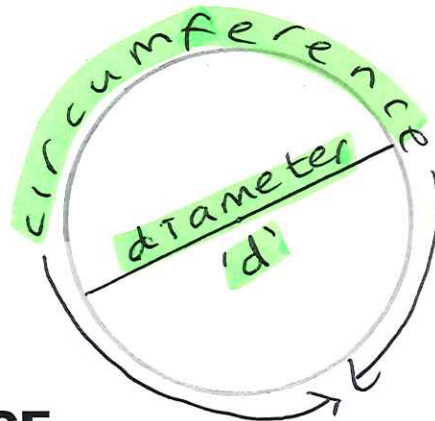


MATHSDIY

$$\text{circumference} = \pi d$$

circumference just means the perimeter of a circle.

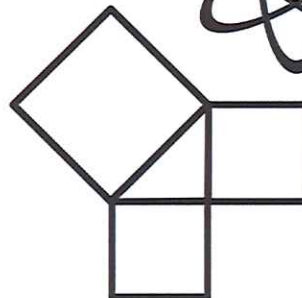
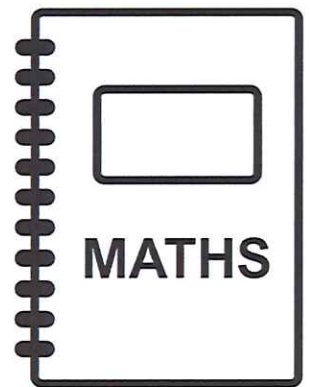
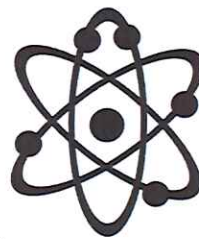


GCSE TOPIC BOOKLET AREA & CIRCUMFERENCE OF A CIRCLE

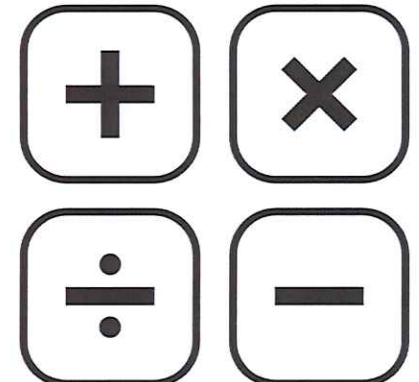
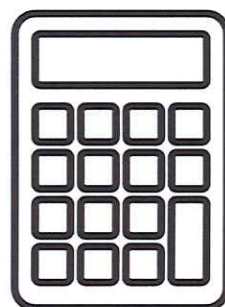
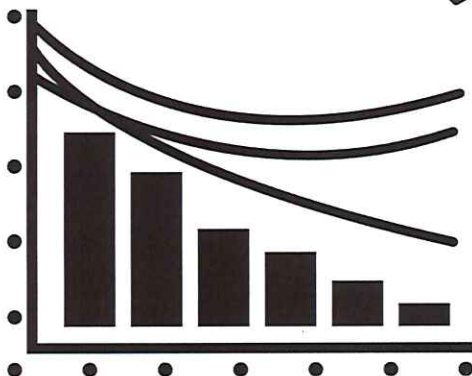
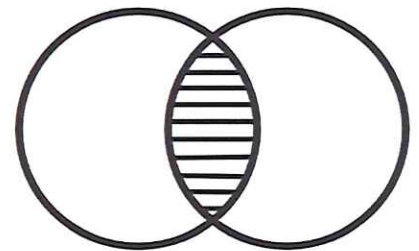
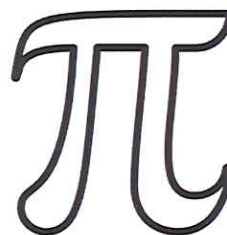
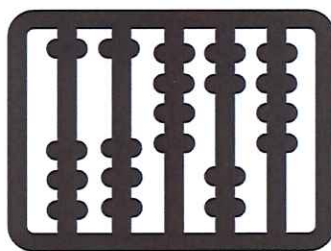
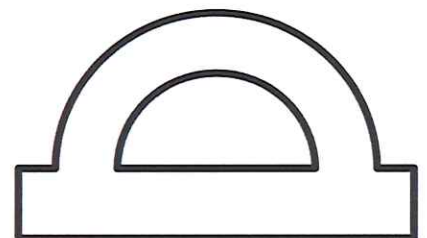
SOLUTIONS



$$\text{area} = \pi r^2$$



$$a^2 = b^2 + c^2$$



1. A circular mat has a radius of 9cm.

- a) Calculate the area of one surface of the table mat.

