

Circles Composite Shapes

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Find the area of a semicircle with radius 5 cm

Step 1 · Area of the whole circle

$$\pi \times 5^2 = 25\pi$$

Step 2 · Halve it

$$12.5\pi \text{ cm}^2$$

Step 3 · As a decimal (π key)

$$39.269... \approx 39.3 \text{ cm}^2$$

Answer: $12.5\pi \text{ cm}^2 \approx 39.3 \text{ cm}^2$

Check: Half of a 10 cm square is 50 cm², and the semicircle fits inside that ✓

2. Now try one with the steps

Find the perimeter of a semicircle with diameter 10 cm

Step 1 · Curved edge = half the circumference

Step 2 · Add the straight edge (the diameter)

Step 3 · Round

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Find the area of a semicircle with radius 4 cm. Leave your answer in terms of π . [1]

2. Find the area of a quarter circle with radius 6 cm. Leave your answer in terms of π . [1]

3. A sector has an angle of 90° . What fraction of the whole circle is it? [1]

4. Find the area of a semicircle with radius 10 cm, to 1 decimal place. [2]

5. Find the length of the curved edge of a semicircle with diameter 12 cm, to 1 decimal place. [2]

6. Find the perimeter of a semicircle with diameter 12 cm, to 1 decimal place. [2]

7. Find the perimeter of a quarter circle with radius 4 cm, to 1 decimal place. [2]

8. A shape is an 8 cm square with a semicircle on one side (diameter 8 cm). Find its area, to 1 decimal place. [3]

9. A quarter circle of radius 10 cm is cut from a 10 cm square, centred on one corner. Find the area left, to 1 decimal place. [3]

10. A sector has radius 9 cm and angle 120° . Find its area in terms of π . [2]

11. Find the arc length of a sector with radius 12 cm and angle 60° , in terms of π . [2]

12. A ring is made by cutting a circle of radius 6 cm from the centre of a circle of radius 10 cm. Find its area in terms of π . [2]

13. Find the area of a sector with radius 8 cm and angle 45° , to 1 decimal place. [2]

14. A 30 cm pizza is cut into 8 equal slices. How long is the crust (the arc) on each slice, to 1 decimal place? [2]

15. A running track has two straights of 100 m and a semicircular end of diameter 60 m at each end. [3]
Find the length of one lap, to the nearest metre.

4. Before you hand it in

Perimeter of a semicircle with diameter 10 cm = $5\pi \approx 15.7$ cm

A perimeter goes all the way round. Add the diameter: $5\pi + 10 \approx 25.7$ cm. For a quarter circle, add two radii.

Area of a semicircle with diameter 8 cm = $\frac{1}{2} \times \pi \times 8^2$

Halve the diameter first: $r = 4$, so area = $\frac{1}{2} \times \pi \times 16 = 8\pi \approx 25.1$ cm².

A 72° sector is $360/72 = 5$ times the circle

The sector is part of the circle, so it is $\theta/360 = 72/360 = 1/5$ of the circle.

Including the join between a rectangle and a semicircle in the perimeter

Only count edges on the OUTSIDE. Trace round the shape with a finger before adding lengths.