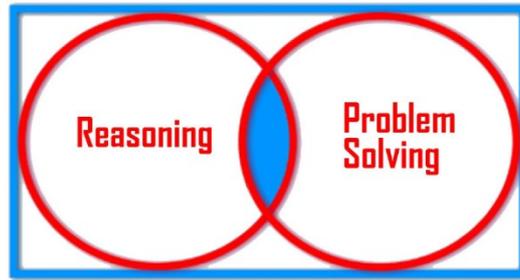


GCSE Foundation (5 – 1)



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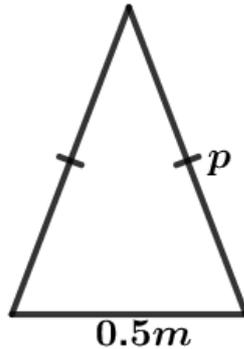
Mathematical Reasoning Questions

(Area and Perimeter) – Set 1

Solutions

The questions are repeated here for your convenience

1 An isosceles triangle of base length 0.5 m is shown below



The perimeter of the triangle is 200 cm. How long is the side p ?

Choose one answer

- a) 1.5 m
- b) 15 cm
- c) 99.75 cm
- d) 0.75 m

Solution

The perimeter of the triangle is 2 m ($200 \text{ cm} = 2 \text{ m}$)

One side of the triangle is 0.5 m long, so the other two sides have a combined length of 1.5m. That is, ($2 \text{ m} - 0.5 \text{ m} = 1.5 \text{ m}$)

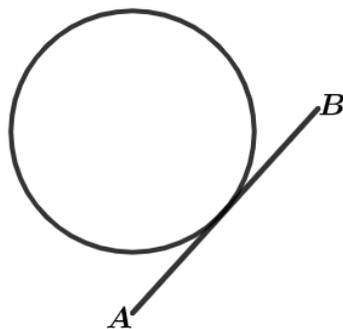
Since the triangle is isosceles, it follows that, $2p = 1.5$

Therefore, $p = 0.75 \text{ m}$

Correct Answer: D

[2Marks]

2 Choose the word which best describes the line AB



- a) Chord
- b) Tangent
- c) Circumference
- d) Arc

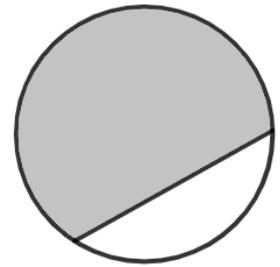
Solution

Correct Answer: B

[1Mark]

3 Choose the word which best describes the shaded area in the diagram below

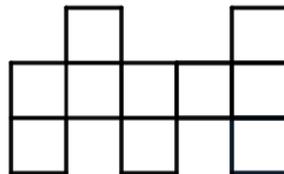
- a) Chord
- b) Sector
- c) Segment
- d) Annulus



Solution

Correct Answer: C [1Mark]

4 10 congruent squares are used to make the shape below



The shape has an area of 90 cm^2

What is the perimeter of the shape? Choose one answer

- a) 90 cm
- b) 60 cm
- c) 66 cm
- d) 120 cm

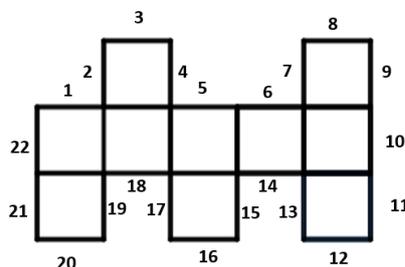
Solution

There are 10 squares and the area of the shape is 90 cm^2

The area of one square must be 9 cm^2

That is, $(10 \times 9 \text{ cm}^2 = 90 \text{ cm}^2)$

If a square has an area of 9 cm^2 , then the sides of the square must be 3 cm. That is, $(3 \text{ cm} \times 3 \text{ cm} = 9 \text{ cm}^2)$



Therefore, the perimeter of the shape will be $22 \times 3 \text{ cm} = 66 \text{ cm}$

Correct Answer: C [3Mark]

