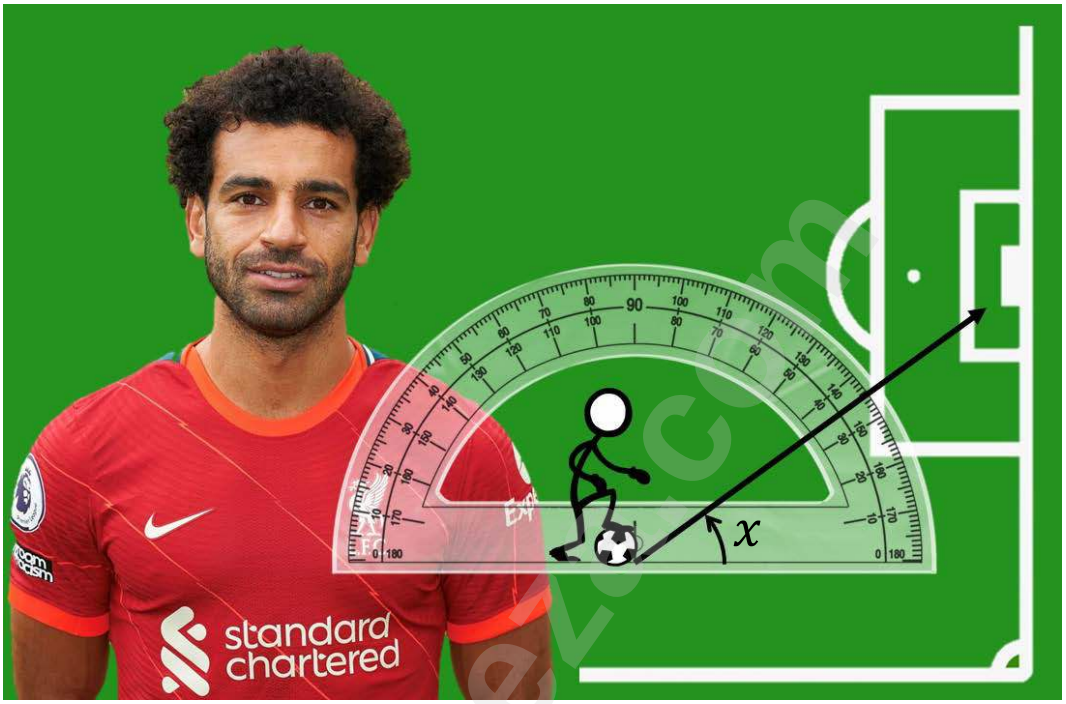
3.1.5 The picture below shows Mohamed Salah, indicated by , aiming for a goal.



Read off the size of the angle marked x on the measuring instrument.

_____

_____ (2)

3.2 Mohamed Salah trains at the Anfield soccer stadium. Study the seating plan below and answer the questions that follow:

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3.2.1 The full seating capacity at the Anfield soccer stadium is 53 394.

40% of the seats are in the main stand, $\frac{1}{5}$ of the seats are in the Anfield Road Stand and 20% in the Centenary Stand.

Determine what percentage of seats are in the KOP Stand.

(3)

3.2.2 Calculate the total number of seats in the Anfield Road stand.

(2)

3.2.3 Tickets for the Anfield stadium costs £49 excluding 15% VAT. Calculate, including VAT, the income from ticket sales if the stadium is full to capacity.

(3)

