

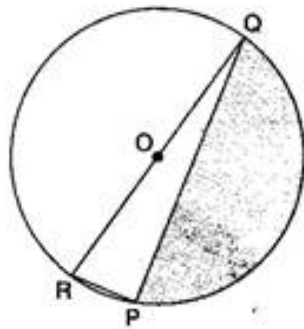


NCERT Solutions For Class 10 Chapter 12 Maths Areas Related to Circles Exercise 12.3

Exercise 12.3

Unless stated otherwise, take $\pi = \frac{22}{7}$.

Q1. Find the area of the shaded region in figure, if $PQ = 24$ cm, $PR = 7$ cm and O is the centre of the circle.



Ans. $\angle RPQ = 90^\circ$ [Angle in semi-circle is 90°]

$$\therefore RQ^2 = PR^2 + PQ^2$$

$$= (7)^2 + (24)^2 = 49 + 576 = 625$$

$$\Rightarrow RQ = 25 \text{ cm}$$

$$\Rightarrow \text{Diameter of the circle} = 25 \text{ cm}$$

$$\therefore \text{Radius of the circle} = \frac{25}{2} \text{ cm}$$

$$\text{Area of the semicircle} = \frac{1}{2} \pi r^2$$

$$= \frac{1}{2} \times \frac{22}{7} \times \frac{25}{2} \times \frac{25}{2} = \frac{6875}{28} \text{ cm}^2$$

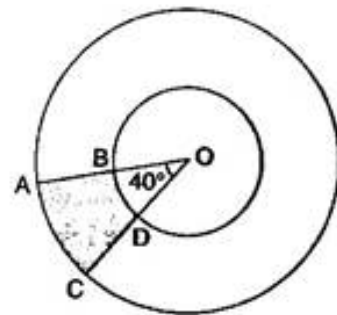
$$\text{Area of right triangle RPQ} = \frac{1}{2} \times PQ \times PR$$

$$= \frac{1}{2} \times 24 \times 7 = 84 \text{ cm}^2$$

Area of shaded region = Area of semicircle –
Area of right triangle RPQ

$$= \frac{6875}{28} - 84 = \frac{6875 - 2352}{28} = \frac{4523}{28} \text{ cm}^2$$

Q2. Find the area of the shaded region in figure, if radii of the two concentric circles with centre O are 7 cm and 14 cm respectively and $\angle AOC = 40^\circ$.



Ans. Area of shaded region = Area of sector OAC – Area of sector OBD

$$= \frac{40^\circ}{360^\circ} \times \frac{22}{7} \times (14)^2 - \frac{40^\circ}{360^\circ} \times \frac{22}{7} \times (7)^2$$

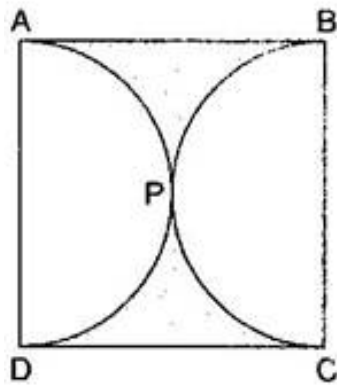
$$= \frac{40^\circ}{360^\circ} \times \frac{22}{7} [(14)^2 - (7)^2]$$

$$= \frac{40^\circ}{360^\circ} \times \frac{22}{7} (14 - 7)(14 + 7)$$

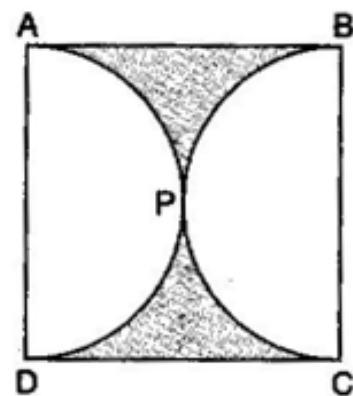
$$= \frac{40^\circ}{360^\circ} \times \frac{22}{7} \times 7 \times 21$$

$$= \frac{154}{3} \text{ cm}^2$$

Q3. Find the area of the shaded region in figure, if ABCD is a square of side 14 cm and APD and BPC are semicircles.



Ans. Area of shaded region



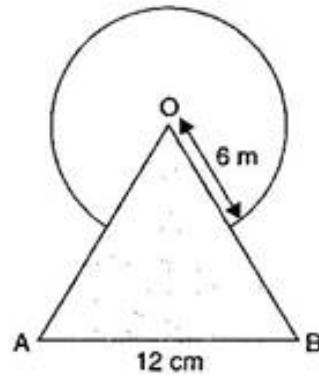
= Area of square ABCD – (Area of semicircle APD + Area of semicircle BPC)

$$= 14 \times 14 - \left[\frac{1}{2} \times \frac{22}{7} \left(\frac{14}{2} \right)^2 + \frac{1}{2} \times \frac{22}{7} \left(\frac{14}{2} \right)^2 \right]$$

$$= 196 - \frac{22}{7} \times 7 \times 7$$

$$= 196 - 154 = 42 \text{ cm}^2$$

Q4. Find the area of the shaded region in figure, where a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.



Ans. Area of shaded region

= Area of circle + Area of equilateral triangle OAB – Area common to the circle and the triangle

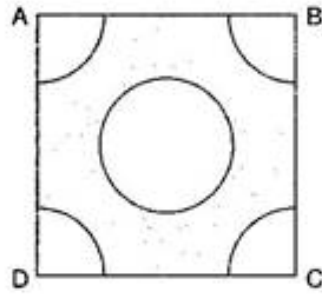
$$= \pi(6)^2 + \frac{\sqrt{3}}{4}(12)^2 - \frac{60^\circ}{360^\circ} \times \pi(6)^2$$

$$= 36\pi + 36\sqrt{3} - 6\pi$$

$$= 30\pi + 36\sqrt{3} = 30 \times \frac{22}{7} + 36\sqrt{3}$$

$$= \left(\frac{660}{7} + 36\sqrt{3} \right) \text{ cm}^2$$

Q5. From each corner of a square of side 4 cm a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in figure. Find the area of the remaining portion of the figure.

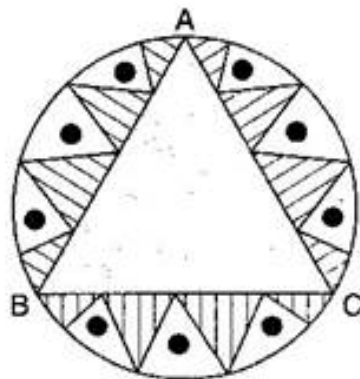


Ans. Area of remaining portion of the square
 = Area of square – (4 × Area of a quadrant + Area of a circle)

$$= 4 \times 4 - \left[4 \times \frac{90^\circ}{360^\circ} \times \frac{22}{7} \times (1)^2 + \frac{22}{7} \times \left(\frac{2}{2}\right)^2 \right]$$

$$= 16 - 2 \times \frac{22}{7} = \frac{68}{7} \text{ cm}^2$$

Q6. In a circular table cover of radius 32 cm, a design is formed leaving an equilateral triangle ABC in the middle as shown in figure. Find the area of the design (shaded region).



Ans. Area of design = Area of circular table cover – Area of the equilateral triangle ABC

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