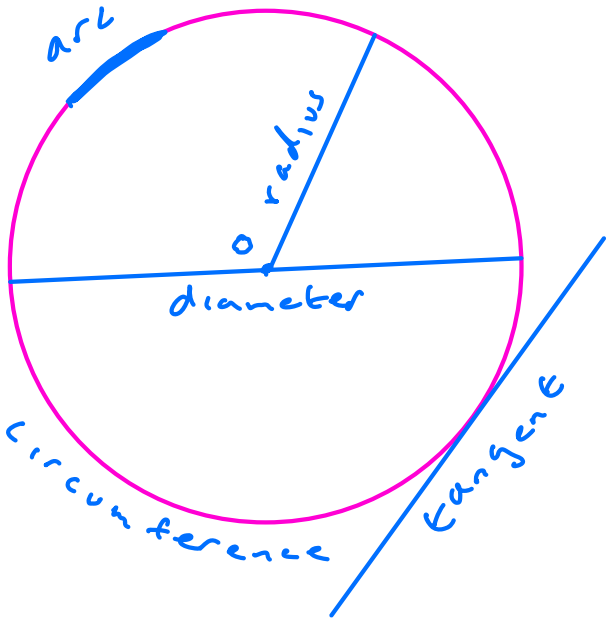
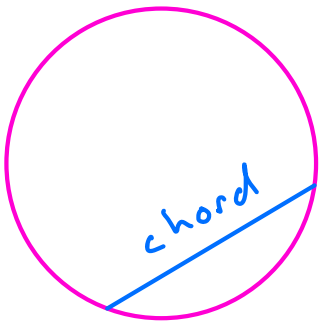
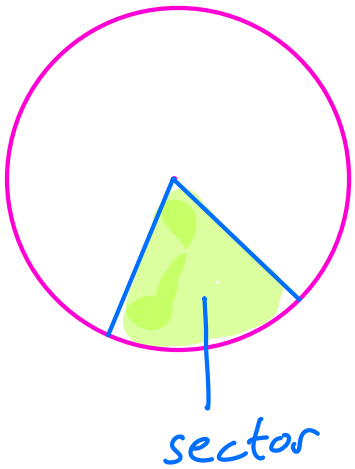
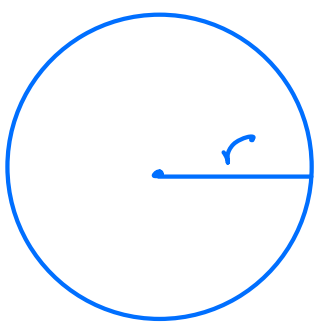
Parts of a Circle









For a circle radius r

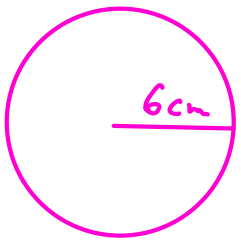
Circumference $C = 2\pi r$ or πd

Area $= \pi r^2$

$\pi \approx \frac{22}{7}$ or 3.142 or on calc

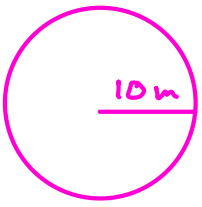
$= 3.141592654$

Examples

1) 

$C = 2 \times \pi \times 6 = 37.7\ cm$

$A = \pi r^2 = \pi \times 6^2 = 113\ cm^2$

2) 

$C = 2\pi r = 2 \times \pi \times 10 = 62.8m$

$A = \pi r^2 = \pi \times 10^2 = 314\ m^2$

Problem Solving

3) A circle has area $25\ m^2$, find its circumference

$$\pi r^2 = 25$$

$$r^2 = \frac{25}{\pi}$$

$$r = \sqrt{\frac{25}{\pi}} = 2.82\ m$$

$$\text{Circumference} = 2\pi r = 2\pi \times 2.809947918$$

$$= 17.7\ m$$

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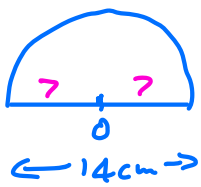
4) Find Area and Perimeter



Semi-circle with 14 cm diameter

$$\text{Perimeter} = \frac{2\pi r}{2} + 2r$$

$= \pi \times 7 + 2 \times 7$

$= 36.0 \text{ cm}$ to 3 s.f.

$$\text{Area} = \frac{\pi r^2}{2} = \frac{\pi \times 7^2}{2} = 77.0 \text{ cm}^2$$

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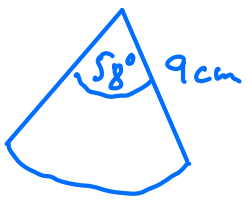
5)



Find area and perimeter of a sector of a circle with radius 9cm and angle the centre 58°

$$\text{Area} = \pi r^2 \times \frac{58}{360} = \pi \times 9^2 \times \frac{58}{360}$$

$$= 41.0 \text{ cm}^2$$

Perimeter

$$= \frac{58}{360} \times 2\pi r + 2r$$

$$= \frac{58}{360} \times 2\pi \times 9 + 2 \times 9 = 27.1 \text{ cm}$$

D

4 A rope is wrapped eight times round a capstan (a cylindrical post), the diameter of which is 35 cm. How long is the rope?

