

# Directorate of Education GNCT of Delhi

Subject: Mathematics

Worksheet: 50

Date: 2/11/2020

Class: X

Name of Student.....

Name of Class Teacher.....

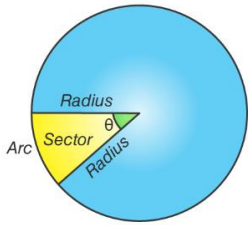
## Area of the Sector of the circle

### Recall and Answer

1. Area of a circle = \_\_\_\_\_
2. Draw a Circle of radius 3cm and mark its centre as O. Draw its two radii making an angle of  $60^\circ$  at the centre.
3. Central angle of a complete circle = \_\_\_\_\_

### Sector of A Circle

The portion (or part) of the circular region enclosed by two radii and the corresponding arc is called a sector of the circle



Region in yellow colour is a sector of the circle with centre O.  
Blue region is also a sector of the circle.

Sector in yellow colour is called **Minor Sector**  
 $\theta$  is called the angle of the sector,  
Sector in blue colour is called **Major Sector**  
Angle of the major sector is  $360^\circ - \theta$ .

### Area of the sector

In a circle with centre O and radius r, let OPAQ be a sector and  $\theta$  (in degrees) be the angle of the sector.

Area of a circle (in fact of a circular region or disc) =  $\pi r^2$ .

We can consider this circular region to be a sector forming an angle of  $360^\circ$  (i.e., of degree measure  $360^\circ$ ) at the centre O.

Now by applying the Unitary Method, Area of the sector OPAQ as follows:

When the angle at the centre is  $360^\circ$ , area of the sector, i.e., the complete circle =  $\pi r^2$

When the angle at the center is  $1^\circ$ , area of the sector =  $\frac{\pi r^2}{360^\circ}$

Thus, when the angle is  $\theta$ , **area of sector, OAPB** =  $\theta \times \frac{\pi r^2}{360^\circ}$

**Area of the major sector OAQB =  $\pi r^2$  – Area of the minor sector OAPB**

Example 2: In a circle of radius 21 cm, an arc subtends an angle of  $60^\circ$  at the centre. Find area of major sector formed by the arc.

Solution: Area of major sector = Area of circle – Area of minor sector

Area of minor sector =  $(\theta/360^\circ) \times \pi r^2$   
=  $(60^\circ/360^\circ) \times \pi r^2$

=  $(1/6) \times (22/7) \times (21)^2$  =  $22/7 \times 441/6$

=  $11 \times 63/3$   $\text{cm}^2$  =  $11 \times 21$

=  $231 \text{ cm}^2$

Or, Area of minor sector =  $231 \text{ cm}^2$

Area of major sector = Area of circle – Area of minor sector

=  $(22/7 \times (21)^2) - 231$

=  $22 \times 3 \times 21 - 231$

=  $(1386 - 231) \text{ cm}^2$

=  $1155 \text{ cm}^2$

Example 3: The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

Solution: Length of minute hand = radius of the clock (circle)

$\therefore$  Radius (r) of the circle = 14 cm (given)

Angle swept by minute hand in 60 minutes =  $360^\circ$

So, the angle swept by the minute hand in 5 minutes =  $360^\circ \times 5/60 = 30^\circ$

We know,

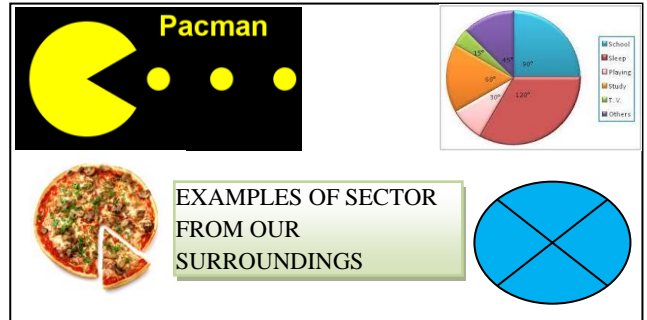
Area of a sector =  $(\theta/360^\circ) \times \pi r^2$

Now, area of the sector making an angle of  $30^\circ$  =  $(30^\circ/360^\circ) \times \pi r^2 \text{ cm}^2$

=  $(1/12) \times \pi (14)^2$

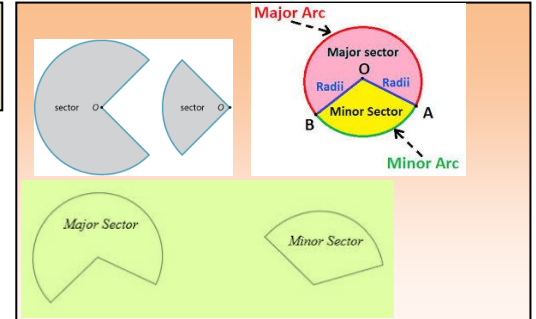
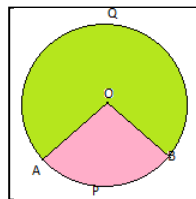
=  $(49/3) \times (22/7) \text{ cm}^2$

=  $154/3 \text{ cm}^2$  =  $51.33 \text{ cm}^2$



EXAMPLES OF SECTOR FROM OUR SURROUNDINGS

NOTE: When we write 'sector' we will mean the 'minor sector', unless stated otherwise.



Example 1: Find the area of a sector of a circle with radius 6 cm if angle of the sector is  $60^\circ$ .

Solution: Given that the angle of the sector is  $60^\circ$

We know that the area of sector =  $(\theta/360^\circ) \times \pi r^2$

$\therefore$  Area of the sector with angle  $60^\circ$  =  $(60^\circ/360^\circ) \times \pi r^2 \text{ cm}^2$

=  $(36/6) \pi \text{ cm}^2$

=  $6 \times 22/7 \text{ cm}^2$  =  $132/7 \text{ cm}^2$

## TRY YOURSELF

1. Find the area of the sector of a circle with radius 4 cm and of angle  $30^\circ$ .

Also, find the area of the corresponding major sector (Use  $\pi = 3.14$ ).

2. Find the area of a quadrant of a circle whose radius is 2 cm.

3. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of  $115^\circ$ . Find the total area cleaned at each sweep of the blades.

COVID appropriate behaviour (CAB) message:

Keep maintaining physical distance of 6 feet or 2 yards.

