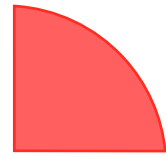


Circles — Worded Problems

Starter

1. (Review of last lesson)

The diagram shows a quarter circle of radius 30 cm. Calculate the perimeter of the shape, giving your answer in terms of π .



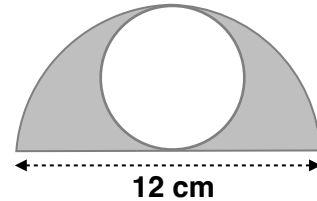
Working:

$$\text{Curved part} = \frac{1}{4} \times 2 \times \pi \times 30 = 15\pi$$

$$\text{Perimeter} = 15\pi + 30 + 30 = 15\pi + 60$$

2. (Review of last lesson)

The diagram shows a circle within a semi-circle. Find the shaded area.



Working:

The radius of the semi-circle is 6 cm.

$$\text{Area of semi-circle} = \frac{1}{2} \times \pi \times 6^2$$

$$= 18\pi$$

The radius of the white circle is half the radius of the semi-circle: 3 cm.

$$\text{Area of white circle} = \pi \times 3^2$$

$$= 9\pi$$

$$\text{Shaded area} = 18\pi - 9\pi = 9\pi = 28.3 \text{ cm (3 s.f.)}$$

E.g. 1 A bicycle wheel has diameter 70 cm.

- (a) If the wheel makes 300 complete rotations. How far does the bicycle move? Give your answer to the nearest metre.
- (b) How many complete rotations are required for the bicycle to travel 1 km?

Working:

(a) $d = 70$ so use $C = \pi d$
 $C = \pi d: C = \pi \times 70 = 70\pi$
 Distance travelled = $300 \times 70\pi = 21000\pi = 65973 \text{ cm}$
 The distance travelled is 660 m (to the nearest metre).

(b) $1 \text{ km} \equiv 1000 \text{ m} \equiv 100000 \text{ cm}$
 Let the number of rotations be n .
 $70\pi \times n = 100000$
 $n = \frac{100000}{70\pi} = 454.7$
 There need to be 455 complete rotations to travel 1 km.

E.g. 2 A tin of tomatoes has diameter 7.5 cm. The label around the tin overlaps itself by 1 cm. How long is the label?

Working:

$d = 7.5$ so use $C = \pi d$
 Circumference of tin = $\pi \times 7.5 = 7.5\pi$
 Length of label = $7.5\pi + 1 = 24.6 \text{ cm (3 s.f.)}$

E.g. 3 Roadsigns have a diameter of 300 mm. Given that the white circle in the centre has a diameter of 240 mm calculate the area that is painted red. Give your answer in term of π in cm^2 .



Working: Convert the diameters to cm: 30 & 24 cm
Convert the diameters into radii: 15 & 12 cm
Use $A = \pi r^2$:
Red area = $\pi \times 15^2 - \pi \times 12^2$
 $= 225\pi - 144\pi$
 $= 81\pi \text{ cm}^2$

Video: [Circumference of a circle](#)

Video: [Area of a circle](#)

Video: [Perimeter of a semi-circle](#)

Video: [Perimeter of a quarter-circle](#)

[Solutions to Starter and E.g.s](#)

Exercise

CIMT 8B p83 Ex 16.5 Qu 1-10