

Name: _____

GCSE (1 – 9)

Area and Circumference of Circles

Instructions

- Use **black** ink or ball-point pen.
- Answer all Questions.
- Answer the Questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

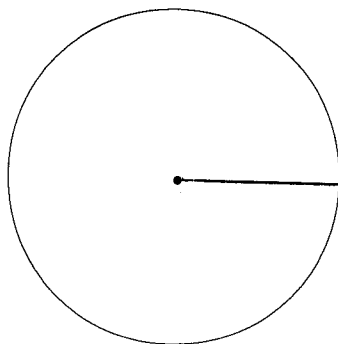
Information

- The marks for each Question are shown in brackets
– *use this as a guide as to how much time to spend on each Question.*

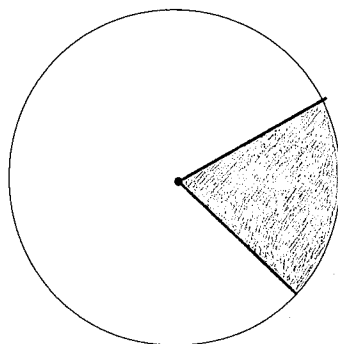
Advice

- Read each Question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every Question.
- Check your answers if you have time at the end

- 1 (a) On the diagram below, draw a radius of the circle.

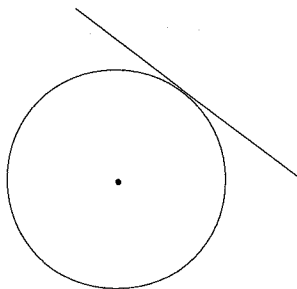


- (b) On the diagram below, draw a sector of the circle.
Shade the sector.



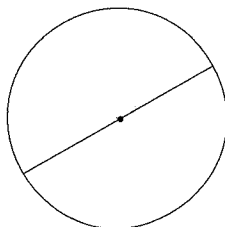
(Total for question 1 is 2 marks)

- 2 (a) Write down the mathematical name for the straight line touching the circle.



tangent

- (b) Write down the mathematical name for the straight line shown in the diagram.



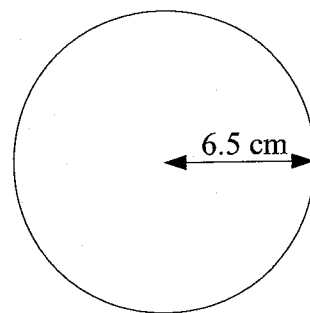
diameter

(Total for question 2 is 2 marks)

3

A circle has a radius of 6.5 cm.
Work out the circumference of the circle.
Give your answer correct to 2 decimal places.

$$\begin{aligned}\text{Circumference} &= 2\pi r \\ &= 2\pi(6.5) \\ &= 13\pi \\ &= 40.84 \text{ cm}\end{aligned}$$



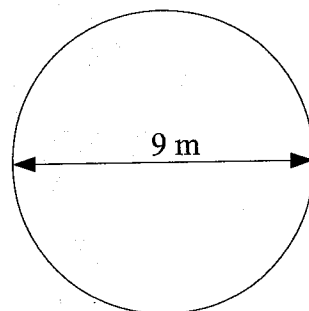
40.84 cm

(Total for question 3 is 3 marks)

4

A circle has a diameter of 9 m. Radius = 4.5
Work out the area of the circle.
Give your answer correct to 1 decimal place.

$$\begin{aligned}\text{Area} &= \pi r^2 \\ &= \pi(4.5)^2 \\ &= \frac{81}{4}\pi \\ &= 63.6 \text{ m}^2\end{aligned}$$



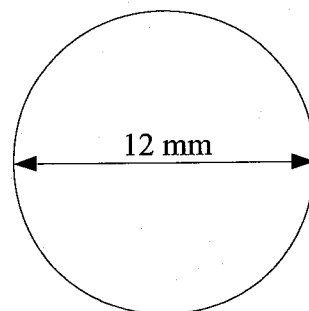
63.6 m²

(Total for question 4 is 3 marks)

