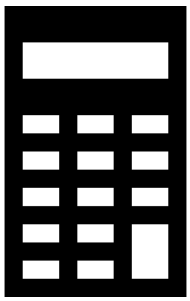
AQA, OCR, Edexcel

GCSE

GCSE Maths

Area of Circles & Sectors

Name:

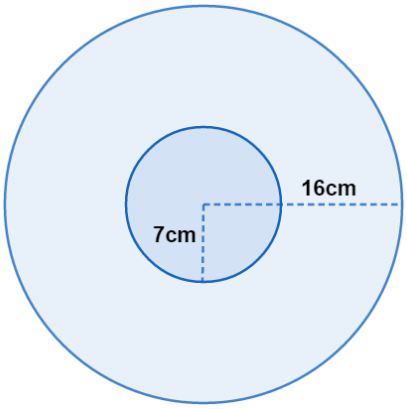


Guidance

1. Read each question carefully.
2. Don't spend too long on each question.
3. Attempt every question.
4. Always show your workings.

Revise GCSE Maths:
www.MathsMadeEasy.co.uk/gcse-maths-revision/

1. Calculate the area between the two circles. Give your answer to 2dp.



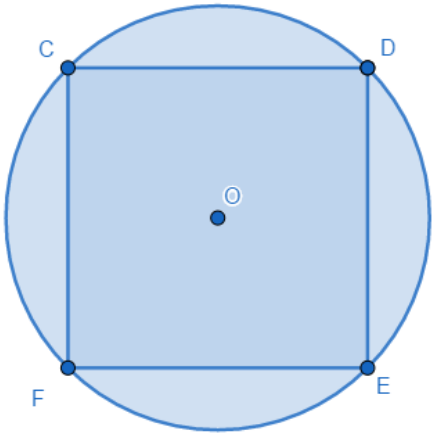
$$Area\ of\ Circle = \pi r^2$$

$$Area\ of\ big\ circle = \pi \times 16^2 = 256\pi$$
$$Area\ of\ small\ circle = \pi \times 7^2 = 49\pi$$

$$Difference\ in\ circles = 256\pi - 49\pi$$
$$= 207\pi$$
$$= 650.31$$

Area = ……650.31….cm^2
(3 marks)

2. The radius of the circle below is 6cm. By first calculating the area of the square, calculate the total area between the square and the circle. Give your answer to 2dp.



$$OD = 6cm$$
$$FD = 2 \times OD$$
$$= 2 \times 6$$
$$= 12cm$$

$$FE = ED = x$$

FED is a right-angle triangle.

$$FD^2 = FE^2 + ED^2$$
$$12^2 = x^2 + x^2$$
$$144 = 2x^2$$
$$x^2 = 72$$
$$x = \sqrt{72} = 6\sqrt{2}$$

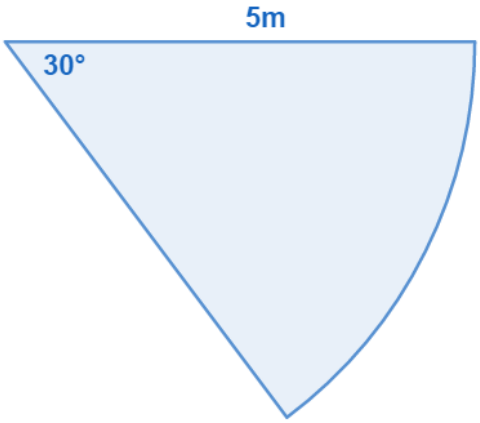
$$Area\ of\ square = \left(6\sqrt{2}\right)^2 = 72$$

$$\begin{aligned} Area\ of\ circle &= \pi r^2 \\ &= \pi \times 6^2 \\ &= 36\pi \end{aligned}$$

$$Area\ between\ square\ and\ circle = 36\pi - 72 = 41.10\ (2dp)$$

Area = ……41.1….cm^2
(3 marks)

3. The sector of a circle below has a radius of 5m and the angle at the centre is 30°



Find the area of the sector. Give your answer to 2dp.

$$\begin{aligned} Area\ of\ circle &= \pi r^2 \\ &= \pi \times 5^2 \\ &= 25\pi \end{aligned}$$

$$\begin{aligned} Sector\ proportion &= Segment\ angle \div 360° \\ &= 30° \div 360° \\ &= \frac{1}{12} \end{aligned}$$

$$Area\ of\ sector = Circle\ area \times segment\ proportion$$
$$= 25\pi \times \frac{1}{12}$$
$$= \frac{25\pi}{12}$$
$$= 6.54cm^2$$

Find the arc length of the sector. Give your answer to 2dp.

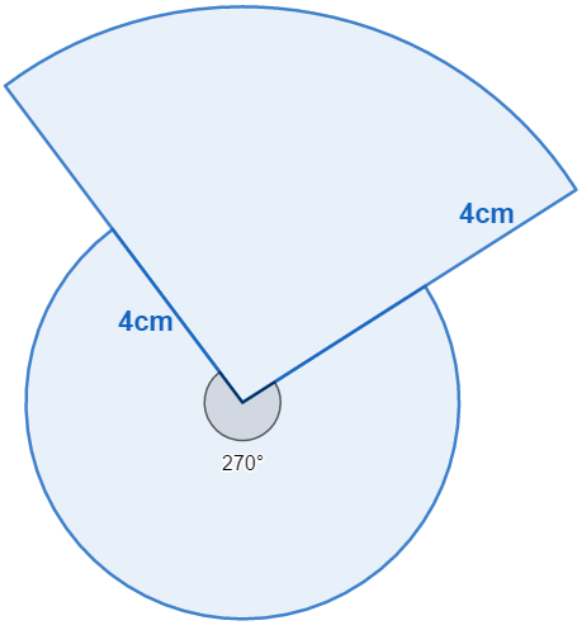
$$Circumference\ of\ circle = \pi d$$
$$= 10\pi$$

$$Sector\ proportion = Sector\ angle \div 360°$$
$$= 30° \div 360°$$
$$= \frac{1}{12}$$

$$Arc\ length = circumference \times sector\ proportion$$
$$= 10\pi \times \frac{1}{12}$$
$$= \frac{10\pi}{12}$$
$$= 2.62cm$$

(2 marks)

4. Calculate the area of the shape below.



Give your answer to 2dp.

