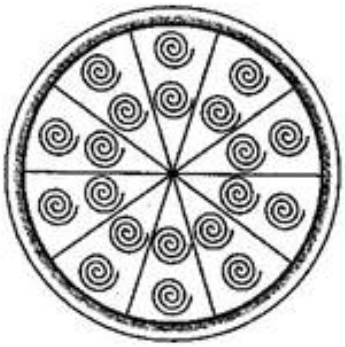
Exercise 12.2

Q9. A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors as shown in figure. Find:



(i) the total length of the silver wire required.

(ii) the area of each sector of the brooch.

Ans. (i) Diameter = 35 mm

$\Rightarrow$ Radius = $\frac{35}{2}$ mm

Circumference = $2\pi r = 2 \times \frac{22}{7} \times \frac{35}{2}$

= 110 mm.....(i)

Length of 5 diameters = $35 \times 5 = 175$ mm.....(ii)

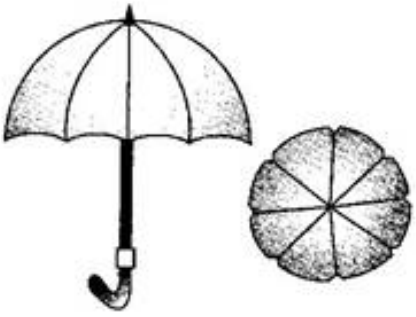
$\therefore$ Total length of the silver wire required

= 110 + 175 = 285 mm

(ii) $r = \frac{35}{2}$ mm and $\theta = \frac{360^\circ}{10} = 36^\circ$

$\therefore$ The area of each sector of the brooch = $\frac{\theta}{360^\circ} \times \pi r^2$

Q10. An umbrella has 8 ribs which are equally spaced (see figure). Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella.



Ans. Here, r = 45 cm and

$$\theta = \frac{360^\circ}{8} = 45^\circ$$

Area between two consecutive ribs of the umbrella

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

$$= \frac{45^\circ}{360^\circ} \times \frac{22}{7} \times 45 \times 45$$

$$= \frac{22275}{28} cm^2$$

Q11. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. Find the total area cleaned at each sweep of the blades.

Ans. Here, r = 25 cm and $\theta = 115°$

The total area cleaned at each sweep of the blades

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

$$= 2 \times \left(\frac{115°}{360°} \times \frac{22}{7} \times 25 \times 25 \right)$$

$$= \frac{158125}{126} cm^2$$

Q12. To warn ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle $80°$ to a distance of 16.5 km. Find the area of the sea over which the ships are warned. $(\text{Use } \pi = 3.14)$

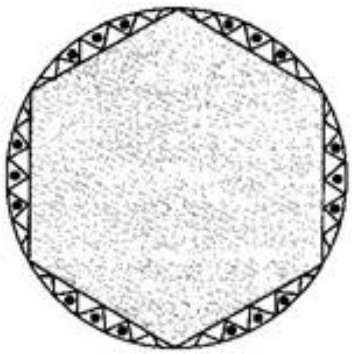
Ans. Here, r = 16.5 km and $\theta = 80°$

The area of sea over which the ships are warned

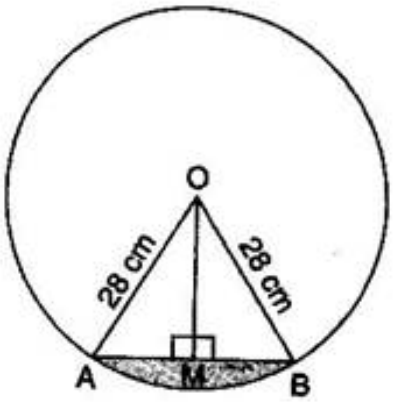
$$= \frac{\theta}{360^\circ} \times \pi r^2$$

$$= \frac{80°}{360°} \times 3.14 \times 16.5 \times 16.5 = 189.97\ km^2$$

Q13. A round table cover has six equal designs as shown in figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of Ts. 0.35 per cm². $\left(\text{Use } \sqrt{3} = 1.7\right)$



Ans. r = 28 cm and $\theta = \frac{360^\circ}{6} = 60^\circ$



Area of minor sector = $\frac{\theta}{360^\circ} \times \pi r^2$

$= \frac{60^\circ}{360^\circ} \times \frac{22}{7} \times 28 \times 28$

$= \frac{1232}{3} = 410.67\ cm^2$

For, Area of $\triangle AOB$,

Draw OM$\perp$ AB.

