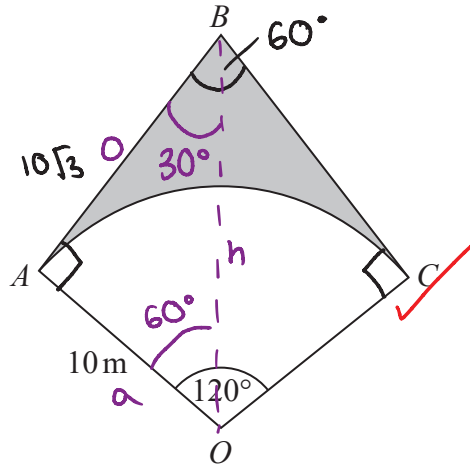


1.



OAC is a sector of a circle, centre O , radius 10 m.

BA is the tangent to the circle at point A .

BC is the tangent to the circle at point C .

Angle $AOC = 120^\circ$

Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

$$\tan x = \frac{o}{a}$$

$$\tan 60^\circ = \frac{AB}{10}$$

$$10 \times \tan 60^\circ = AB$$

$$10\sqrt{3} = AB$$

$$\begin{aligned} \text{Area of circle} &= \pi r^2 \\ \text{Area of sector } AOC &= \frac{\pi r^2}{3} \end{aligned}$$

$$\text{Area} = \frac{\pi \times 10^2}{3}$$

$$= 104.72 \text{ m}^2$$

$$\begin{aligned} \angle ABC &= 360 - 90 - 90 - 120 \\ &= 60^\circ \end{aligned}$$

$$\text{Area of triangle} = \frac{1}{2} bh$$

$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 10 \times 10\sqrt{3} \\ &= 50\sqrt{3} \text{ m}^2 \end{aligned}$$

$$\text{Area of quadrilateral} = 173.21$$

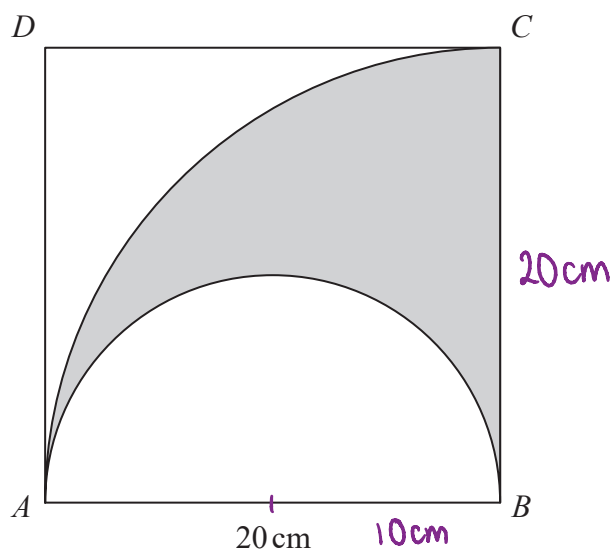
$$\text{Shaded area} = \text{area of quadrilateral} - \text{area of sector}$$

$$\begin{aligned} \text{Shaded area} &= 173.21 - 104.72 \\ &= 68.49 \\ &= 68.5 \end{aligned}$$

..... 68.5 ✓ m²

(Total for Question is 5 marks)

2. The diagram shows a square $ABCD$ with sides of length 20 cm. It also shows a semicircle and an arc of a circle.



AB is the diameter of the semicircle.
 AC is an arc of a circle with centre B .

Show that $\frac{\text{area of shaded region}}{\text{area of square}} = \frac{\pi}{8}$

$$\text{Area of circle} = \pi r^2$$

$$\begin{aligned} \text{Area of ACB} &= \frac{\pi (20)^2}{4} \\ &= \frac{\pi \times 400}{4} \\ &= 100\pi \quad \checkmark \end{aligned}$$

$$100\pi - 50\pi = 50\pi$$

$$\begin{aligned} \text{Area of square} &= b \times h \\ &= 20 \times 20 \\ &= 400 \quad \checkmark \end{aligned}$$

$$\begin{aligned} \text{Area of semi-circle} &= \frac{\pi (10)^2}{2} \\ &= \frac{\pi \times 100}{2} \\ &= 50\pi \quad \checkmark \end{aligned}$$

$$\begin{aligned} \frac{\text{Area of shaded region}}{\text{Area of square}} &= \frac{50\pi}{400} \\ &= \frac{5\pi}{40} \\ &= \frac{\pi}{8} \quad \checkmark \end{aligned}$$

(Total for Question is 4 marks)