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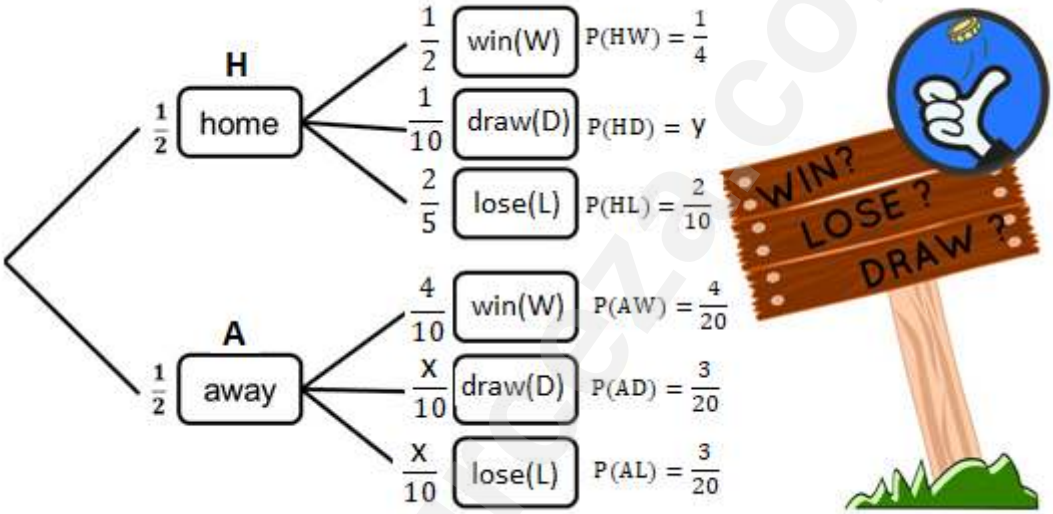
3.3 Mohamed Salah has realised that the team performs better in their home matches when compared to away matches. He notices that when they play at home the team has $\frac{1}{2}$ chance of winning, $\frac{1}{10}$ chance of drawing and $\frac{2}{5}$ of losing. He has also noticed that the team had a $\frac{4}{10}$ chance of winning, and an equal chance of drawing or losing if they played away.

The following tree diagram illustrates the various options with some missing information.



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

3.3.1 Write down the value of x.

(2)

3.3.2 Determine the probability (y) that Salah will draw a home game if it is given that P(HD) = P(H) × P(D). [Note: P(H) means Probability of home game]

(2)

3.3.3 Determine the probability that the team will win, regardless of playing at home or away.

(3)
[34]

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QUESTION 4

Bathu Sneakers, a 'Sneaker Brand from Africa for Africa' was founded by Theo Baloyi. Bathu produced its first pair of sneakers in 2015 and by 2017 Bathu had released over 1 000 sneakers. Bathu has since opened 16 stores around South Africa.

Use the above information to answer the questions that follow.

4.1 A pair of Bathu sneakers cost R1 200 and delivery charges costs R300 per order. Calculate the total cost for 2 pairs of sneakers delivered together in one order.

(2)

4.2 Bathu sneakers are sold in boxes with the given dimensions.

Use the above information to answer the questions that follow.

4.2.1 Determine the volume of the shoe box, using the formula:

Volume of rectangular prism = L × B × H

(3)

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4.2.2 Multiple boxes of Bathu sneakers are boxed in the transport box shown below.

Show, with calculations, if 4 boxes of sneakers will fit into this transport box.

NOTE: 1 inch (1") = 2,54 cm

(6)

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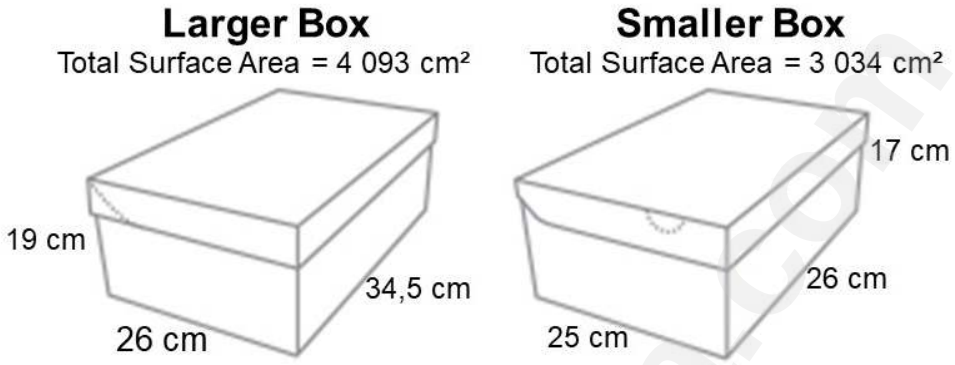
4.2.3 Bathu Sneakers have been looking into different shoebox sizes: a large box for male shoes and small box for female shoes.

The cost of the cardboard to make the boxes is 0,502 cents/cm². Calculate the percentage savings Bathu Sneakers will make if the smaller box is used compared to the normal larger box.



(6)

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4.2.4 One of the 16 Bathu stores is found in Kimberley. Sneakers are transported by truck to the store.

Use the above map to answer the questions that follow:

(i) Upington lies in the Northern/Western/Eastern Cape. (Underline the correct province).

_____

_____ (2)

(ii) In which general direction does Kimberley lie from Johannesburg?

_____ (2)

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(iii) Using the given scale, calculate the distance as a crow flies, from Johannesburg to Kimberley.