In right triangles OMA and OMB,

OA = OB[Radii of same circle]

OM = OM[Common]

$\therefore \Delta OMA \cong \Delta OMB$ [RHS congruency]

$\therefore AM = BM$[By CPCT]

$\Rightarrow AM = BM = \frac{1}{2} AB$ and $\angle AOM = \angle BOM = \frac{1}{2}\angle AOB = \frac{1}{2}\times 60^\circ = 30^\circ$

In right angled triangle OMA,

$\cos 30^\circ = \frac{OM}{OA}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{OM}{28}$

$\Rightarrow OM = 14\sqrt{3}$ cm

Also, $\sin 30^\circ = \frac{AM}{OA}$

$\Rightarrow \frac{1}{2} = \frac{AM}{28}$

$\Rightarrow AM = 14$ cm

$\Rightarrow 2\,AM = 2\times 14 = 28$ cm

$\Rightarrow AB = 28$ cm

$\therefore$ Area of $\Delta AOB = \frac{1}{2}\times AB \times OM$

$= \frac{1}{2}\times 28\times 14\sqrt{3} = 196\sqrt{3}$

$= 196\times 1.7 = 333.2\ cm^2$

$\therefore \Delta OMA \cong \Delta OMB$ [RHS congruency]

$\therefore$ AM = BM[By CPCT]

$\Rightarrow$ AM = BM = $\frac{1}{2}$ AB and $\angle AOM = \angle BOM =$

$\frac{1}{2}\angle AOB = \frac{1}{2}\times 60^\circ = 30^\circ$

In right angled triangle OMA,

$\cos 30^\circ = \frac{OM}{OA}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{OM}{28}$

$\Rightarrow$ OM = $14\sqrt{3}$ cm

Also, $\sin 30^\circ = \frac{AM}{OA}$

$\Rightarrow \frac{1}{2} = \frac{AM}{28}$

$\Rightarrow$ AM = 14 cm

$\Rightarrow$ 2 AM = 2×14 = 28 cm

$\Rightarrow$ AB = 28 cm

$\therefore$ Area of $\Delta AOB = \frac{1}{2}\times AB \times OM$

$= \frac{1}{2}\times 28\times 14\sqrt{3} = 196\sqrt{3}$

$= 196\times 1.7 = 333.2\ cm^2$

$\therefore$ Area of minor segment = Area of minor sector – Area of ΔAOB

$= 410.67 - 333.2 = 77.47\ cm^2$

$\therefore$ Area of one design $= 77.47\ cm^2$

$\therefore$ Area of six designs $= 77.47 \times 6 = 464.82\ cm^2$

Cost of making designs $= 464.82 \times 0.35 =$ Rs. 162.68

Q14. Tick the correct answer in the following:

Area of a sector of angle p (in degrees) of a circle with radius R is:

(A) $\frac{p}{180^\circ} \times 2\pi r$

(B) $\frac{p}{180^\circ} \times \pi r^2$

(C) $\frac{p}{360^\circ} \times 2\pi r$

(D) $\frac{p}{360^\circ} \times 2\pi r^2$

Ans. (D) Given, r = R and $\theta = p$

Area of sector = $\frac{\theta}{360^\circ} \times \pi r^2$

$= \frac{p}{360^\circ} \times \pi R^2$

$= \frac{p}{2 \times 360^\circ} \times 2\pi R^2$

$= \frac{p}{720^\circ} \times 2\pi R^2$

********** END **********