5 The roller used on a cricket pitch has a radius of 70 cm.

a What is the circumference of the roller?

b A cricket pitch has a length of 20 m. How many complete revolutions does the roller make when rolling the pitch?

6 The diameter of each of the following coins is as follows.

1p: 2 cm, 2p: 2.6 cm, 5p: 1.7 cm, 10p: 2.4 cm

Calculate the area of one face of each coin. Give your answers to 1 decimal place.

C

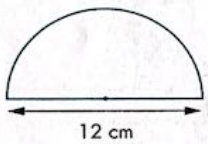
7 A circle has a circumference of 25 cm. What is its diameter?

8 What is the total perimeter of a semicircle of diameter 15 cm?

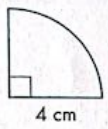
9 What is the total perimeter of a semicircle of radius 7 cm? Give your answer in terms of π.

10 Calculate the area of each of these shapes, giving your answers in terms of π.

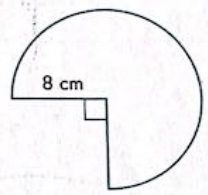
a



b

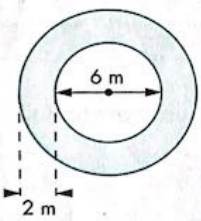


c



11 Calculate the area of the shaded part of each of these diagrams, giving your answers in terms of π.

a



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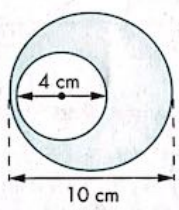

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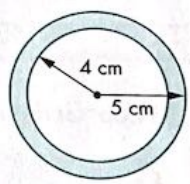


12 Assume that the human waist is circular.

a What are the distances around the waists of the following people?

Sue: waist radius of 10 cm

Dave: waist radius of 12 cm

Julie: waist radius of 11 cm

Brian: waist radius of 13 cm

b Compare differences between pairs of waist circumferences. What connection do they have to π?

c What would be the difference in length between a rope stretched tightly round the Earth and another rope always held 1 m above it?

4 A rope is wrapped eight times round a capstan (a cylindrical post), the diameter of which is 35 cm. How long is the rope?

Circumference $= \pi d = 35\pi$ cm

8 wraps so $8 \times 35\pi = 879.6$ cm

5 The roller used on a cricket pitch has a radius of 70 cm.

a What is the circumference of the roller?

b A cricket pitch has a length of 20 m. How many complete revolutions does the roller make when rolling the pitch?

a) $C = 2\pi r = 2 \times \pi \times 70 = 439.8$ cm

b) $20 \div 4.398 = 4.54$ revolutions

so 4 complete revolutions

6 The diameter of each of the following coins is as follows.

1p: 2 cm, 2p: 2.6 cm, 5p: 1.7 cm, 10p: 2.4 cm

Calculate the area of one face of each coin. Give your answers to 1 decimal place.

1p $\pi r^2 = \pi \times 1^2 = 3.1$ cm^2

2p $\pi r^2 = \pi \times 1.3^2 = 5.3$ cm^2

5p $\pi r^2 = \pi \times 0.85^2 = 2.3$ cm^2

10p $\pi r^2 = \pi \times 1.2^2 = 4.5$ cm^2

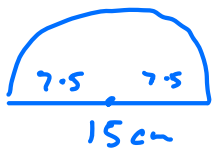
7 A circle has a circumference of 25 cm. What is its diameter?

$C = \pi d$

$$\frac{c}{\pi} = d$$

$$d = \frac{25}{\pi} = 7.96 \text{ cm}$$

8 What is the total perimeter of a semicircle of diameter 15 cm?



$$\text{Perimeter} = \frac{\pi d}{2} + d$$

$$= \frac{15\pi}{2} + 15 = 38.6 \text{ cm}$$

9 What is the total perimeter of a semicircle of radius 7 cm? Give your answer in terms of π.

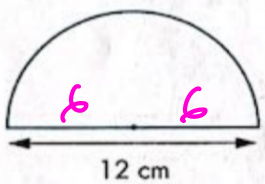
$$\text{Perimeter} = \frac{2\pi r}{2} + 2r$$

$$= \pi \times 7 + 2 \times 7$$

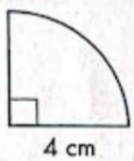
$$= 7\pi + 14 \text{ cm}$$

10 Calculate the area of each of these shapes, giving your answers in terms of π.

a



b



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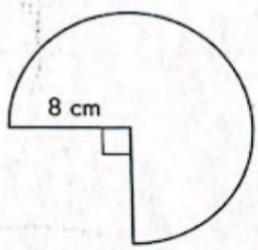

a) $\text{Area} = \frac{\pi r^2}{2}$

$$= \frac{\pi \times 6^2}{2} = 18\pi \text{ cm}^2$$

b) $\text{Area} = \frac{\pi r^2}{4} = \frac{\pi \times 4^2}{4} = 4\pi \text{ cm}^2$

c) $\text{Area} = \frac{3}{4}\pi r^2 = \frac{3}{4}\pi \times 8^2 = 48\pi \text{ cm}^2$