(3)

(iv) The delivery truck travels the 505,5 km from Johannesburg to Kimberley at a speed of 98 km/h. Determine the time the truck will arrive in Kimberley if it left Johannesburg at 09:00. Give your answer to the nearest minute in the format of hh:mm.

(4)

(v) On the return journey, the truck takes 3 hours 20 minutes to complete the trip. Determine the speed of the return journey.

(2)

[30]

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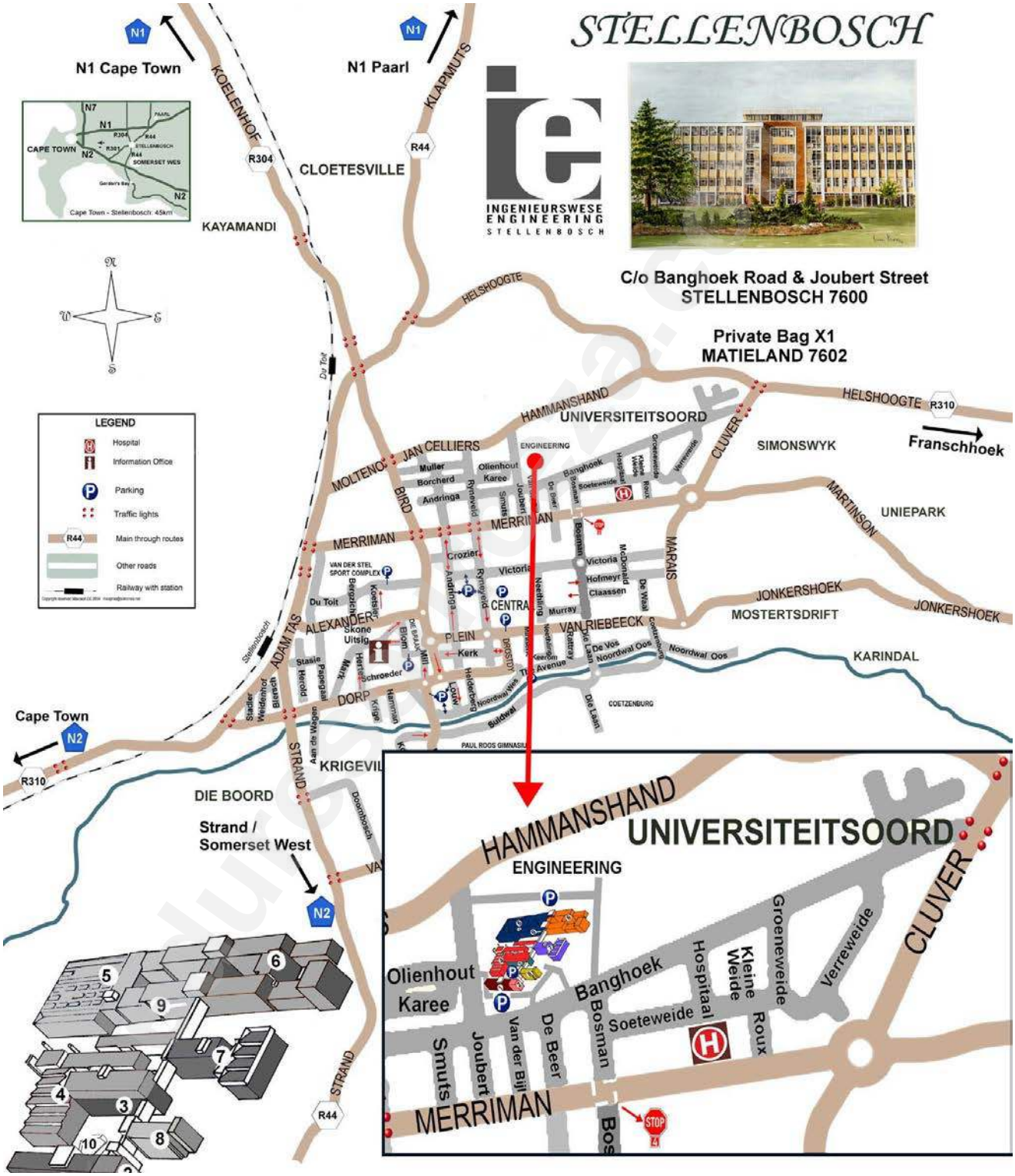
QUESTION 5

Sofi plans to study Engineering at the Stellenbosch University next year. Below is a map of Stellenbosch University.



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5.1 Use the map on the previous page to answer the questions that follow.