- 5 Five identical equilateral triangles are drawn inside a rectangle as shown below



Find the ratio of the shaded area to the unshaded area in the rectangle? Make your choice

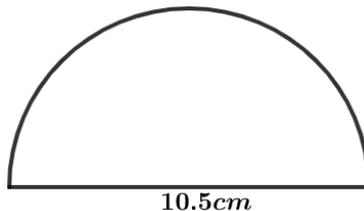
- a) 3: 2
- b) 1: 1
- c) 5: 3
- d) 2: 3

Solution

There are 3 shaded congruent triangles and 3 unshaded congruent triangles. Therefore, the required ratio is 1: 1

Correct Answer: B [2Marks]

- 6 A semi-circle of diameter 10.5 cm is given below



Which option below is closest to area of the semi-circle?

Choose one answer

- a) 87 cm²
- b) 16 cm²
- c) 43 cm²
- d) 173 cm²

Solution

Area of a semi-circle = $\frac{\pi r^2}{2}$ (where r is the radius)

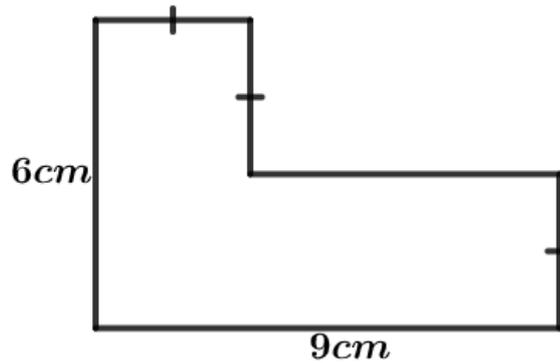
The radius is half of the diameter (10.5 cm)

Therefore $r = 10.5 \div 2 = 5.25$

$$\frac{\pi r^2}{2} = \frac{\pi(5.25)^2}{2} = 43.3 \text{ cm}^2 \text{ (1dp)}$$

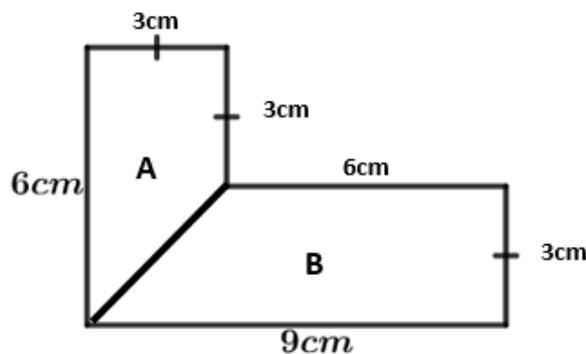
Correct Answer: C [2Marks]

7 A composite shape is shown below.



By drawing an extra line, two trapezia can be created from the above shape. Use this method to calculate the area of the shape.

Solution



Now, we have two trapezia A and B

$$\text{Area of a trapezium} = \frac{(a+b) \times h}{2}$$

$$\text{Area of trapezium A: } \frac{(3+6) \times 3}{2} = \frac{27}{2} = 13.5 \text{ cm}^2$$

$$\text{Area of trapezium B: } \frac{(9+6) \times 3}{2} = \frac{45}{2} = 22.5 \text{ cm}^2$$

$$\text{Total area of the shape} = 13.5 + 22.5 = 36 \text{ cm}^2$$

So, the area of the shape is 36 cm^2

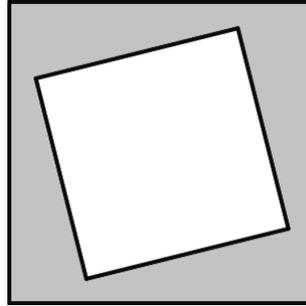
[3marks]

8

A smaller square lie inside a larger square.

The perimeter of the larger square is 48 cm.

The perimeter of the smaller square is 25% less than the perimeter of the larger square.