Area of 270º Sector

$$\begin{aligned} Area\ of\ circle &= \pi r^2 \\ &= \pi \times 4^2 \\ &= 16\pi \end{aligned}$$

$$\begin{aligned} Sector\ proportion &= Segment\ angle \div 360° \\ &= 270° \div 360° \\ &= \frac{3}{4} \end{aligned}$$

$$\begin{aligned} Area\ of\ sector &= Circle\ area \times segment\ proportion \\ &= 16\pi \times \frac{3}{4} \\ &= 12\pi \end{aligned}$$

Area of 270º Sector

$$\begin{aligned} Area\ of\ circle &= \pi r^2 \\ &= \pi \times 8^2 \\ &= 64\pi \end{aligned}$$

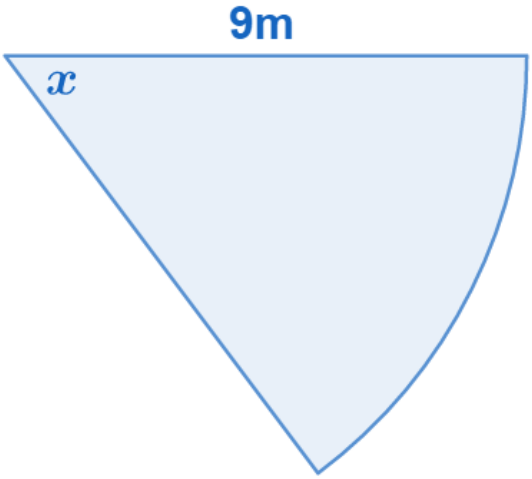
$$\begin{aligned} Sector\ proportion &= Segment\ angle \div 360° \\ &= 90° \div 360° \\ &= \frac{1}{4} \end{aligned}$$

$$\begin{aligned} Area\ of\ sector &= Circle\ area \times segment\ proportion \\ &= 64\pi \times \frac{1}{4} \\ &= 16\pi \end{aligned}$$

$$Total\ area = 12\pi + 16\pi = 28\pi = 87.96cm$$

(2 marks)

The area of the sector below is 26.15m^2



Calculate the value of the angle x. Give your answer to 2dp.

$$\begin{aligned} Area\ of\ circle &= \pi r^2 \\ &= \pi \times 9^2 \\ &= 81\pi \end{aligned}$$

$$\begin{aligned} Sector\ proportion &= sector\ area \div circle\ area \\ &= 26.15 \div 81\pi \\ &= 0.103\ (3dp) \end{aligned}$$

$$\begin{aligned} angle &= 360° \times sector\ proportion \\ &= 360° \times 0.103 \\ &= 37.08° \end{aligned}$$

(2 marks)

5. A set of circles have radii in the ratio 1: 2: 3: 5.
   What is the ratio of their areas?

   Give your answer in its simplest terms.

$$Area\ of\ circle = \pi r^2$$

Radius	Area
1	π
2	4π
3	9π
5	25π

Areas as ratios

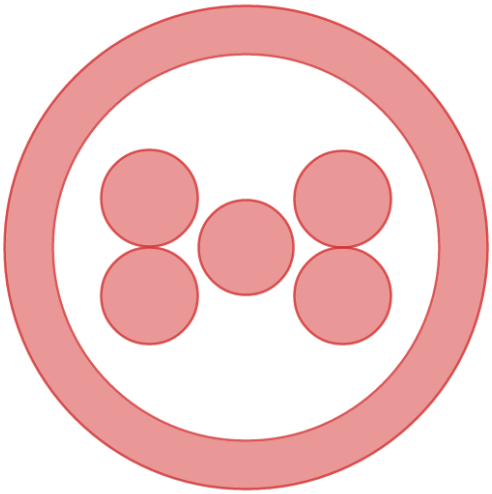
$$\pi : 4\pi : 9\pi : 25\pi$$

Diving all by π

$$1 : 4 : 9 : 25$$

…1… **:** …4… **:** …9… **:** …25…
(2 marks)

6. The largest circle in the diagram below has a radius of 10m
The radius of the white circle is 7m
Each small red circle has a diameter of 2m



What percentage of the area in the diagram is red?

$$Red\ area = area\ of\ big\ circle - area\ of\ white\ circle + area\ of\ small\ circles$$

$$Area\ of\ circle = \pi r^2$$

$$Area\ of\ big\ circle = \pi \times 10^2 = 100\pi\ m^2$$

$$Area\ of\ white\ circle = \pi \times 7^2 = 49\pi\ m^2$$

$$Small\ circle\ radius = 2 \div 2 = 1c$$

$$Area\ of\ small\ circle = \pi \times 1^2 = \pi\ cm^2$$

$$\begin{aligned} Red\ area &= 100\pi - 49\pi + 5 \times \pi \\ &= 100\pi - 49\pi + 5\pi \\ &= 56\pi\ m^2 \end{aligned}$$

$$\begin{aligned} Percentage\ of\ area\ that\ is\ red &= red\ area \div total\ area \\ &= 56\pi \div 100\pi \\ &= 56\% \end{aligned}$$

Percentage = ……%
(4 marks)