



1

The diagram shows a circle with centre  $O$ .

- Write down the mathematical name of the straight line  $P$ , which touches the circle at one point.
- Write down the mathematical name of the straight line  $Q$ .
- Write down the mathematical name of the shaded region  $R$ .
- The radius of a different circle is 4.5 cm. Write down its diameter.

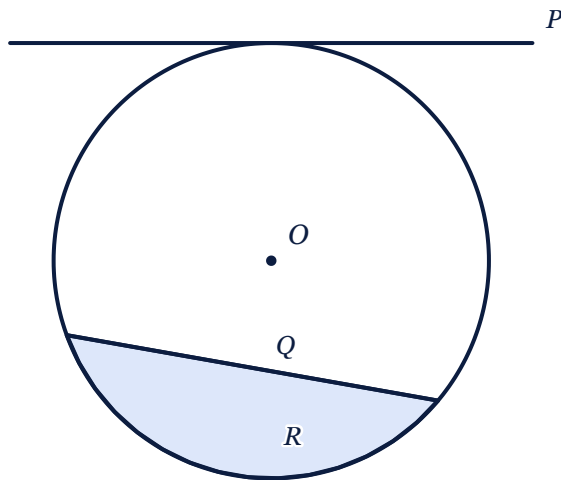


Diagram NOT accurately drawn

(4 marks)

a) Touches the circle at one point

Tangent

b) Joins two points on the circle

Chord

c) Between a chord and the arc

Segment

d)

$$d = 2r$$

$$d = 2 \times 4.5 = 9$$

9 cm

2

A circular coaster has a diameter of 10 cm.

- Work out the circumference of the coaster.
- Work out the area of the coaster.

Give each answer correct to 1 decimal place.

(3 marks)

a)

$$C = \pi d$$

$$C = \pi \times 10 = 31.415...$$

$$\boxed{31.4 \text{ cm}}$$

b) Radius first

$$r = 10 \div 2 = 5$$

$$A = \pi r^2$$

$$A = \pi \times 5^2 = 78.539...$$

$$\boxed{78.5 \text{ cm}^2}$$

3

A circle has diameter 18 cm.

- Work out the circumference of the circle. Give your answer in terms of  $\pi$ .
- Work out the area of the circle. Give your answer in terms of  $\pi$ .

(3 marks)

$$\text{Circumference} = \pi d = 18\pi \text{ cm}$$

$$\text{Radius} = 18 \div 2 = 9 \text{ cm, so area} = \pi r^2 = \pi \times 81 = 81\pi \text{ cm}^2$$

4

The circumference of a circle is  $14\pi$  cm.

Work out the area of the circle. Give your answer in terms of  $\pi$ .

(4 marks)

$$\text{Circumference} = 2\pi r, \text{ so } 2\pi r = 14\pi \text{ and } r = 7 \text{ cm}$$

$$\text{Area} = \pi r^2 = \pi \times 7^2 = 49\pi \text{ cm}^2$$

$$\boxed{49\pi \text{ cm}^2}$$

5

a. A bicycle wheel has a circumference of 88 cm. Work out its diameter.

b. A circular rug has an area of 154 cm<sup>2</sup>. Work out its radius.

Give each answer correct to 1 decimal place.

(4 marks)

a)

$$\begin{array}{rcl} \pi d & = & 88 \\ \div \pi & & \\ d & = & 28.01... \end{array} \quad \div \pi$$

28.0 cm

b)

$$\begin{array}{rcl} \pi r^2 & = & 154 \\ \div \pi & & \\ r^2 & = & 49.01... \\ \sqrt{\phantom{x}} & & \\ r & = & 7.001... \end{array} \quad \div \pi \quad \sqrt{\phantom{x}}$$

7.0 cm

6

Shape *A* is a semicircle with diameter 12 cm. Shape *B* is a quarter circle with radius 8 cm.

a. Work out the area and the perimeter of shape *A*.

b. Work out the area and the perimeter of shape *B*.

