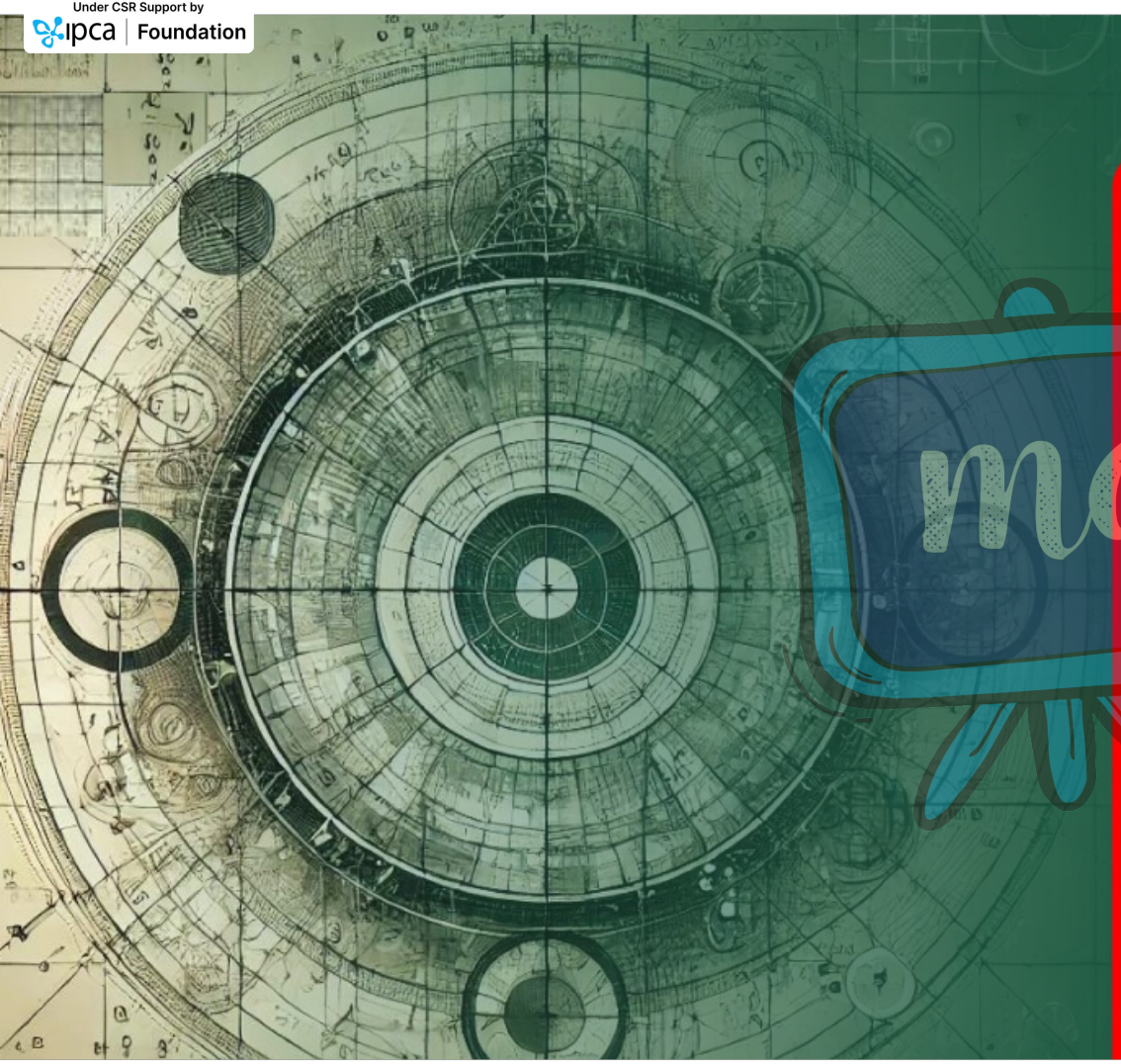


CLASS – 10

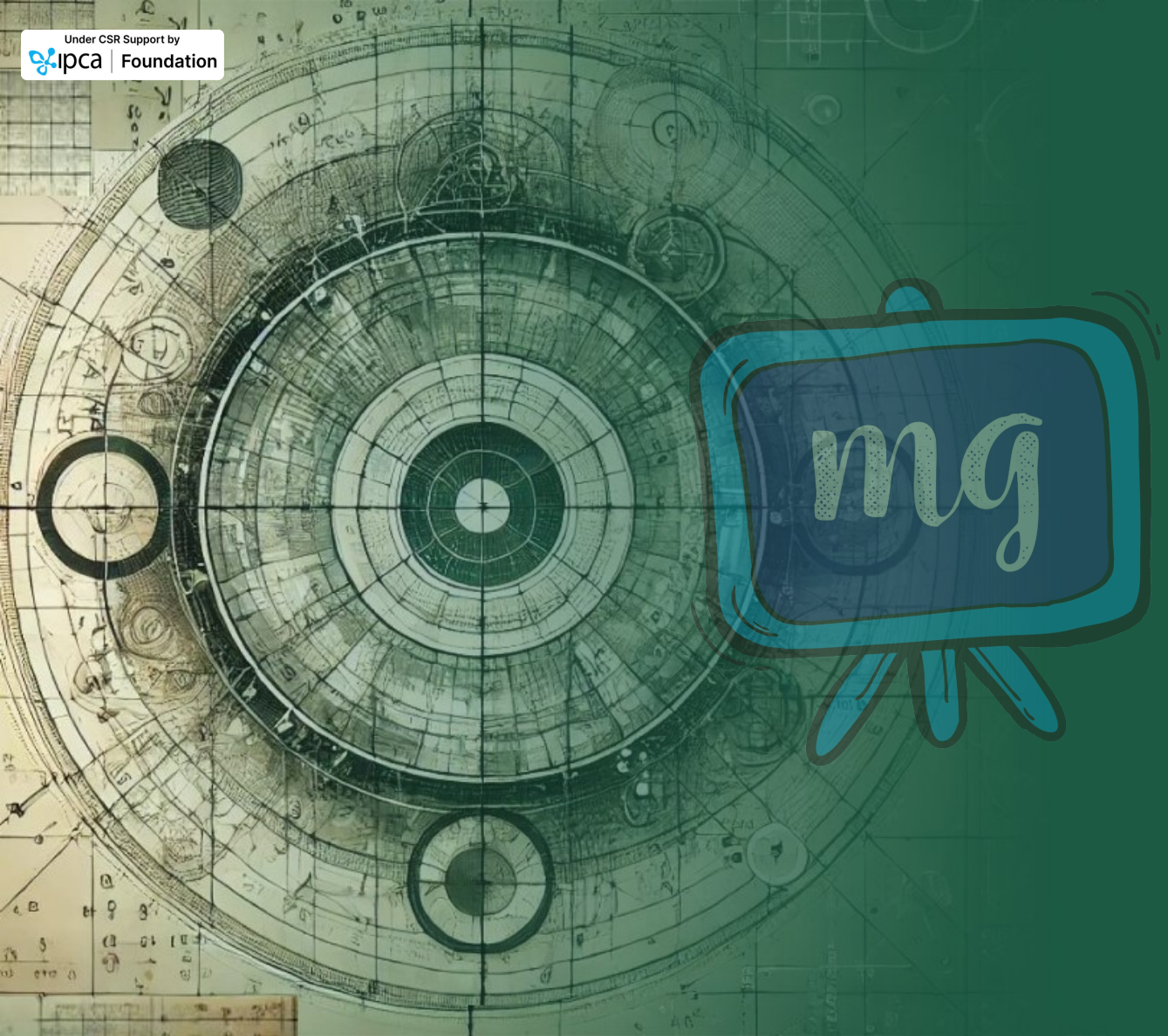
MATHEMATICS

Chapter – 11

AREAS RELATED TO CIRCLES

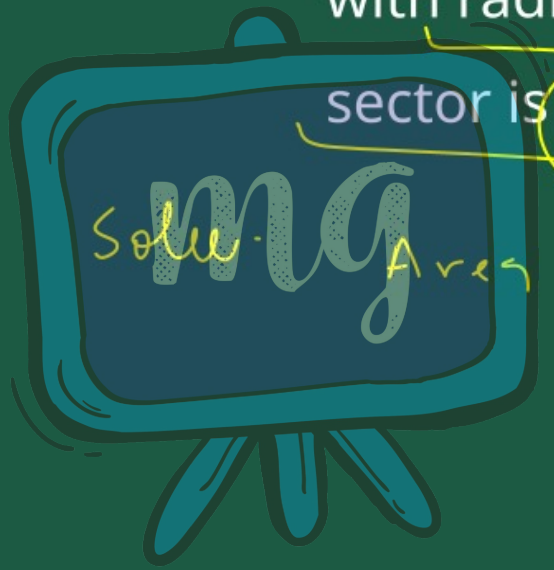
Part – 2

EXERCISE 11.1 (1 to 7)



