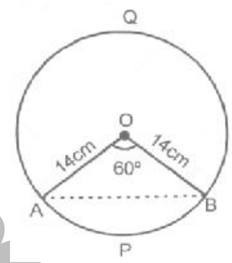
12.3 ILLUSTRATION

Ex.1 A chord of circle 14 cm makes an angle of 60^0 at the center of the circle. Find :

(i) area of minor sector (ii) area of the minor segment

(iii) area of the major sector (iv) area of the major segment

Sol. **Given,** r = 14 cm, $\theta = 60^0$



(i) Area of minor sector OAPB = $\frac{\theta}{360^0}\pi r^2$

$= \frac{60^0}{360^0} \times 3.14 \times 14 \times 14$

$= 102.57$ cm^2

(ii) Area of minor segment APB = $\frac{\pi r^2\theta}{360^0} - \frac{r^2}{2}\sin\theta$

$= 102.57 - \frac{14\times 14}{2}\sin 60^0$

$= 102.57 - 98 \times \frac{\sqrt{3}}{2}$

$= 17.80$ cm^2

(iii) Area of major sector = Area of circle - Area of minor sector OAPB

$= \pi\ (14)^2 - 102.57$

$= 615.44 - 102.57 = 512.87$ cm^2

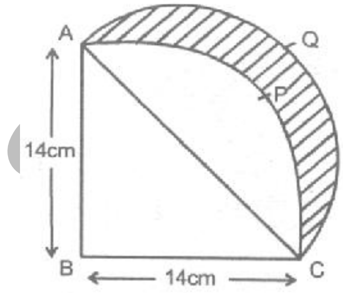
(iv) Area of major segment AQB

= Area of circle - Area of minor segment APB

= 615.44 - 17.80

= 597.64 cm^2.

Ex.2 ABCP is a quadrant of a circle of radius 14 cm. With AC as diameter, a semicircle is drawn. Find the area of the shaded portion **(figure).**



Sol. In right angled triangle ABC,
we have.

$AC^2 = AB^2 + BC^2$

$AC^2 = 14^2 + 14^2$

AC = $\sqrt{2 \times 14^2} = 14\sqrt{2}$ cm

Now required Area = Area APCQA

= Area ACQA - Area ACPA

= Area ACQA - (Area ABCPA - Area of ΔABC)

$$= \frac{1}{2}\times\pi\times\left(\frac{14\sqrt{2}}{2}\right)^2 - \left[\frac{1}{4}\times\pi(14)^2 + \frac{1}{2}\times14\times14\right]$$

$$= \frac{1}{2}\times\frac{22}{7}\times7\sqrt{2}\times7\sqrt{2} - \frac{1}{4}\times\frac{22}{7}\times14\times14 + 7\times14$$

= 154 – 154 $\div$ 98

= 98 cm^2

Ex.3 The diameter of cycle wheel is 28 cm. How many revolution will it make in moving 13.2 km ?

Sol. Distance traveled by the wheel is one revolution = $2\pi r$

$$= 2\times\frac{22}{7}\times\frac{28}{2} = 88 \text{ cm}$$

and the total distance covered by the wheel = 13.2 × 1000 × 100 cm

= 1320000 cm

$\therefore$ Number of revolution made by the wheel $= \frac{1320000}{88}$

= 15000.

Ex. 4 How many balls, each of radius 1 cm, can be made from a solid sphere of lead of radius 8 cm ?

Sol. Volume of the spherical ball of radius 8 cm = $\frac{4}{3}\pi\times8^3$ cm^3

Also, volume of each smaller spherical ball of radius 1 cm = $\frac{4}{3}\pi\times1^3 cm^3$.

Let n be the number of smaller balls that can be made. Then, the volume of the larger ball is equal to the sum of all the volumes of n smaller balls.

Hence, $\frac{4}{3}\pi\times n = \frac{4}{3}\pi\times8^3$

$\Rightarrow$ $n = 8^3 = 512$

Hence, the required number of balls = 512.

Ex.5 An iron of length 1 m and diameter 4 cm is melted and cast into thin wires of length 20 cm each. If the number of such wires be 2000, find the radius of each thin wire.

Sol. Let the radius of each thin wire be r cm. The, the sum of the volumes of 2000 thin wire will be equal to the volume of the iron rod. Now, the shape of the iron rod and each thin wire is cylindrical.

Hence, the volume of the iron rod of radius $\frac{4}{2}$ cm = 2 cm is $\pi\times2^2\times100cm^3$

Again, the volume of each thin wire = $\pi r^2\times20$

Hence, we have $\pi\times2^2\times100 = 2000\times\pi r^2\times20$

$\Rightarrow \quad 40r^2 = 4 \Rightarrow r^2 = \frac{1}{100}$

$\Rightarrow r = \frac{1}{10}$ [Taking positive square root only]

Hence, the required radius of each thin wire is $\frac{1}{10}$ cm. of 0.1 cm.