Give your answers correct to 1 decimal place.

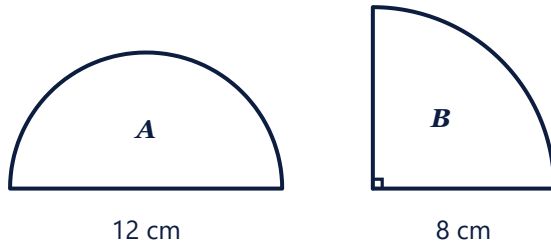


Diagram NOT accurately drawn

(4 marks)

a)  $r = 6$

$$\text{Area} = \frac{1}{2} \times \pi \times 6^2 = 56.54\dots$$

$$\boxed{56.5 \text{ cm}^2}$$

$$\text{Curved edge} = \frac{1}{2} \times \pi \times 12 = 18.84\dots$$

$$\text{Perimeter} = 18.84\dots + 12 = 30.84\dots$$

$$\boxed{30.8 \text{ cm}}$$

b)

$$\text{Area} = \frac{1}{4} \times \pi \times 8^2 = 50.26\dots$$

$$\boxed{50.3 \text{ cm}^2}$$

$$\text{Curved edge} = \frac{1}{4} \times 2 \times \pi \times 8 = 12.56\dots$$

$$\text{Perimeter} = 12.56\dots + 8 + 8 = 28.56\dots$$

$$\boxed{28.6 \text{ cm}}$$

7

A circle of radius 5 cm is drawn inside a square with sides of length 10 cm, so that the circle touches all four sides of the square.

The region inside the square but outside the circle is shaded.

Work out the shaded area. Give your answer correct to 1 decimal place.

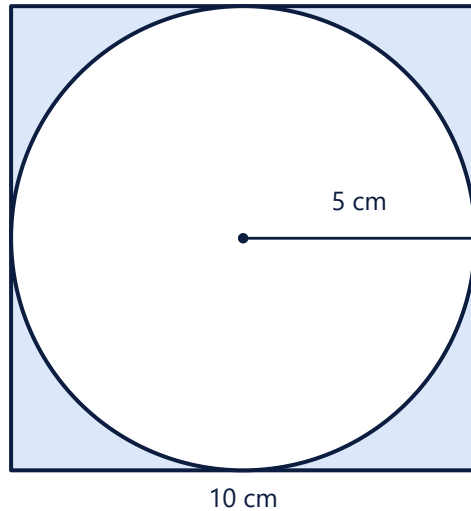


Diagram NOT accurately drawn

(4 marks)

$$\text{Area of the square} = 10 \times 10 = 100 \text{ cm}^2$$

$$\text{Area of the circle} = \pi \times 5^2 = 25\pi = 78.539... \text{ cm}^2$$

$$\text{Shaded area} = 100 - 78.539... = 21.460... = 21.5 \text{ cm}^2 \text{ (1 dp)}$$

$$\boxed{21.5 \text{ cm}^2}$$

8

The diagram shows a sector of a circle with radius 9 cm and angle  $100^\circ$ .  
Work out the area of the sector. Give your answer correct to 1 decimal place.

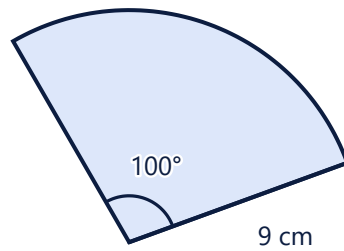


Diagram NOT accurately drawn

(2 marks)

$$\text{Fraction of the circle} = \frac{100}{360}$$

$$\text{Area} = \frac{100}{360} \times \pi \times 9^2$$

$$= 70.68\dots$$

$$\boxed{70.7 \text{ cm}^2}$$

9

A slice of a round cheese is a sector of a circle with radius 12 cm and angle  $75^\circ$ .

- Work out the length of the curved edge (the arc) of the slice.
- Work out the perimeter of the slice.

Give your answers correct to 1 decimal place.