$$\begin{aligned} \text{Area} &= \pi r^2 \\ &= \pi \times 9^2 \\ &= 254.469 \dots \\ &= \underline{\underline{254.5 \text{ cm}^2}} \quad (1 \text{ dp}) \end{aligned}$$

(2)

- b) Calculate the ^{→ circumference}perimeter of the table mat.

$$\begin{aligned} &= \pi d = \pi \times 18 \quad (\text{diameter} = 2 \times \text{radius}) \\ &= 56.5486 \dots \\ &= \underline{\underline{56.5 \text{ cm}}} \quad (1 \text{ dp}) \end{aligned}$$

(2)

2. Elliot measures the diameter of a £2 coin and finds it to be 28mm. Clearly stating the units of your answers, calculate [→] marks will be deduct if you do not give correct units.

- a) the circumference of his £2 coin, giving your answer to an appropriate degree of accuracy.

$$\begin{aligned} \text{Circumference} &= \pi \times d \\ &= \pi \times 28 \\ &= 87.964 \dots = \underline{\underline{88.0 \text{ cm}}} \\ &\quad (1 \text{ dp}) \end{aligned}$$

(3)

- b) the area of one circular face of his £2 coin.

$$\begin{aligned} \text{Area} &= \pi r^2 \quad (\text{radius} = \text{diameter} \div 2) \\ &= \pi \times (14)^2 \\ &= 615.75 \dots \\ &= \underline{\underline{615.8 \text{ cm}^2}} \quad (1 \text{ dp}) \end{aligned}$$

(3)

3. A circular pond has a radius of 6.5m.

a) Find the circumference of the pond, giving your answer to an appropriate degree of accuracy.

$$\begin{aligned} \text{circumference} &= \pi \times d & \text{diameter} &= 2 \times 6.5 = 13 \\ &= \pi \times 13 \\ &= 40.840\dots = \underline{40.8 \text{ m}} \text{ (1dp)} \end{aligned}$$

(3)

b) Calculate the area of the surface of the pond, stating clearly the units of your answer.

$$\begin{aligned} \text{Area} &= \pi r^2 = \pi \times 6.5^2 \\ &= 132.732\dots \\ &= \underline{132.7 \text{ m}^2} \text{ (1dp)} \end{aligned}$$

(3)

4. In both parts (a) and (b) of this question you should state the units of your answer and give your answer to an appropriate degree of accuracy.

A circular pond has a radius of 8.2m.

a) Find the perimeter of the pond. $\rightarrow$ circumference

$$\begin{aligned} \text{Circumference} &= \pi \times d & (\text{diameter} &= 8.2 \times 2) \\ &= \pi \times 16.4 & &= 16.4 \\ &= 51.5221\dots \\ &= \underline{51.5 \text{ m}} \text{ (1dp)} \end{aligned}$$

(3)

- b) Calculate the area of the surface of the pond.

$$\begin{aligned} \text{Area} &= \pi r^2 \\ &= \pi \times 8.2^2 \\ &= 211.24 \dots \\ &= \underline{\underline{211.2 \text{ m}^2}} \text{ (1dp)} \end{aligned}$$

(3)