5

A circle has a diameter of 12 mm.
Work out the circumference of the circle.
Give your answer in terms of π

$$\begin{aligned}\text{Circumference} &= \pi d \\ &= \pi(12) \\ &= 12\pi\end{aligned}$$



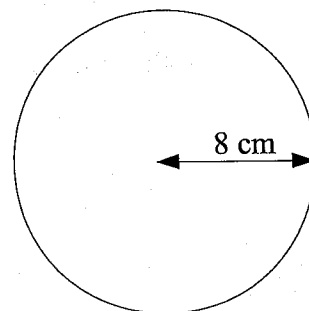
12 π mm

(Total for question 5 is 3 marks)

6

A circle has a radius of 8 cm.
Work out the area of the circle.
Give your answer in terms of π

$$\begin{aligned}\text{Area} &= \pi r^2 \\ &= \pi(8)^2 \\ &= 64\pi\end{aligned}$$



64 π cm²

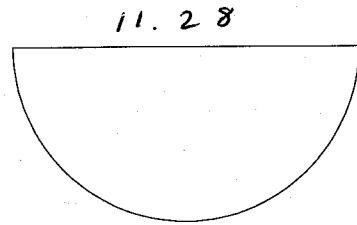
(Total for question 6 is 3 marks)

7

A semi-circle has an area of 50 m^2 .

Find the perimeter of the semi-circle.

Give your answer correct to one decimal place.



$$\text{Area of semi circle} = \frac{\pi r^2}{2}$$

$$\frac{\pi r^2}{2} = 50$$

$$\pi r^2 = 100$$

$$r^2 = \frac{100}{\pi}$$

$$r = \sqrt{\frac{100}{\pi}}$$

$$= 5.64189...$$

$$\begin{aligned} \text{diameter} &= 5.64189 \times 2 \\ &= 11.28379... \end{aligned}$$

$$\begin{aligned} \text{circumference} &= \pi d \\ (\text{whole circle}) \end{aligned}$$

$$= \pi (11.28)$$

$$= 35.449...$$

$$\frac{35.449}{2} = 17.72...$$

$$11.28 + 17.72 = \underline{\underline{29.0}}$$

$$\dots\dots\dots 29.0 \dots\dots\dots \text{m}$$

(Total for question 7 is 4 marks)

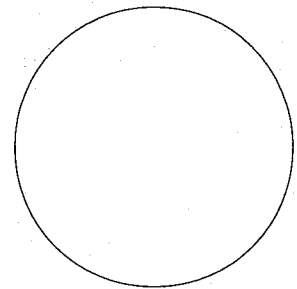
8

A circular field has a diameter of 32 metres.

A farmer wants to build a fence around the edge of the field.

Each metre of fence will cost £15.95

Work out the total cost of the fence.



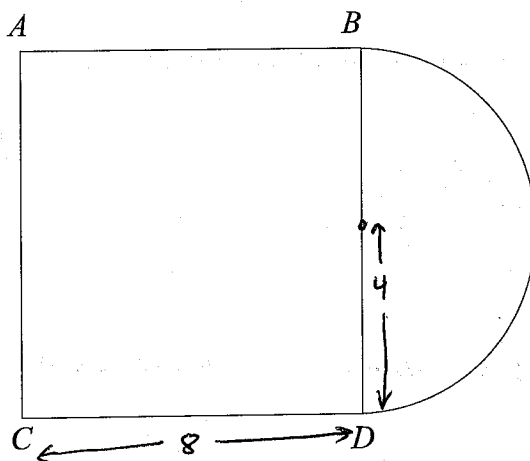
$$\begin{aligned} \text{Circumference} &= \pi d \\ &= \pi (32) \\ &= 32\pi \text{ m} \end{aligned}$$

$$32\pi \times 15.95 = £1603.47$$

$$£ \dots\dots 1603.47 \dots\dots$$

(Total for question 8 is 3 marks)

9



An area is formed by a square, $ABCD$, and a semi circle.
 BD is the diameter of the semi circle.