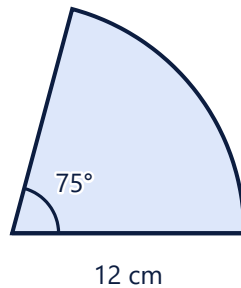


Diagram NOT accurately drawn

(3 marks)

a)

$$\text{Arc} = \frac{75}{360} \times \pi \times 24$$

$$= 15.70\dots$$

$$\boxed{15.7 \text{ cm}}$$

b) Arc + two radii

$$15.70\dots + 12 + 12 = 39.70\dots$$

$$\boxed{39.7 \text{ cm}}$$

10

A circular pond has radius 3 m.

The pond is surrounded by a path of constant width 1 m.

Calculate the area of the path. Give your answer correct to 3 significant figures.

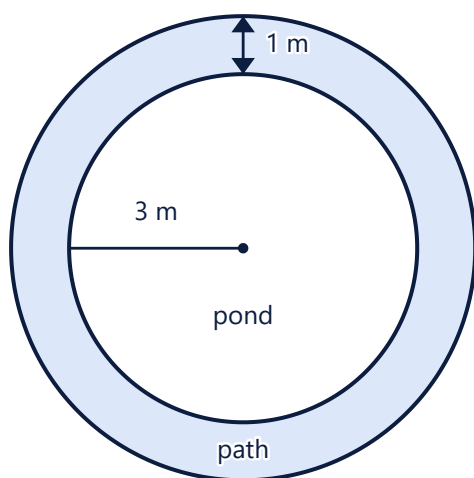


Diagram NOT accurately drawn

(4 marks)

The outer edge of the path is a circle of radius  $3 + 1 = 4$  m

$$\text{Area of the path} = \pi \times 4^2 - \pi \times 3^2 = 16\pi - 9\pi = 7\pi \text{ m}^2$$

$$7\pi = 21.991\dots = 22.0 \text{ m}^2 \text{ (3 sf)}$$

$$\boxed{22.0 \text{ m}^2}$$

11

A sector of a circle has angle  $45^\circ$ .

The arc length of the sector is  $3\pi$  cm.

Work out the area of the sector.

Give your answer in terms of  $\pi$ .

(4 marks)

$$\text{Arc length} = \left(\frac{45}{360}\right) \times 2\pi r = \frac{\pi r}{4}$$

$$\frac{\pi r}{4} = 3\pi, \text{ so } r = 12 \text{ cm}$$

$$\text{Area} = \left(\frac{45}{360}\right) \times \pi \times 12^2 = \frac{1}{8} \times 144\pi = 18\pi \text{ cm}^2$$

$$\boxed{18\pi \text{ cm}^2}$$

12

A school field is a rectangle 100 m long and 60 m wide with a semicircle on each of the two short ends.

- Work out the perimeter of the field.
- Work out the area of the field.

Give your answers correct to 1 decimal place.

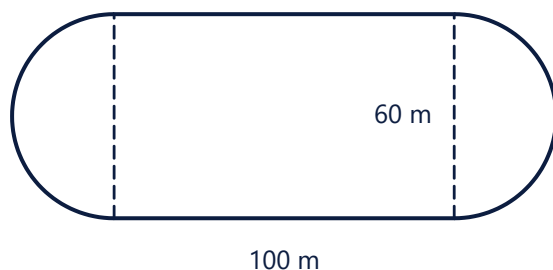


Diagram NOT accurately drawn

(4 marks)

Two semicircles = one whole circle,  $d = 60$

a)

Curved parts:  $\pi \times 60 = 188.49\dots$

Perimeter =  $100 + 100 + 188.49\dots$

=  $388.49\dots$

**388.5 m**

b)  $r = 30$

Rectangle:  $100 \times 60 = 6000$

Circle:  $\pi \times 30^2 = 2827.43\dots$

$6000 + 2827.43\dots = 8827.43\dots$

**8827.4 m<sup>2</sup>**