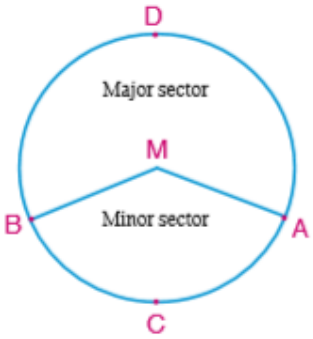
Circular Sectors



Definition:

A circular sector is that part of the circle bounded by an arc and the two radii through the ends of that arc.

M is a circle and $\overline{MA}$, $\overline{MB}$ are two radii, the circle surface is divided into two parts, each of them is called a circular sector.
The part MACB is called the minor sector and the part MADB is called the major sector.

* The perimeter of sector

The perimeter of smaller sector MACB = $2r + L$ where r is the length of radius and L is the length of its arc $\overset{\frown}{AB}$

** The area of sector

The ratio between the area of the sector and the area of the circle is the same ratio between the measure of the angle of the sector and the measure of the circle.

$$\frac{Area\ of\ the\ sector}{Area\ of\ the\ circle} = \frac{Measure\ of\ the\ angle\ of\ the\ sector}{Measure\ of\ the\ circle}$$

1 $\frac{Area\ of\ the\ sector}{\pi r^2} = \frac{\theta^{rad}}{2\pi}$

The area of the circular sector = $\frac{1}{2}\theta^{rad}r^2$

2 $\frac{Area\ of\ the\ sector}{\pi r^2} = \frac{x^\circ}{360^\circ}$

The area of the circular sector = $\frac{x^\circ}{360} \times \pi r^2$

3 $\because \theta^{rad} = \frac{l}{r}$, **the area of the circular sector = $\frac{1}{2}\theta^{rad}r^2$**

$\therefore$ **The area of the circular sector = $\frac{1}{2} \times \frac{l}{r} \times r^2$**

The area of the circular sector = $\frac{1}{2}\ lr$

EX (1)

Find the area of a sector where the measure of its angle is 40^0 and the length of its radius is 6 cm.

EX (2) **Complete the following:**

(1) The area of sector in which the length of the radius of its circle = 7cm. and the measure of its central angle is 2.1^{rad} = …….cm^2.

(2) The area of sector in which the length of the radius of its circle = 6.5 cm. and the length of its arc = 8 cm. = ……. cm^2.

(3) The area of sector in which the measure of its angle is 60° in a circle of radius length 5 cm. = ……cm^2.

EX (3)

A sector its surface area is equals 3 cm^2 ,and its perimeter is 7 cm. calculate the length of its radius and the measure of its central angle in degrees and in radians.

Exercises

(1) Calculate the area of sector of radius 10 cm. and its angle of measures 135°.

(2) Calculate the area of the sector whose arc length is 24 cm. and the length of radius is 7.3 cm. find its central angle in radians and degrees.

(3) A circular sector the measure of its central angle is 30° and the length of its arc is 3.5cm.Calculate the area of the sector to the nearest cm^2.

(4) The perimeter of the circular sector equals 28 cm. and the length of its radius is 7cm. Find the area of the sector and the measure of its central angle in degrees and in radians.

(5) A circular sector its perimeter equals 12 cm. and its area equals 8 cm^2. Find the length of the radius of its circle and the measure of its central angle in degrees and in radians.

(6) Three circles the length of its radii of each is 5 cm. and its centers are the vertices of equilateral triangle the length of its side is 10 cm. find the area included between this circles.