BYJU'S

Grade 10
Mathematics Chapter Notes

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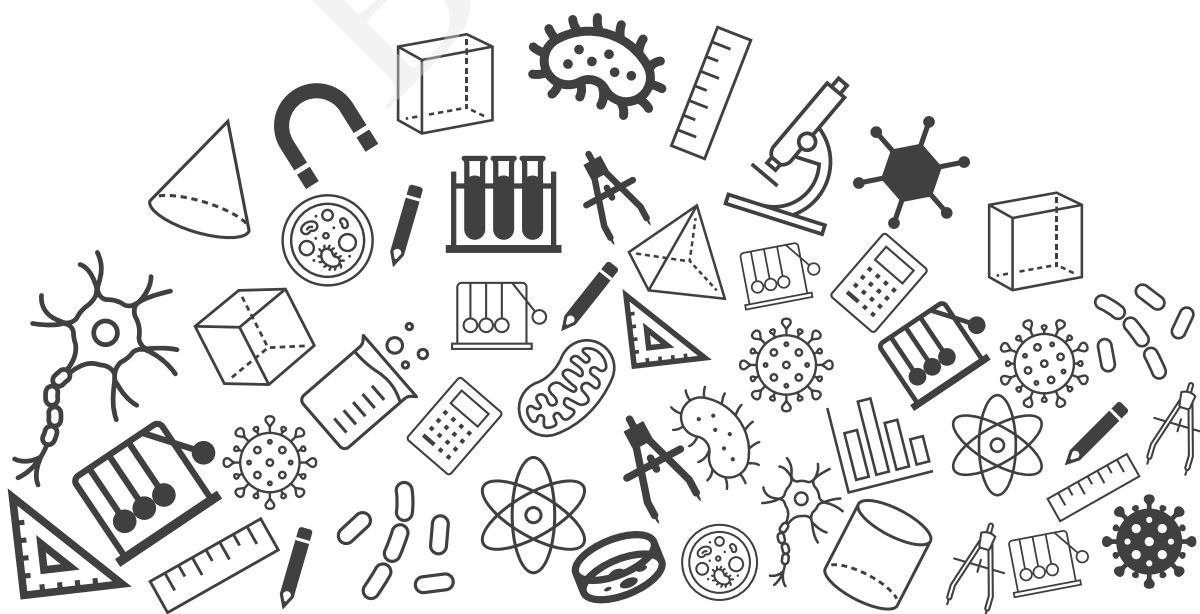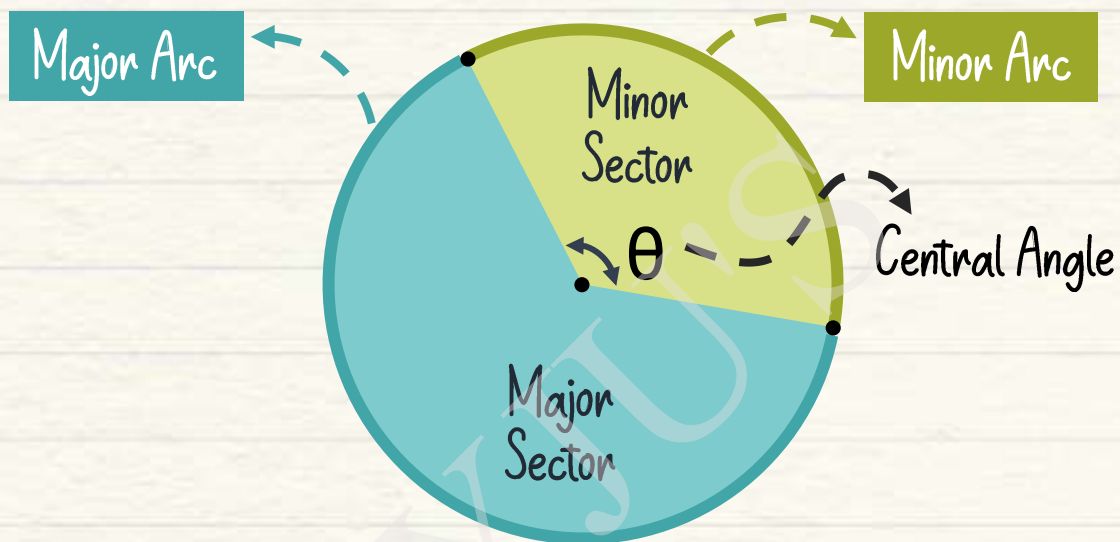## CHAPTER NOTES

Areas Related to Circle

Topics

1. Area of sector

2. Area of segment

3. Area of combined plane figures

1. Area of Sector

Sector

A sector of a circle is the portion of an area enclosed by two radii and an arc.

