Class 10th

MATHEMATICS

AREAS RELATED TO CIRCLES

Introduction

Area of a Circle: Area of a circle is πr^2, where $\pi = \frac{22}{7}$ or ≈ 3.14 (can be used interchangeably for problem solving purposes) and r is the radius of the circle.

π is the ratio of the circumference of a circle to its diameter.

Circumference of a circle: The perimeter of a circle is the distance covered by going around its boundary once. The perimeter of a circle has a special name: Circumference, which is π times the diameter which is given by the formula $2\pi r$

Segment of a circle: A circular segment is a region of a circle which is "cut off" from the rest of the circle by a secant or a chord

Sector of a circle: A circular sector or circle sector, is the portion of a circle enclosed by two radii and an arc, where the smaller area is known as the minor sector and the larger being the major sector.

Angle of a Sector: Angle of a sector is that angle which is enclosed between the two radii of the sector.

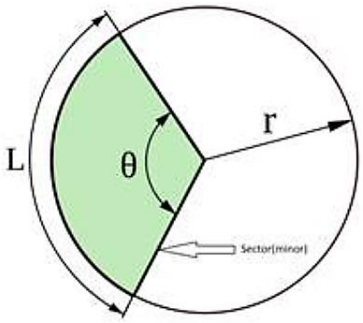
Length of arc of a sector: The length of the arc of a sector can be found by using the expression for the circumference of a circle and the angle of the sector, using the following formula:

$$L = \frac{\theta}{360^\circ} \times 2\pi r$$

where θ is the angle of sector and r is the radius of the circle.

Area of a Sector of a Circle: Area of a sector is given by $\frac{\theta}{360^\circ} \times \pi r^2$

where $\angle\theta$ is the angle of this sector(minor sector in the following case) and r is its radius

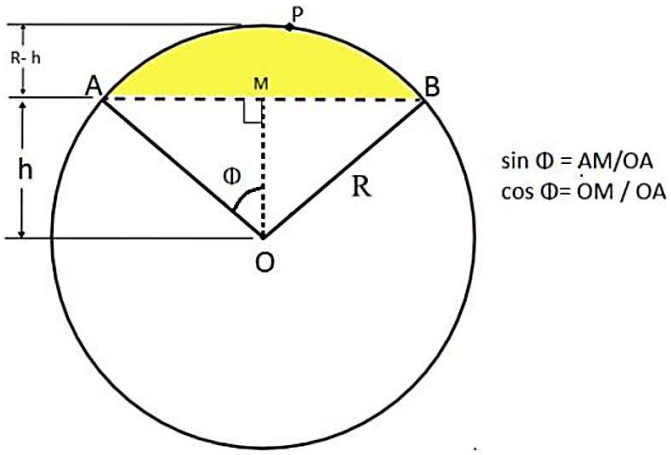


Area of a sector

Area of a Triangle: Area of a triangle is, Area = $\frac{1}{2}$ × base × height

If the triangle is a equilateral then area $= \frac{\sqrt{3}}{4} \times a^2$ where a is the side of the triangle.

Area of a Segment of a Circle:



Area of the segment

Area of segment APB

= (Area of sector OAPB) – (Area of triangle AOB)

$$=\left(\frac{2\phi}{360^\circ}\times\pi r^2\right)-\left(\frac{1}{2}\times AB\times OM\right)$$

[To find the area of triangle AOB, use trigonometric ratios to find OM (height) and AB (base)]

Also, Area of segment APB can be calculated directly if the angle of the sector is known using the following formula.

$$=\left(\frac{\theta}{360^\circ}\times\pi r^2\right)-\frac{r^2}{2}\sin$$

where θ is the angle of the sector and r is the radius of the circle