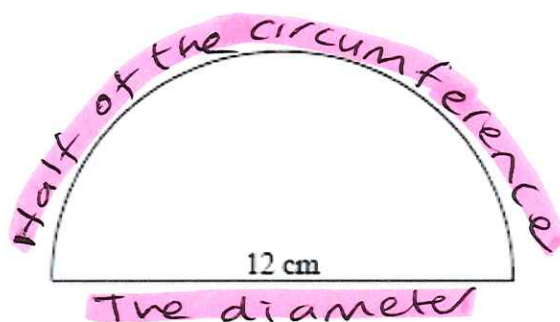
5. Jonathan measures the radius of a circular pond as 4.6m. Calculate the circumference of the pond, giving your answer to an appropriate degree of accuracy.

$$\text{diameter} = 2 \times 4.6 = 9.2 \text{ m}$$

$$\begin{aligned} \text{Circumference} &= \pi \times d = \pi \times 9.2 \\ &= 28.9026 \dots \\ &= \underline{\underline{28.9 \text{ m}}} \text{ (1dp)} \end{aligned}$$

(3)

6. Calculate the perimeter of this shape.



$$\begin{aligned} \text{Circumference} &= \pi \times d = \pi \times 12 = 37.699 \dots \\ \frac{1}{2} \text{ a circumference} &= 37.699 \dots \div 2 = 18.849 \dots \end{aligned}$$

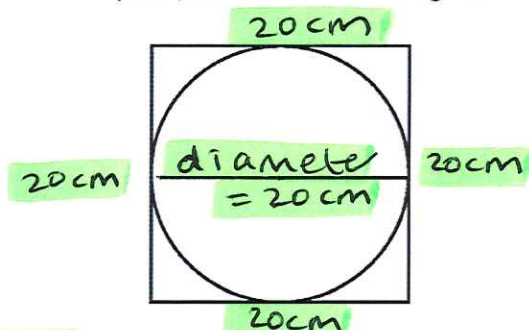
$$\begin{aligned} \text{Perimeter} &= \frac{1}{2} \text{ of the circumference} + \text{the diameter} \\ &= 18.849 + 12 = \underline{\underline{30.8 \text{ cm}}} \text{ (1dp)} \end{aligned}$$

(3)

7.

A square has a perimeter of 80 cm.

A circle fits exactly inside the square, as shown in the diagram.



Calculate the circumference of the circle.

Give your answer correct to 1 decimal place.

You must show your working.

[4]

$$\text{Perimeter} = 80 \text{ cm}$$

$$1 \text{ side} = 80 \div 4 = 20 \text{ cm}$$

$$\text{diameter of circle} = 20 \text{ cm}$$

$$\text{Circumference} = \pi \times d$$

$$= \pi \times 20$$

$$= 62.8318 \dots$$

$$= \underline{\underline{62.8 \text{ cm}}} \text{ (1dp)}$$

8.

- (a) The shape below shows a semi circle attached to a rectangle.

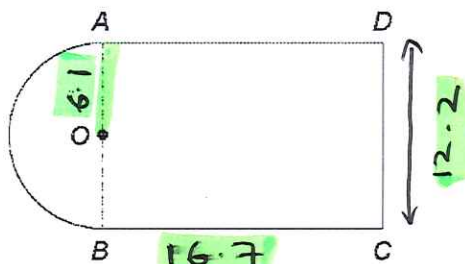


Diagram not drawn to scale

The radius of the semi circle is 6.1 cm and the length $BC = 16.7$ cm.
Calculate the area of the shape.

[6]

$$\text{Area rectangle} = L \times W = 16.7 \times 12.2 = 203.74 \text{ cm}^2$$

$$\begin{aligned} \text{Area semicircle} &= \frac{\pi r^2}{2} = \frac{\pi \times 6.1^2}{2} = 58.449.. \\ &= 58.45 \text{ cm}^2 \end{aligned}$$

$$\text{Total area} = 203.74 + 58.45 = 262.19 \text{ cm}^2$$

(2dp)

- (b) A circle has a circumference of 24π cm.
Calculate the radius of the circle.

[2]

$$\begin{aligned} \text{Circumference} &= \pi \times d = 24\pi \\ d &= 24 \text{ cm} \end{aligned}$$

$$\text{radius} = \text{diameter} \div 2$$

$$\text{radius} = 12 \text{ cm}$$

9.