The radius of the semi circle is 4m. *diameter = 8m*

The area is going to be covered completely with lawn seed.

A box of lawn seed covers 25 m^2 .

How many boxes of lawn seed will be needed?
 You must show your working.

$$\begin{aligned} \text{Area of square} &= 8 \times 8 \\ &= 64 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of semi-circle} &= \frac{\pi r^2}{2} \\ &= \frac{\pi (4)^2}{2} \\ &= 8\pi \\ &= 25.1 \text{ m}^2 \end{aligned}$$

$$64 + 25.1 = \underline{89.1 \text{ m}^2}$$

$$75 \text{ m}^2 = 3 \text{ boxes}$$

$$100 \text{ m}^2 = 4 \text{ boxes}$$

4

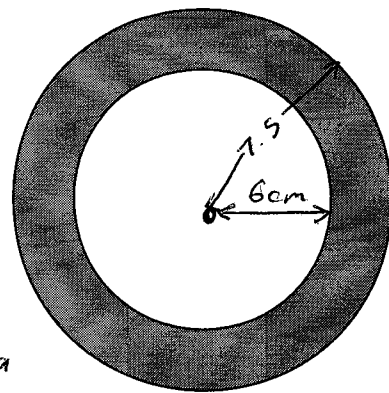
(Total for question 9 is 5 marks)

- 10 The diagram shows a shaded ring formed by cutting a smaller circle out of a larger circle.

The radius of the smaller circle is 6 cm.
The diameter of the larger circle is 15 cm.

$$r = 7.5$$

Find the area of the shaded ring.



$$\text{Shaded Area} = \text{Large Area} - \text{Small Area}$$

$$= \pi (7.5)^2 - \pi (6)^2$$

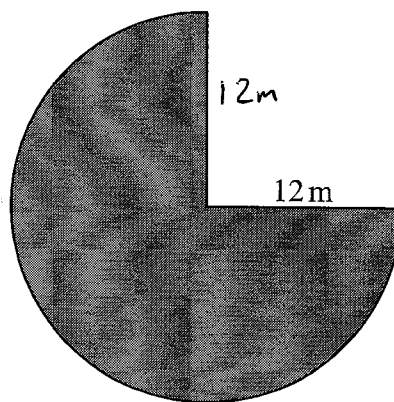
$$= \frac{81}{4} \pi \quad \text{or} \quad 63.6 \text{ cm}^2$$

$$\dots\dots\dots \frac{81}{4} \pi \dots\dots\dots \text{cm}^2$$

(Total for question 10 is 3 marks)

- 11 The diagram shows three quarters of a circle with a radius of 12 metres.

Find the perimeter of the shape.



$$\begin{aligned} \text{Circumference (whole circle)} &= 2\pi r \\ &= 2\pi(12) \\ &= 24\pi \end{aligned}$$

$$\frac{3}{4} \times 24\pi = 18\pi$$

$$\begin{aligned} \text{perimeter} &= 18\pi + 12 + 12 \\ &= 80.55 \text{ m (2dp)} \end{aligned}$$

$$\dots\dots\dots 80.55 \dots\dots\dots \text{m}$$

(Total for question 11 is 3 marks)

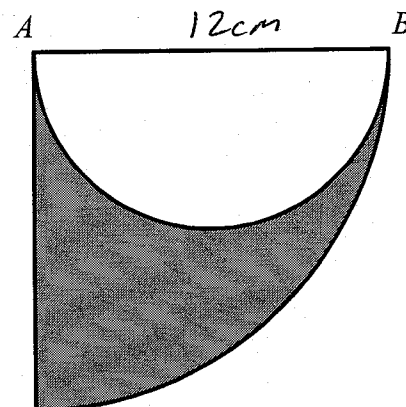
- 12 The diagram shows a semi circle inside a sector of a circle, ABC .

