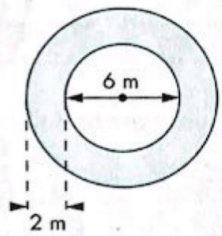
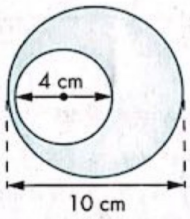
Circle continued

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

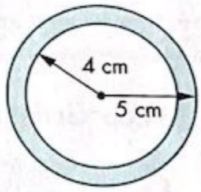
a



b



c



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?

11 a) Radius large circle = 3 + 2 = 5 m

Radius small circle = 3 m

Area of annulus = $\pi \times 5^2 - \pi \times 3^2$

$= 25\pi - 9\pi$

$= 16\pi \text{ m}^2$

---

11 b) Small circle radius 2 cm

large circle radius 5 cm

Shaded area = $\pi \times 5^2 - \pi \times 2^2$

$= 25\pi - 4\pi$

$= 21\pi \text{ cm}^2$

---

11 c) Shaded area = $\pi \times 5^2 - \pi \times 4^2$

$= 25\pi - 16\pi$

$= 9\pi \text{ cm}^2$

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?

a) Sue $2\pi r = 2 \times \pi \times 10 = 62.8$ cm

Dave $2 \times \pi \times 12 = 75.4$ cm

Julie $2 \times \pi \times 11 = 69.1$ cm

Brian $2 \times \pi \times 13 = 81.7$ cm

b) 2π cm difference for each 1 cm increase

c) If radius of Earth $= R$

Difference $= 2\pi(R+1) - 2\pi R$

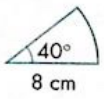
$= 2\pi R + 2\pi - 2\pi R$

$= 2\pi$ m

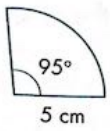
EXERCISE 4G

1 For each of these sectors, calculate **i** the arc length **ii** the sector area

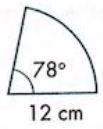
a



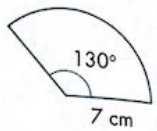
b



c



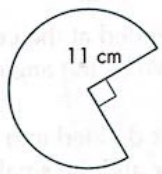
d



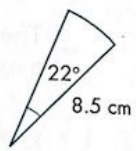
2 Calculate the arc length and the area of a sector whose arc subtends an angle of 60° at the centre of a circle with a diameter of 12 cm. Give your answer in terms of π.

3 Calculate the total perimeter of each of these sectors.

a

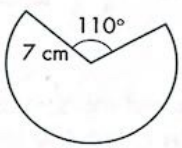


b

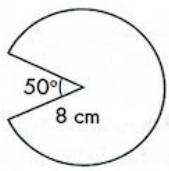


4 Calculate the area of each of these sectors.

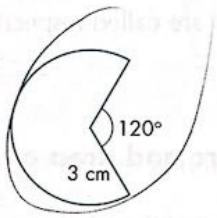
a



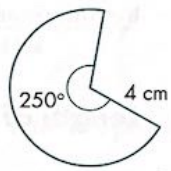
b



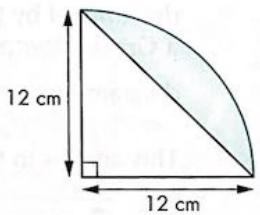
c



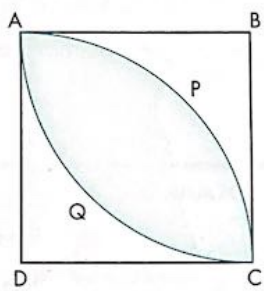
d



5 Calculate the area of the shaded shape giving your answer in terms of π.

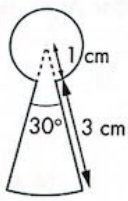


6 ABCD is a square of side length 8 cm. APC and AQC are arcs of the circles with centres D and B. Calculate the area of the shaded part.



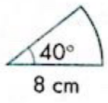
7 A pendulum of length 72 cm swings through an angle of 15°. Through what distance does the bob swing? Give your answer in terms of π.

8 Find **i** the perimeter and **ii** the area of this shape.

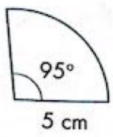


1 For each of these sectors, calculate **i** the arc length **ii** the sector area

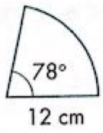
a



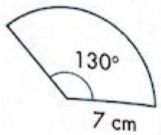
b



c



d



a i) Arc $= 2\pi r \times \frac{40}{360} = 2\pi \times 8 \times \frac{40}{360} = 5.59$ cm

ii) Area $= \pi r^2 \times \frac{40}{360} = \pi \times 8^2 \times \frac{40}{360} = 22.3$ cm^2

b i) Arc $= 2\pi r \times \frac{95}{360} = 2\pi \times 5 \times \frac{95}{360} = 8.29$ cm

ii) Area $= \pi r^2 \times \frac{95}{360} = \pi \times 5^2 \times \frac{95}{360} = 20.7$ cm^2

c i) Arc $= 2\pi r \times \frac{78}{360} = 2\pi \times 12 \times \frac{78}{360} = 16.3$ cm

ii) Area $= \pi r^2 \times \frac{78}{360} = \pi \times 12^2 \times \frac{78}{360} = 98.0$ cm^2

d i) Arc $= 2\pi r \times \frac{130}{360} = 2\pi \times 7 \times \frac{130}{360} = 15.9$ cm

ii) Area $= \pi r^2 \times \frac{130}{360} = \pi \times 7^2 \times \frac{130}{360} = 55.6$ cm^2