Major Arc **Minor Arc**

Minor Sector

θ

Central Angle

Major Sector

Area of minor sector

$$\frac{\theta}{360°} \times \pi r^2$$

Area of major sector
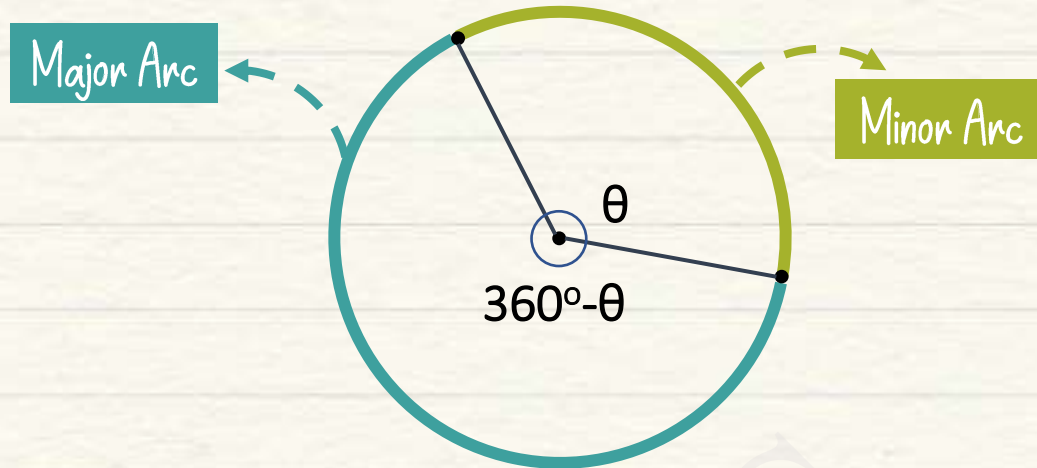
$$\frac{360° - \theta}{360°} \times \pi r^2$$

Central angle θ must be in degrees.

If θ is given in radians, multiply it with $\frac{180°}{\pi}$ to convert in degrees.
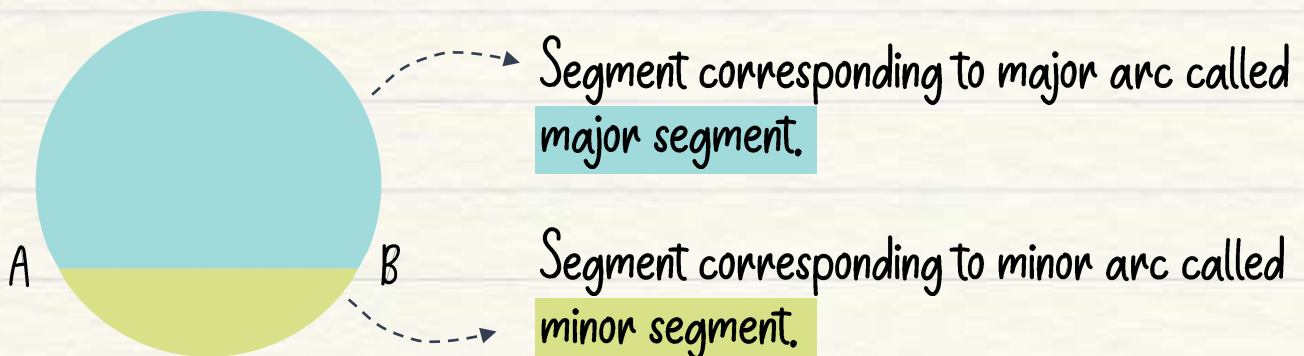
Length of Arc

