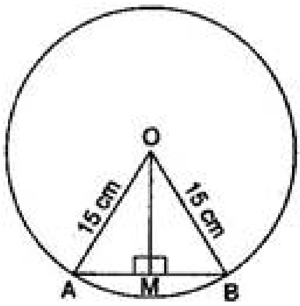
Exercise 12.2



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

$= \frac{60^\circ}{360^\circ} \times 3.14 \times 15 \times 15$

$= 117.75\ cm^2$

For, Area of ΔAOB,

Draw OM$\perp$ AB.

In right triangles OMA and OMB,

OA = OB[Radii of same circle]

OM = OM[Common]

$\therefore$ ΔOMA $\cong$ Δ 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, $\cos 30^\circ = \frac{OM}{OA}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{OM}{15}$

$\Rightarrow$ OM = $\dfrac{15\sqrt{3}}{2}$ cm

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

$\Rightarrow \dfrac{1}{2} = \dfrac{AM}{15} \Rightarrow$ AM = $\dfrac{15}{2}$ cm

$\Rightarrow$ 2 AM = $2 \times \dfrac{15}{2}$ = 15 cm

$\Rightarrow$ AB = 15 cm

$\therefore$ Area of ΔAOB = $\dfrac{1}{2} \times AB \times OM$

$= \dfrac{1}{2} \times 15 \times \dfrac{15\sqrt{3}}{2} = \dfrac{225\sqrt{3}}{3}$

$= \dfrac{225 \times 1.73}{4} = 97.3125\ cm^2$

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

= 117.75 – 97.3125 = $20.4375\ cm^2$ c

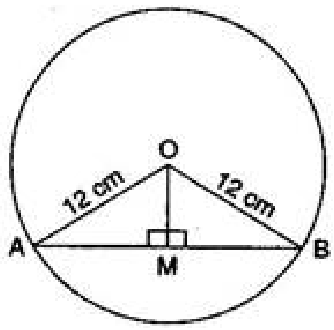
And, Area of major segment = πr^2 – Area of minor segment

= 706.5 – 20.4375 = $686.0625\ cm^2$

Q7. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding segment of the circle.
$\left(\text{Use } \pi = 3.14 \text{ and } \sqrt{3} = 1.73\right)$

Ans. Here, r = 15 cm and $\theta = 120^\circ$

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



$= \dfrac{120^\circ}{360^\circ} \times 3.14 \times 12 \times 12$

$= 150.72\ cm^2$

For, Area of ΔAOB,

Draw OM$\perp$ AB.

In right triangles OMA and OMB,

OA = OB[Radii of same circle]

OM = OM[Common]

$\therefore$ ΔOMA $\cong$ Δ OMB [RHS congruency]

$\therefore$ AM = BM[By CPCT]

$\Rightarrow$ AM = BM = $\dfrac{1}{2}$ AB and

$\angle$ AOM = $\angle$ BOM = $\frac{1}{2}\angle$AOB = $\frac{1}{2}\times 120^\circ = 60^\circ$

In right angled triangle OMA, $\cos 60^\circ = \frac{\text{OM}}{\text{OA}}$

$\Rightarrow \frac{1}{2} = \frac{\text{OM}}{12}$

$\Rightarrow$ OM = 6 cm

Also, $\sin 60^\circ = \frac{\text{AM}}{\text{OA}}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{\text{AM}}{12}$

$\Rightarrow$ AM = $6\sqrt{3}$ cm

$\Rightarrow$ 2 AM = $2\times 6\sqrt{3}$ = $12\sqrt{3}$ cm

$\Rightarrow$ AB = $12\sqrt{3}$ cm

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

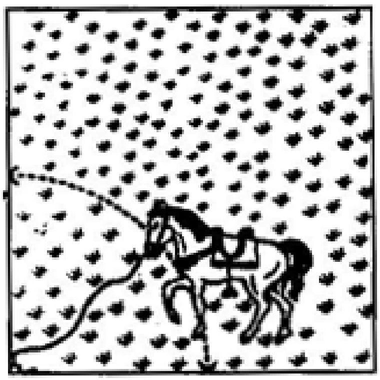
= $\frac{1}{2}\times 12\sqrt{3}\times 6$ = $36\sqrt{3}$

= 36×1.73 = $62.28\ cm^2$

$\therefore$ Area of corresponding segment = Area of corresponding sector – Area of Δ AOB

= 150.72 – 62.28 = $88.44\ cm^2$

Q8. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope (see figure). Find:



(i) the area of that part of the field in which the horse can graze.

(ii) the increase in the grazing area if the rope were 10 m long instead of 5 cm. $(\text{Use } \pi = 3.14)$

Ans. (i) Area of quadrant with 5 m rope

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

$= \frac{90^\circ}{360^\circ} \times 3.14 \times 5 \times 5 = 19.625\ m^2$

(ii) Area of quadrant with 10 m rope

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

$= \frac{90^\circ}{360^\circ} \times 3.14 \times 10 \times 10 = 78.5\ m^2$

$\therefore$ The increase in grazing area

= 78.5 – 19.625

$= 58.875\ m^2$

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