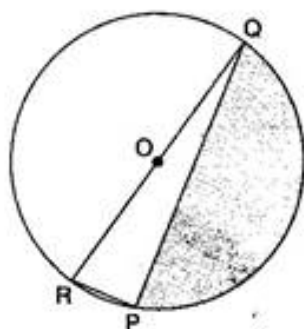NCERT Solutions For Class 10 Chapter 12 Maths Areas Related to Circles Exercise 12.3

Exercise 12.3

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

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 = $90°$ [Angle in semi-circle is $90°$]

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

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

$\Rightarrow$ RQ = 25 cm

$\Rightarrow$ Diameter of the circle = 25 cm

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

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

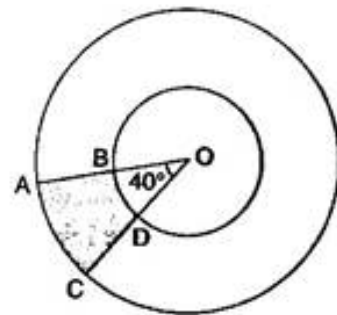$= \dfrac{1}{2} \times \dfrac{22}{7} \times \dfrac{25}{2} \times \dfrac{25}{2}$ $= \dfrac{6875}{28}\, cm^2$

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

$= \dfrac{1}{2} \times 24 \times 7$ $= 84\, cm^2$

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

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

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°.

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

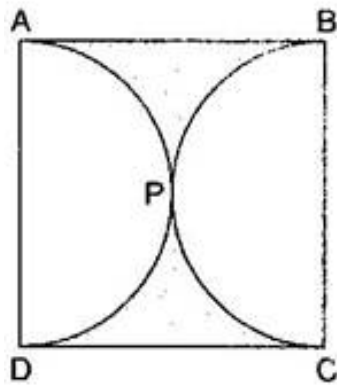$$= \frac{40°}{360°} \times \frac{22}{7} \times (14)^2 - \frac{40°}{360°} \times \frac{22}{7} \times (7)^2$$

$$= \frac{40°}{360°} \times \frac{22}{7} \left[(14)^2 - (7)^2 \right]$$
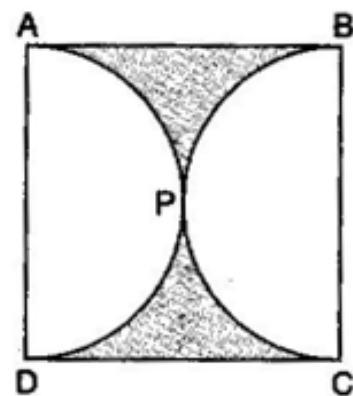
$$= \frac{40°}{360°} \times \frac{22}{7} (14 - 7)(14 + 7)$$

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

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

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.
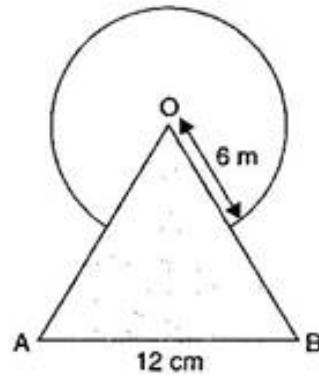

Ans. Area of shaded region

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

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

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

$$= 196 - 154 = 42 \; cm^2$$

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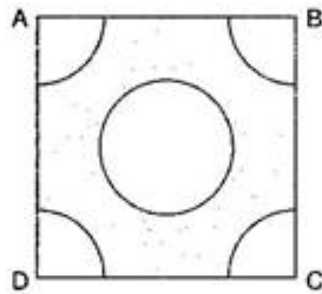
$$= \pi(6)^2 + \frac{\sqrt{3}}{4}(12)^2 - \frac{60°}{360°} \times \pi(6)^2$$

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

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

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

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.
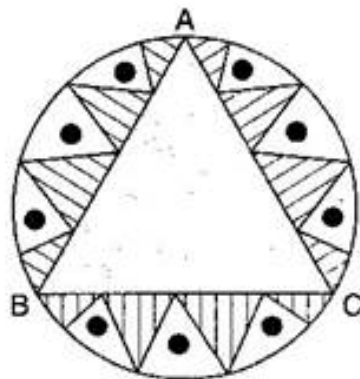
Ans. Area of remaining portion of the square

= Area of square – (4 × Area of a quadrant + Area of a circle)

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

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

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

********** END *********