AB is the diameter of the semi circle.

Angle $BAC = 90^\circ$

$AB = 12$ cm

Find the area of the shaded region.



Radius of semi-circle = 6 cm

$$\begin{aligned}\text{Area of semi circle} &= \frac{\pi r^2}{2} \\ &= \frac{\pi (6)^2}{2} \\ &= 18\pi\end{aligned}$$

$$\begin{aligned}\text{Radius of } \frac{1}{4} \text{ circle} &= 12 \text{ cm} \\ \text{Area of } \frac{1}{4} \text{ circle} &= \frac{\pi r^2}{4} \\ &= \frac{\pi (12)^2}{4} \\ &= 36\pi\end{aligned}$$

$$\begin{aligned}\text{Shaded Area} &= 36\pi - 18\pi \\ &= 18\pi \text{ or } 56.5 \text{ cm}^2\end{aligned}$$

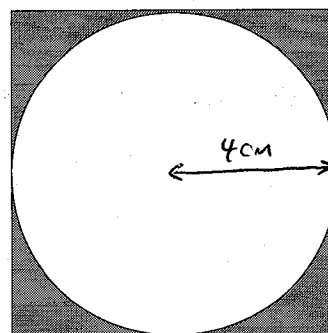
(Total for question 12 is 3 marks)

- 13 A circle is enclosed by a square as shown in the diagram.

Each side of the square measures 8 cm.

Find the area of the shaded region.

Give your answer correct to 1 decimal place.



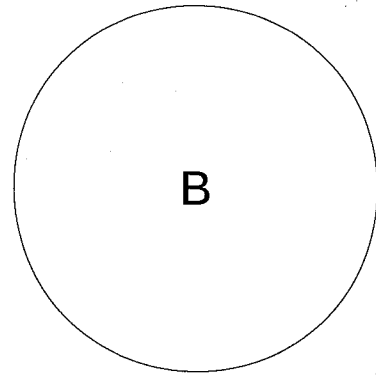
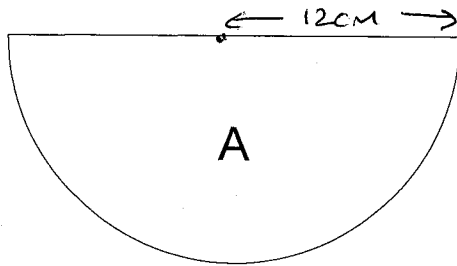
$$\text{Area of square} = 8 \times 8 = 64 \text{ cm}^2$$

$$\begin{aligned}\text{Area of circle} &= \pi (4)^2 \\ &= 16\pi\end{aligned}$$

$$\begin{aligned}\text{Shaded Area} &= 64 - 16\pi \\ &\approx 13.7 \text{ cm}^2\end{aligned}$$

$$13.7 \text{ cm}^2$$

(Total for question 13 is 3 marks)



Shape **A** is a semi-circle which has a radius of 12 cm.
Shape **B** is a circle.

The area of shape **A** is 8 times the area of shape **B**.

Show that the radius of shape **B** is 3 cm.

$$\begin{aligned}
 \text{Area of semi-circle} &= \frac{\pi r^2}{2} \\
 &= \frac{\pi (12)^2}{2} \\
 &= \underline{\underline{72\pi}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of B} &= \frac{72\pi}{8} \\
 &= 9\pi
 \end{aligned}$$

$$\begin{aligned}
 &\underline{\underline{\text{B}}} \\
 \text{Area of circle} &= \pi r^2 \\
 \cancel{\pi} r^2 &= 9\cancel{\pi} \\
 r^2 &= 9 \\
 \underline{\underline{r}} &= \underline{\underline{3}}
 \end{aligned}$$

(Total for question 14 is 3 marks)