EXERCISE 11.1

1. Find the area of a sector of a circle with radius 6 cm if angle of the sector is 60°.



Solu.

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

$= \frac{60}{360} \times \pi (6)^2$

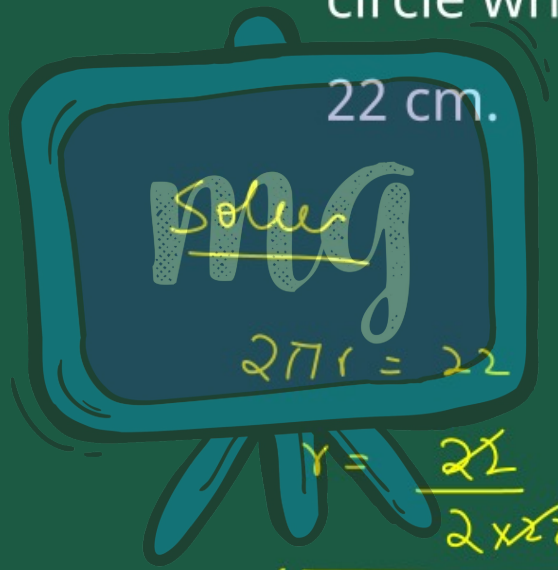
$= \frac{1}{6} \times \pi \times 6 \times 6 = 6\pi$

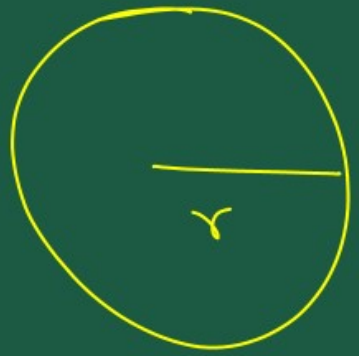
Area of the sector = 6π

$= 6 \times \frac{22}{7}$

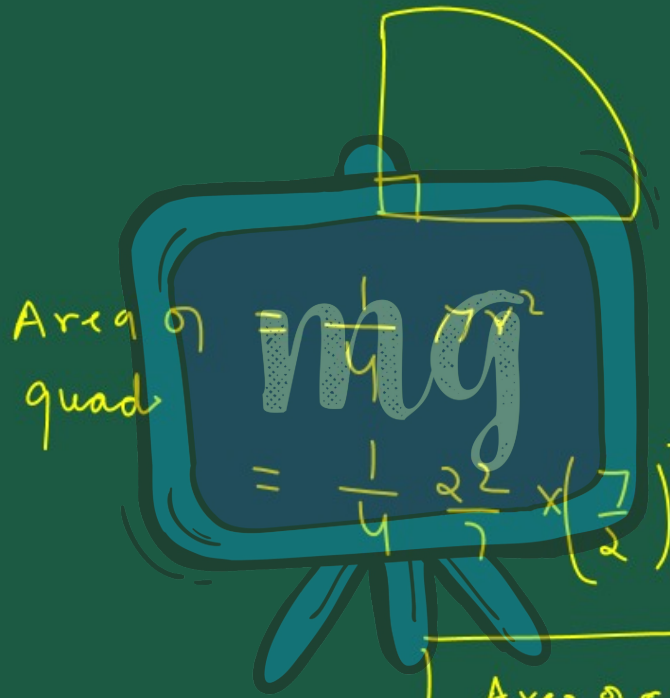
$= \frac{132}{7}$ $(m^2$

2. Find the area of a quadrant of a circle whose circumference is 22 cm.





$C = 2\pi r = 22$ cm.

