

CHAPTER-12

AREA OF PLANE FIGURES

WE have already studies about area and perimeter(circumference) of circle, radius, diameter, chord, arc in previous classes.

- Area of circle = πr^2
- Circumference of circle = $2\pi r$

1. The radii of two circles are 19 cm and 9 cm respectively. Find the radius of the circle which has its circumference equal to the sum of the circumferences of the two circles. [Ex 12.1, Q1]

Sol:- Let $r_1 = 19\text{ cm}$ and $r_2 = 9\text{ cm}$ be the radii of given circles and r be the radius to be found.

Now Given Condition: $2\pi r = 2\pi r_1 + 2\pi r_2$

$$\Rightarrow r = r_1 + r_2 \quad [\text{Divide by } 2\pi]$$

$$\Rightarrow r = 19 + 9 = 28\text{ cm}$$

2. The radii of two circles are 8 cm and 6 cm respectively. Find the radius of the circle which has its area equal to the sum of the areas of the two circles. [Ex 12.1, Q2]

Sol:- Let $r_1 = 8\text{ cm}$ and $r_2 = 6\text{ cm}$ be the radii of given circles and r be the radius to be found.

Now Given Condition: $\pi r^2 = \pi r_1^2 + \pi r_2^2$

$$\Rightarrow r^2 = r_1^2 + r_2^2 \quad [\text{Divide by } \pi]$$

$$= 8^2 + 6^2 = 64 + 36 = 100 = 10^2$$

$$\Rightarrow r = 10\text{ cm}$$

3. The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car travelling at a speed of 66 km/h ? [Ex 12.1, Q4]

Sol:- Diameter of wheel = 80 cm then radius (r) = 40 cm

Speed of car = 66 km/h

In 1 hour(60 minutes), Distance covered by car = 66 km

In 10 minutes, Distance covered by car = $\frac{66}{60} \times 10 = 11\text{ km} = 11 \times 1000 \times 100\text{ cm}$

Now in 10 minutes,

Distance covered by car = (Circumference of the wheel) \times (Number of revolutions)

$$\Rightarrow 11 \times 1000 \times 100 = 2\pi r \times (\text{Number of revolutions})$$

$$\begin{aligned}\Rightarrow (\text{Number of revolutions}) &= \frac{11 \times 1000 \times 100}{2\pi r} = \frac{11 \times 1000 \times 100}{2 \times \frac{22}{7} \times 40} \\ &= \frac{11 \times 1000 \times 100 \times 7}{2 \times 22 \times 40} = 4375\end{aligned}$$

4. The area and circumference of a circle are numerically equal. What is the radius of the circle? [Ex 12.1, Q5]

Sol:- Given condition: Area of circle = circumference of circle

$$\Rightarrow \pi r^2 = 2\pi r$$

Divide both sides by πr , we get

$$\Rightarrow r = 2$$

Hence radius of the circle is 2cm.

5. The cost of fencing a circular field at the rate of ₹ 24 per metre is Rs. 5280. The field is to be ploughed at the rate of ₹0.50 per m^2 . Find the cost of ploughing the field.

[Example 1]

Sol:- Total cost of fencing = ₹5280

$$\Rightarrow \text{Circumference of the circle} \times 24 = 5280$$

$$\Rightarrow 2\pi r \times 24 = 5280$$

$$\Rightarrow 2 \times \frac{22}{7} \times r \times 24 = 5280$$

$$\Rightarrow r = \frac{5280 \times 7}{2 \times 22 \times 24} = 35 \text{ m}$$

$$\therefore \text{Radius of the field} = 35 \text{ m}$$

$$\text{Now Area of the field} = \pi r^2 = 2 \times \frac{22}{7} \times 35 \times 35 = 3850 \text{ m}^2$$

$$\therefore \text{Cost of ploughing the field} = (\text{Area of circle}) \times \text{Cost} = 3850 \times .50 = 1925$$