Major Arc

Minor Arc

θ

$360° - \theta$

$$\text{Length of minor arc} = \frac{\theta}{360°} \times 2\pi r$$

$$\text{Length of major arc} = \frac{360° - \theta}{360°} \times 2\pi r$$

2. Area of Segment

Segment

A segment of a circle can be defined as a region bounded by a chord and a corresponding arc lying between the chord"s endpoints.
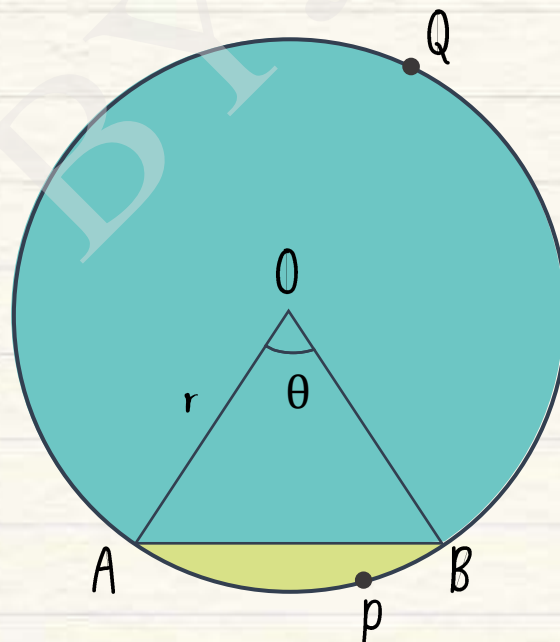

A   B

Segment corresponding to major arc called major segment.

Segment corresponding to minor arc called minor segment.

Area of Segment

When θ is given in degrees,

Area of a segment $= \left(\frac{1}{2}\right) \times r^2 \times \left[\left(\frac{\pi}{180^0}\right)\theta - sin\theta\right]$

When θ is given in radians,

Area of a segment $= \left(\frac{1}{2}\right) \times r^2[\theta - sin\theta]$
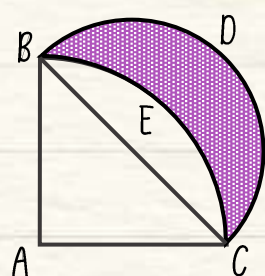
Area of major segment = Area of sector OAQB + Area of ΔOAB

Area of minor segment= Area of the sector OAPB − Area of ΔOAB

General Formula
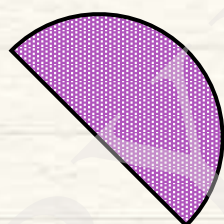
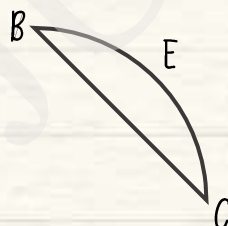Areas of shaded region = Area of entire figure − Area of non shaded region
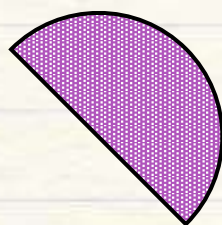
Example

Area of shaded figure = Area of semicircle − Area of minor segment
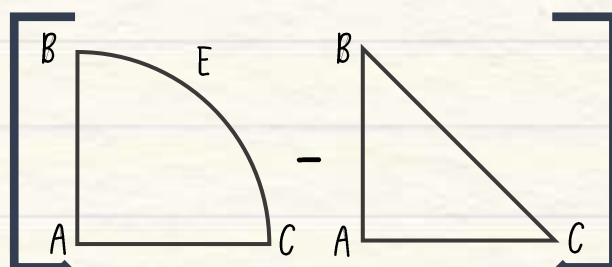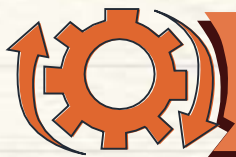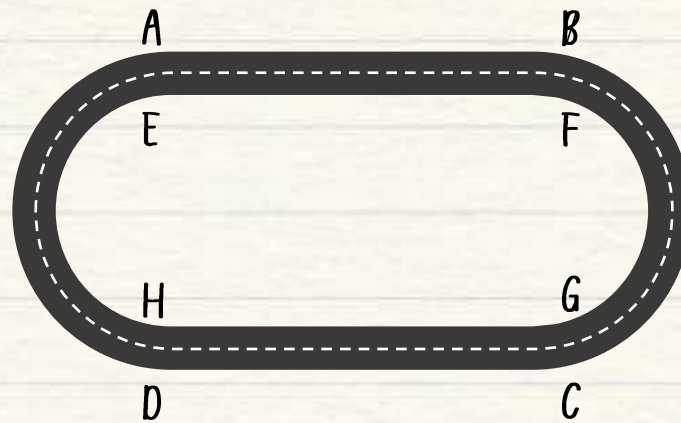