5.1.1 The Engineering Faculty lies on the corner of which two streets?

_____

_____

(2)

5.1.2 Sofi googled the following directions to a specific street in Stellenbosch.

Travel in a Southernly direction along Joubert Street, turning left into Merriman Road. Follow the road to the traffic circle, taking the third turn, left off the circle.

Name the street Sofi was looking for.

_____

_____

(2)

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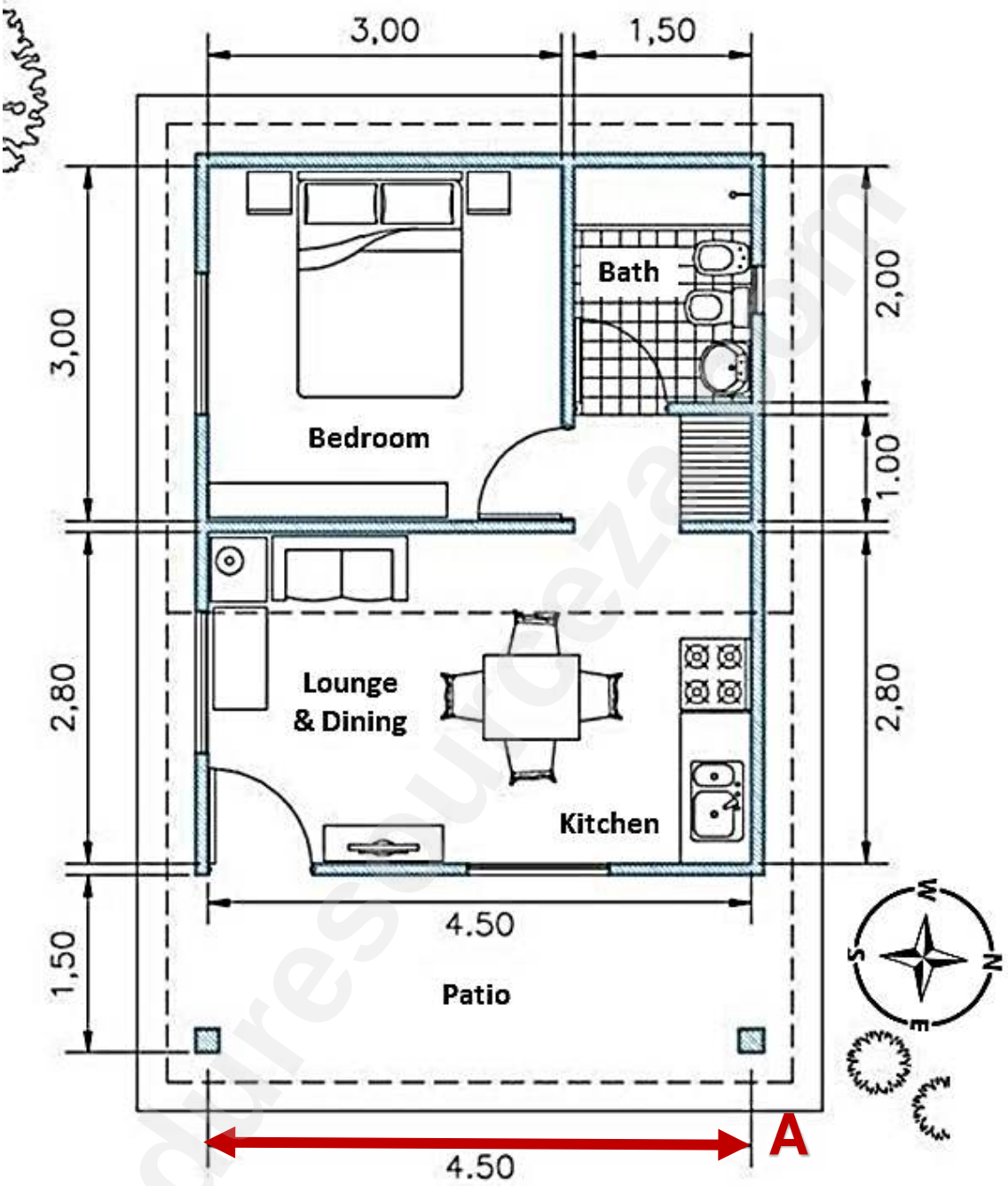
5.2 Study the floor plan of Sofi's flat below with dimensions in metres and answer the questions that follow:



5.2.1 Determine the length and width of the flat excluding the patio.

(2)

5.2.2 State how many windows ( ) are found on the Southern side of the flat.

(2)

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5.2.3 By measuring the length of Line A, determine the unit scale of the floorplan.

