

MATHEMATICS

CLASS NOTES FOR CBSE

Chapter 27. Areas Related to Circles

01. Review of Perimeter and Area of a Circle

Circumference : The perimeter of a circle is generally known as its circumference.

$$C = 2\pi r$$

π stands for a particular irrational number whose approximate value upto two decimal place is 3.14 or $\frac{22}{7}$.

If r is the radius of a circle, then

(i) Circumference = $2\pi r$

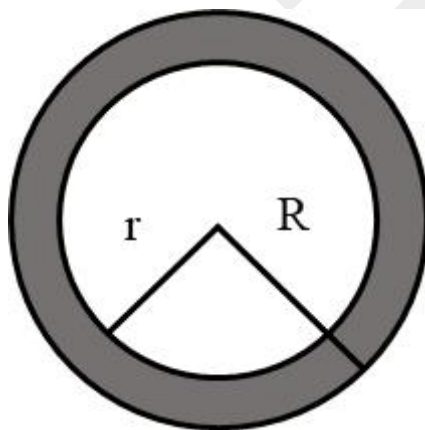
Also, Circumference = πd , where $d = 2r$ is the diameter of the circle.

(ii) Area πr^2 , Also area = $\pi \left(\frac{d}{2}\right)^2 = \frac{1}{4}\pi d^2$

(iii) Area of semi-circle = $\frac{1}{2}\pi r^2$

(iv) Area of a quadrant of a circle = $\frac{1}{4}\pi r^2$

Area Enclosed By Two Concentric Circles if R and r are radii of two con-centric circles, then Area = $\pi R^2 - \pi r^2 = \pi(R^2 - r^2) = \pi(R + r)(R - r)$



Some useful results :

- (i) If two circles touch internally, then the distance between their centres is equal to the difference of their radii.
- (ii) If two circles touch externally, then the distance between their centres is equal to the sum of their radii.



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- (iii) Distance moved by a rotating wheel in one revolution is equal to the circumference of the wheel.
- (iv) The number of revolutions completed by a rotating wheel in one minute
- $$= \frac{\text{Distance moved in one minute}}{\text{Circumference}}$$

Example : The circumference of a circle exceeds the diameter by 16.8 cm. Find the radius of the circle.

Remark : Let the radius of the circle be r cm. Then,

Diameter = $2r$ cm and, Circumference = πr cm. Then,

It is given that the circumference exceeds the diameter by 16.8 cm. That is,

$$\Rightarrow 2\pi r = 2r + 16.8$$

$$\Rightarrow 2 \times \frac{22}{7} \times r = 2r + 16.8$$

$$\Rightarrow 44r = 14r + 16.8 \times 7 \quad \left[\because \pi = \frac{22}{7} \right]$$

$$\Rightarrow 44r - 14r = 117.6 \Rightarrow 30r = 117.6 \Rightarrow r = \frac{117.6}{30} = 3.92$$

Hence, radius of the circle is 3.92 cm.

Example : Find the number of revolutions made by a circular wheel of area is 1.54 m^2 in rolling a distance of 176 m.

Remark : Let r be the radius of the circular wheel of area 1.54 m^2

$$\therefore \pi r^2 = 1.54 \Rightarrow \frac{22}{7} r^2 = 1.54 \Rightarrow r^2 = 1.54 \times \frac{7}{22} = 0.49 \Rightarrow r = 0.7$$

Suppose the wheel makes n revolutions in rolling a distance of 176 m.

$$\therefore n \times \text{Distance rolled in one revolution} = 176$$

$$\Rightarrow n \times 2\pi r = 176 \quad [\because \text{Distance rolled in one revolution} = \text{Circumference}]$$

$$\Rightarrow n \times 2 \times \frac{22}{7} \times 0.7 = 176 \Rightarrow n = \frac{176 \times 7}{2 \times 22 \times 0.7} = 40$$

02. Sector of A Circle and its Area

Consider a circle of radius r having its centre at the point O . Let A , B , and C be three points on the circle as shown in Figure. The area enclosed by the circle is divided into two regions, namely, OBA and $OBCA$. These regions are called **sectors** of the circle. Each of these two sectors has an arc of the circle as part of its boundary. The sector OBA has arc AB as a part of its boundary whereas the sector $OBCA$ has arc ACB as a part of its boundary. These sectors are known as **minor** and **major sectors** of the circle as defined below.



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