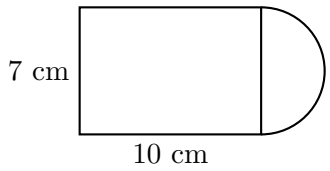
Perimeter of Composite Shapes with Circles

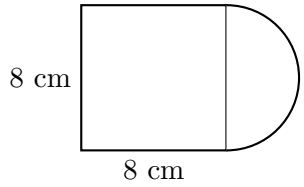
Core Worksheet

Worked Examples & Guided Practice

I Do (Teacher Model) A shape consists of a rectangle of length 10 cm and width 7 cm, with a semicircle attached to one of the width sides (7 cm). Calculate the total perimeter of the shape. Give your answer to 3 significant figures.



We Do (Guided Practice) A shape is formed by removing a semicircle of diameter 8 cm from one side of a square of side length 8 cm. Calculate the perimeter of the shape. Give your answer to 3 significant figures.



You Do (Independent Practice) A running track consists of two straight sections of length 80 m each, and two semicircular ends of diameter 50 m. Calculate the total perimeter of the track. Give your answer to 3 significant figures.

Challenge (Extension) A shape consists of a sector of a circle of radius 6 cm with an angle of 120°. Calculate the exact perimeter of the shape in terms of π.

Practice Perfect Questions

Q1. Calculate the perimeter of a semicircle of radius 5 cm. Give your answer to 3 s.f.

Q2. A shape consists of a rectangle (12 cm by 6 cm) with two semicircles attached on the 6 cm ends. Find the perimeter to 3 s.f.

Q3. A quarter-circle of radius 8 cm has two straight radii attached. Calculate its total perimeter to 3 s.f.

Q4. A shape is made from a square of side 10 cm with a semicircle of diameter 10 cm added on top. Find the total perimeter to 1 d.p.

Q5. A shape is formed by taking a rectangle of 14 cm by 8 cm and cutting out a semicircle of diameter 14 cm from one long side. Calculate the total perimeter to 3 s.f.

Q6. A sector of a circle with radius 9 cm has an arc length equal to the perimeter of a square of side 3 cm. Calculate the angle of the sector to 1 d.p.

Answers & Worked Solutions

Model Solutions

- **I Do:** Perimeter $= 10 + 10 + 7 + \frac{1}{2}\pi(7) = 27 + 3.5\pi \approx 38.0$ cm
- **We Do:** Perimeter $= 8 + 8 + 8 + \frac{1}{2}\pi(8) = 24 + 4\pi \approx 36.6$ cm
- **You Do:** Perimeter $= 80 + 80 + \pi(50) = 160 + 50\pi \approx 317$ m
- **Challenge:** Arc $= \frac{120}{360} \times 2\pi(6) = 4\pi$. Perimeter $= 4\pi + 6 + 6 = (4\pi + 12)$ cm

Practice Perfect Questions Solutions

Q1. Arc + Diameter $= 5\pi + 10 \approx 25.7$ cm

Q2. $12 + 12 + \pi(6) = 24 + 6\pi \approx 42.8$ cm

Q3. $\frac{1}{4}(2\pi \times 8) + 8 + 8 = 4\pi + 16 \approx 28.6$ cm

Q4. $10 + 10 + 10 + \frac{1}{2}\pi(10) = 30 + 5\pi \approx 45.7$ cm

Q5. $8 + 8 + 14 + \frac{1}{2}\pi(14) = 30 + 7\pi \approx 52.0$ cm

Q6. Arc $= 12$ cm $\implies \frac{\theta}{360} \times 2\pi(9) = 12 \implies \theta = \frac{12 \times 360}{18\pi} \approx 76.4°$