(2)

5.2.4 Sofi needs to clean the carpet in her bedroom. She sees an advert for Carpet Cleaning Services, a company she has used before. Study the advert below and answer the question that follow:

Show, with calculations, whether Sofi can afford to have her bedroom cleaned with her budget of R1 000.

(6)

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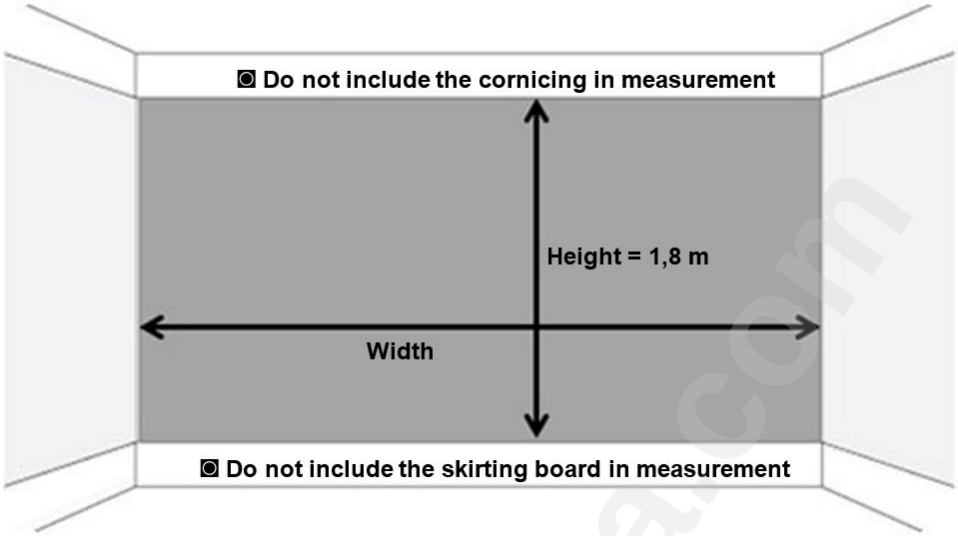
5.2.5 Sofi wants to paint the wall behind the bed of her bedroom. Study the diagram below, the floorplan given on page 23 and the given information:



- The height of the wall is 1,8 m.
- Two coats of paint are required.
- One litre of paint will cover 6 m².

Determine how much paint is needed to paint this wall.

(5)

5.2.6 Using the scale 1 : 50, draw a scaled rectangle representing the back wall in the bedroom.

(2)

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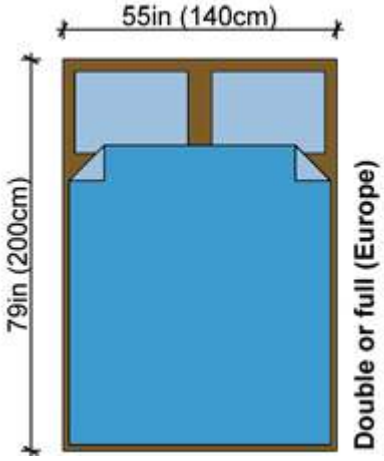
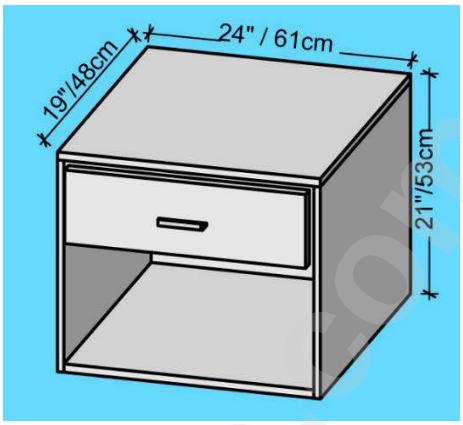
5.3 Sofi wants to purchase a double bed and two bedside tables as illustrated below. She will place the bed and side tables against the back wall of the bedroom.

Double Bed



One bedside table



Calculate (in cm) how much wall length is left over on either side of the bed and side tables if they are placed exactly against the centre of the wall.

(5)
[28]

Total: 150 marks

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ADDITIONAL SPACE (ALL QUESTIONS)

CLEARLY INDICATE AT THE QUESTION THAT YOU USED THE ADDITIONAL SPACE TO ENSURE THAT ALL ANSWERS ARE MARKED.

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