A company has a large semicircle as part of its logo.
The company plans to paint the logo onto one of the walls of its headquarters.
One tin of paint covers 15m^2 .

Calculate the number of tins of paint that the company needs to buy to paint a semicircle of radius 6.3m onto the wall. [4]

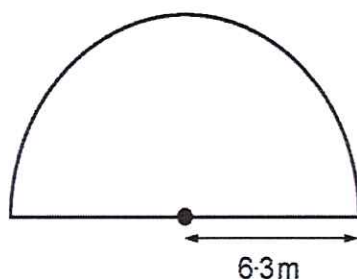


Diagram not drawn to scale

$$\text{Area of semicircle} = \frac{\pi r^2}{2} = \frac{\pi \times 6.3^2}{2}$$

$$= 62.344\dots$$

$$= 62.3\text{m}^2 \text{ (1dp)}$$

$$\text{Number of tins required} = 62.344\dots \div 15$$

$$= 4.15\dots$$

$$= 5 \text{ tins}$$

↑
remember you need to round the number of tins up (even if you only need the tiniest amount of the 5th tin).

10.

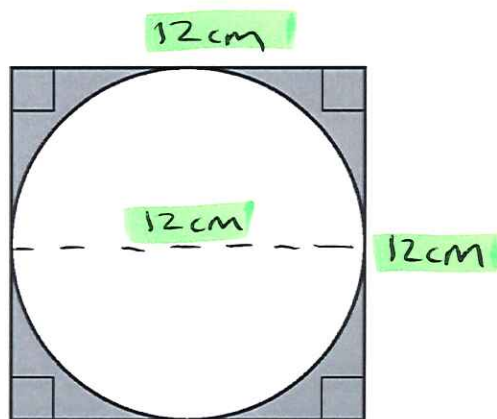


Diagram not drawn to scale

In the diagram above, the circle has a diameter of 12 cm.
Calculate the area of the shaded part.

$$\text{Area of square} = L \times W = 12^2 = 144 \text{ cm}^2$$

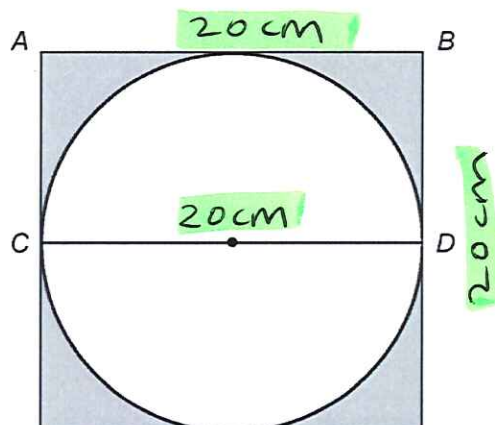
$$\text{Area of circle} = \pi r^2 = \pi \times 6^2 = 113.097 \dots \text{ cm}^2$$

$$\begin{aligned} \text{Shaded Area} &= 144 - 113.097 \dots \\ &= 30.9 \text{ cm}^2 \text{ (1dp)} \end{aligned}$$

[4]

11.

The following shape is a circle within a square.



- (a) The line AB is a side of the square.
It also has a special name in relation to the circle.
Fill in the blank below.

The line AB is a Tangent to the circle.

[1]

- (b) What is the special name given to the line CD ?

[1]

Diameter

- (c) The length of AB is 20 cm.
Calculate the area of the shaded region in the diagram above.

[4]

$$\text{Area of square} = L \times W = 20 \times 20 = 400 \text{ cm}^2$$

$$\text{Area of circle} = \pi r^2 = \pi \times 10^2 = 314.15 \dots \text{ cm}^2$$

$$\text{Shaded Area} = 400 - 314.15 \dots \text{ cm}^2 = 85.8 \text{ cm}^2$$

$$\text{Area} = 85.8 \text{ cm}^2 \quad (1 \text{ dp})$$