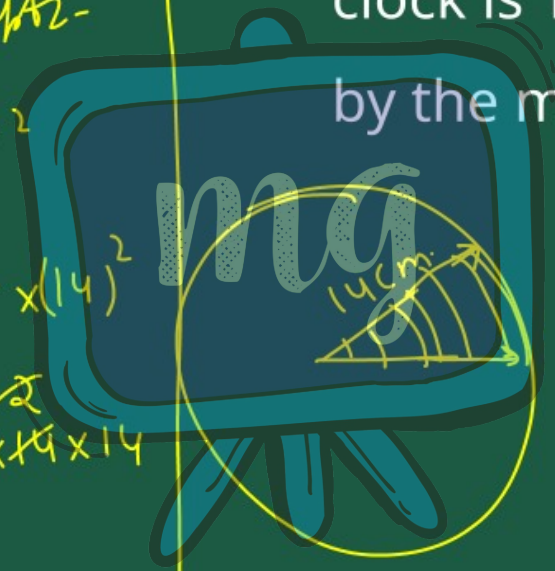


Area of quad $= \frac{1}{4}\pi r^2$

$= \frac{1}{4} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2 = \frac{1}{4} \times \frac{22}{\cancel{7}} \times \frac{\cancel{7}}{2} \times \frac{7}{2}$

Area of quad $= \frac{77}{8}\ cm^2$

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



Area swept -

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

$\frac{30}{360} \times \frac{22}{7} \times (14)^2$

$\frac{1}{12} \times \frac{22}{7} \times 14 \times 14$

$= \frac{11 \times 14}{3} = \frac{154}{3} cm^2$

60 min $\longrightarrow$ 360°

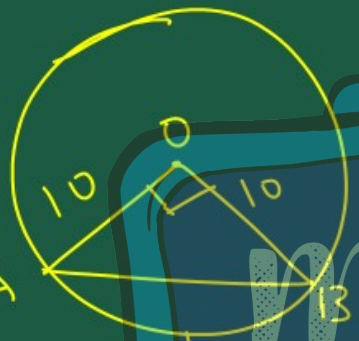
1 min = $\frac{360}{60} = 6°$

5 min = $6 \times 5 = 30°$

4. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corresponding :

(i) minor segment

(ii) major sector. (Use $\pi = 3.14$)



Area of sector $OAPB = \frac{\theta}{360} \times \pi r^2 = \frac{90}{360} \times 3.14 \times (10)^2$

$= \frac{1}{4} \times 3.14 \times 100$

$= \frac{314}{4}\ cm^2$

Area of $\triangle OAB = \frac{1}{2} B \times h$

$= \frac{1}{2} 10 \times 10$

$= \frac{100}{2} = 50 cm^2$

Area of minor segment = Area of sector $OAPB$ − Area of $\triangle OAB$

$= \frac{314}{4} - 50$

$= \frac{314 - 200}{4} = \frac{114}{4} = 28.5 \ cm^2$

Area of major sector = Area of circle − Area of minor sector

$= \pi r^2 - \frac{314}{4}$

$= 3.14 \times (10)^2 - \frac{314}{4}$

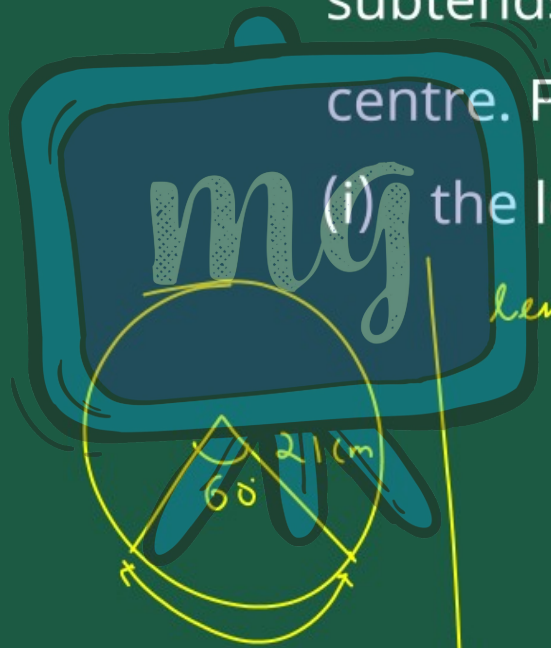
$= 314 - \frac{314}{4}$

$= 314\left[1 - \frac{1}{4}\right] = 314 \times \frac{3}{4} = \frac{942}{4}$

$= 235.5 \ (m^2)$

5. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find:

(i) the length of the arc



length of the Arc :- $\frac{\theta}{360} \times 2\pi r$

$= \frac{60}{360} \times 2 \times \frac{22}{7} \times 21$

$= \frac{1}{6} \times 2 \times \frac{22}{7} \times 21$

length = 22 cm

(ii) area of the sector formed by the arc

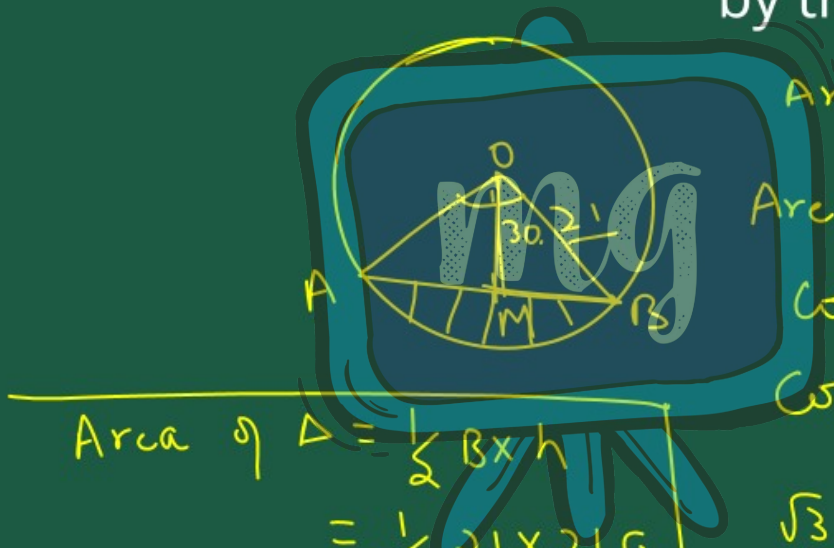
Area of the sector $= \frac{\theta}{360} \times \pi r^2$

$= \frac{60}{360} \times \frac{22}{7} \times (21)^2$

$= \frac{1}{6} \times \frac{22}{7} \times 21 \times 21$

$= 21 \times 11 = 231 \text{ cm}^2$

(iii) area of the segment formed by the corresponding chord



Area of the sector :- $231\ cm^2$

Area of Δ.

$\cos\theta = \frac{B}{H}$

$\cos 30^\circ = \frac{OM}{21}$

$\frac{\sqrt{3}}{2} = \frac{OM}{21}$

$\frac{21\sqrt{3}}{2} = OM$

$\sin\theta = \frac{P}{H}$

$\sin 30^\circ = \frac{MB}{21}$

$\frac{1}{2} = \frac{MB}{21}$

$\frac{21}{2} = MB$

$AB = 2MB = 21$

Area of $\Delta = \frac{1}{2} B \times h$

$= \frac{1}{2} \times 21 \times \frac{21}{2}\sqrt{3}$

Ar. $\Delta = \frac{441\sqrt{3}}{4}\ cm^2$

Area of segment = Ar of sector − Area of Δ.

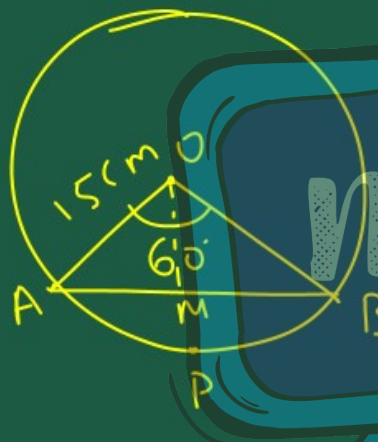
$= 231 - \frac{441\sqrt{3}}{4}$

$= 21 \times 11 - \frac{(21)^2\sqrt{3}}{4}$

$= 21\left[11 - \frac{21\sqrt{3}}{4}\right]$

$= 21\left[\frac{44 - 21\sqrt{3}}{4}\right] = \frac{21}{4}\left[44 - 21\sqrt{3}\right] cm^2$

