

Shaded Area – Sectors and Semicircles

Instructions: Show all working • Give answers in terms of π

1. ABC is a sector of a circle, centre A. The angle of the sector is 90° and the radius is 8 cm.
AB is the diameter of a semicircle inside the sector.

Find the area of the shaded region.

2. PQR is a sector of a circle, centre P. The angle of the sector is 120° and the radius is 12 cm.
PR is the diameter of a semicircle.

Find the area of the shaded region.

3. AOB is a sector of a circle, centre O. The angle of the sector is 60° and the radius is 14 cm.
OB is the diameter of a semicircle inside the sector.

Find the area of the shaded region.

4. XYZ is a sector of a circle, centre X. The angle of the sector is 150° and the radius is 10 cm.
XZ is the diameter of a semicircle.

Calculate the area of the shaded region.

5. DEF is a sector of a circle, centre D. The angle of the sector is 45° and the radius is 16 cm.
DE is the diameter of a semicircle inside the sector.

Find the area of the shaded region.

6. LMN is a sector of a circle, centre L. The angle of the sector is 180° and the radius is 9 cm.
LN is the diameter of a semicircle.

Find the area of the shaded region.

1.

$$\text{Sector area} = (90/360) \times \pi \times 8^2 = 16\pi$$

$$\text{Semicircle radius} = 4$$

$$\text{Semicircle area} = \frac{1}{2} \times \pi \times 4^2 = 8\pi$$

$$\text{Shaded area} = 16\pi - 8\pi = \mathbf{8\pi \text{ cm}^2}$$

2.

$$\text{Sector area} = (120/360) \times \pi \times 12^2 = 48\pi$$

$$\text{Semicircle radius} = 6$$

$$\text{Semicircle area} = \frac{1}{2} \times \pi \times 6^2 = 18\pi$$

$$\text{Shaded area} = 48\pi - 18\pi = \mathbf{30\pi \text{ cm}^2}$$

3.

$$\text{Sector area} = (60/360) \times \pi \times 14^2 = 98\pi/3$$

$$\text{Semicircle radius} = 7$$

$$\text{Semicircle area} = \frac{1}{2} \times \pi \times 7^2 = 49\pi/2$$

$$\text{Shaded area} = 98\pi/3 - 49\pi/2 = \mathbf{49\pi/6 \text{ cm}^2}$$

4.

$$\text{Sector area} = (150/360) \times \pi \times 10^2 = 125\pi/3$$

$$\text{Semicircle radius} = 5$$

$$\text{Semicircle area} = \frac{1}{2} \times \pi \times 5^2 = 25\pi/2$$

$$\text{Shaded area} = 125\pi/3 - 25\pi/2 = \mathbf{175\pi/6 \text{ cm}^2}$$

5.

$$\text{Sector area} = (45/360) \times \pi \times 16^2 = 32\pi$$

$$\text{Semicircle radius} = 8$$

$$\text{Semicircle area} = \frac{1}{2} \times \pi \times 8^2 = 32\pi$$

$$\text{Shaded area} = 32\pi - 32\pi = \mathbf{0 \text{ cm}^2}$$

6.

$$\text{Sector area} = (180/360) \times \pi \times 9^2 = 81\pi/2$$

$$\text{Semicircle radius} = 4.5$$

$$\text{Semicircle area} = \frac{1}{2} \times \pi \times 4.5^2 = 81\pi/8$$

$$\text{Shaded area} = 81\pi/2 - 81\pi/8 = \mathbf{243\pi/8 \text{ cm}^2}$$