What is the size of the shaded area? Choose one answer

- a) 28 cm^2
- b) 63 cm^2
- c) 135 cm^2
- d) 140 cm^2

Solution

Length of side of the larger square will be $48 \div 4 = 12$

Therefore, the area of the larger square will be

$$12 \times 12 = 144 \text{ cm}^2$$

The perimeter of the smaller square is 25% less than the perimeter of the large square (48 cm)

$$\text{So, } 25\% \text{ of } 48 = 12$$

$$48 - 12 = 36$$

Therefore, the perimeter of the smaller square is 36cm, and the

Hence, side length of the smaller square will be $36 \div 4 = 9 \text{ cm}$

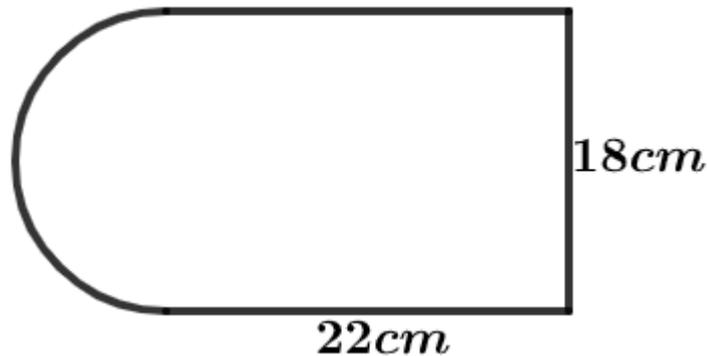
So, the area of the smaller square is $9 \times 9 = 81 \text{ cm}^2$

Therefore, the shaded area= $144 - 81 = 63 \text{ cm}^2$

Correct Answer: B

[3marks]

- 9 A semi-circle is drawn to one end of a rectangle to form the shape shown below.



Calculate the area of the shape in terms of pi

Freddie's Answer:

Area of rectangular part: $22 \times 18 = 396$

Area of semi-circular part: $18^2 \times \pi = 324\pi$

Total area = $396 + 324\pi = 720\pi$

Freddie has made two mistakes.

Identify the mistakes and give the correct answer.

Solution

1. Diameter of the semi-circle is 18 cm therefore, the radius will be 9 cm {Freddie calculated the area using the diameter}

2. Freddie needed to divide the area by 2 since it's a semi-circle

Correct Solution:

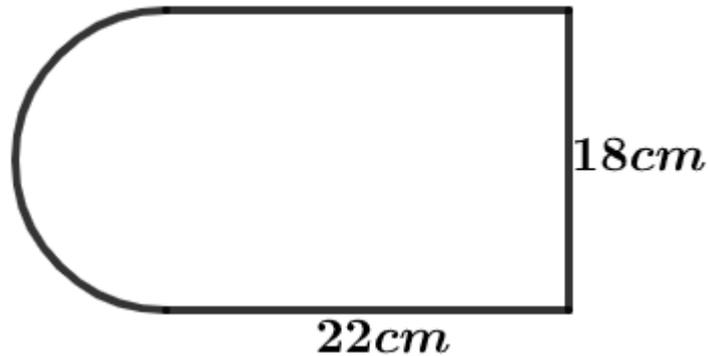
$$\text{Area of the Semi-Circle} = \frac{9^2 \times \pi}{2} = \frac{81}{2} \pi$$

$$\text{Area of rectangular part} = 18 \times 22 = 396$$

$$\text{Total area of the shape in terms of pi} = \frac{81}{2} \pi + 396$$

[4marks]

- 10** A semi-circle is drawn to one end of a rectangle to form the shape shown below.



Calculate the perimeter of the shape to 2 significant figures

Marie's Answer

Perimeter of the rectangular part: $22 + 18 + 22 = 62$ cm

Perimeter of the semi-circular part: $18 \times \pi \div 2 = 9\pi$

Total perimeter of the shape: $62 + 9\pi = 90.3$ cm(2sf)

Identify and rectify the one mistake Marie made?

Solution

90.3 cm is not given to 2 significant figures.

The correct answer would be 90 cm

[1mark]