= Area of semicircle − (Area of sector ABEC − Area of △ABC)

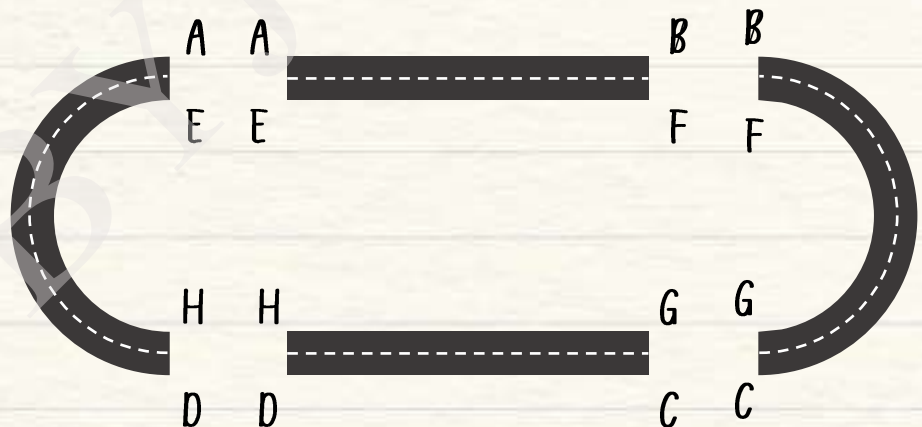## ? Find the area of the track.

A   B
E   F
H   G
D   C

Methodology

Step 1

Simplify the given figure into known standard shapes.

A A   B B
E E   F F
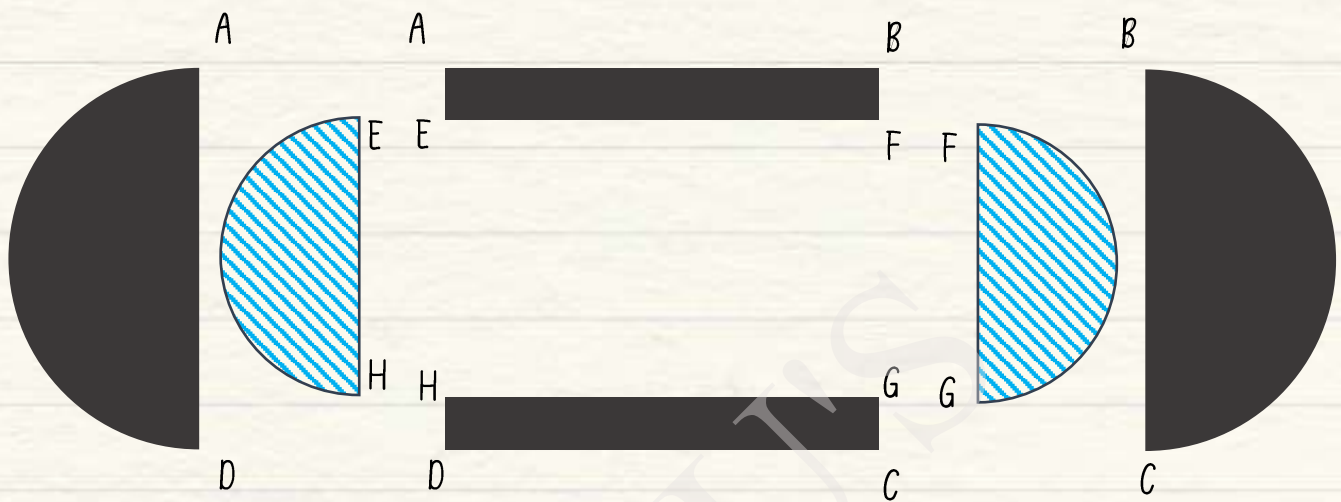H H   G G
D D   C C

Step 2

Apply the formula of area on each shape.

= Area of rectangle ABFE + Area of rectangle HGCD
+ Area of the sidetracks

To find the area of the required region, add or subtract the areas of the standard figures as per the requirement.

= Area of rectangle ABFE + Area of rectangle HGCD

+

(Area of semicircle with diameter AD − Area of semicircle with diameter EH)

+

(Area of semicircle with diameter BC − Area of semicircle with diameter FG)

Area of combined plane shapes

Areas Related to Circle

Segments

Sectors

Area of segments

Area of sectors

Length of arc