6. A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circle.
(Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)



Solu.- Area of the sector :-

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

$$\text{Ar.} = \frac{60}{360} \times \pi (15)^2$$

$$= \frac{1}{6} \times 3.14 \times 15 \times 15$$

$$= \frac{1}{2} \times 3.14 \times 5 \times 15$$

Area of the Sector = 117.75 cm^2

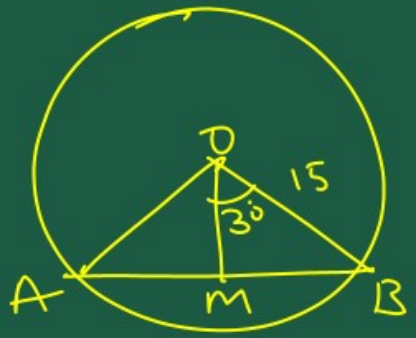
$\sin\theta = \frac{P}{H}$

$\sin\theta = \frac{MB}{15}$

$\sin 30^\circ = \frac{MB}{15}$

$\frac{1}{2} = \frac{MB}{15}$

$\frac{15}{2} = MB$



$AB = 2MB$

$AB = \frac{15}{2} \times 2 = 15$ cm.

$\cos 0 = \frac{OM}{H}$

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

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

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

Area of $\Delta = \frac{1}{2} B \times h = \frac{1}{2} \times 15 \times \frac{15\sqrt{3}}{2}$

Area of the Triangle = 97.3125 cm^2

Area of segment =

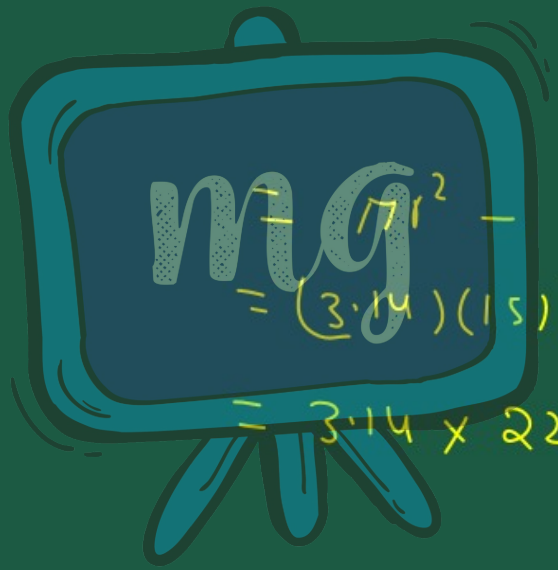
Area of sector

− Area of Δ.

=

Area of the Minor Segment = 117.75 – 97.3125

= 20.4375 cm^2



Area of major segment =

Area of Circle − Area of minor segment.

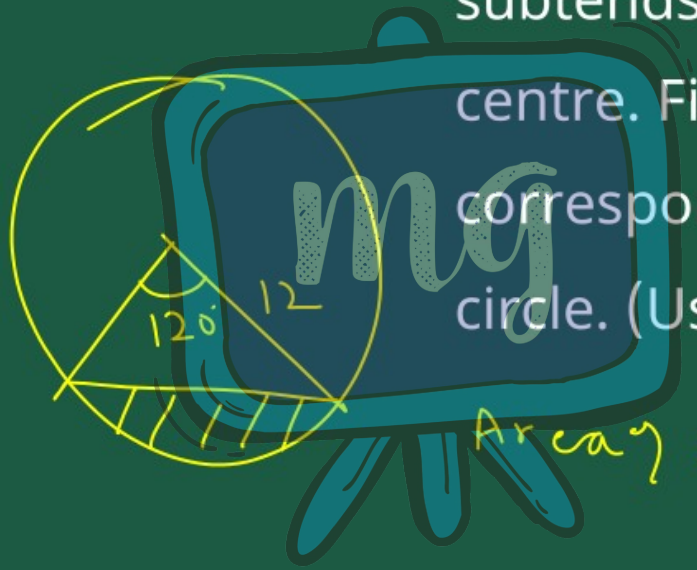
$= \pi r^2 - 20.4375$

$= (3.14)(15)^2 - 20.4375$

$= 3.14 \times 225 - 20.4375$

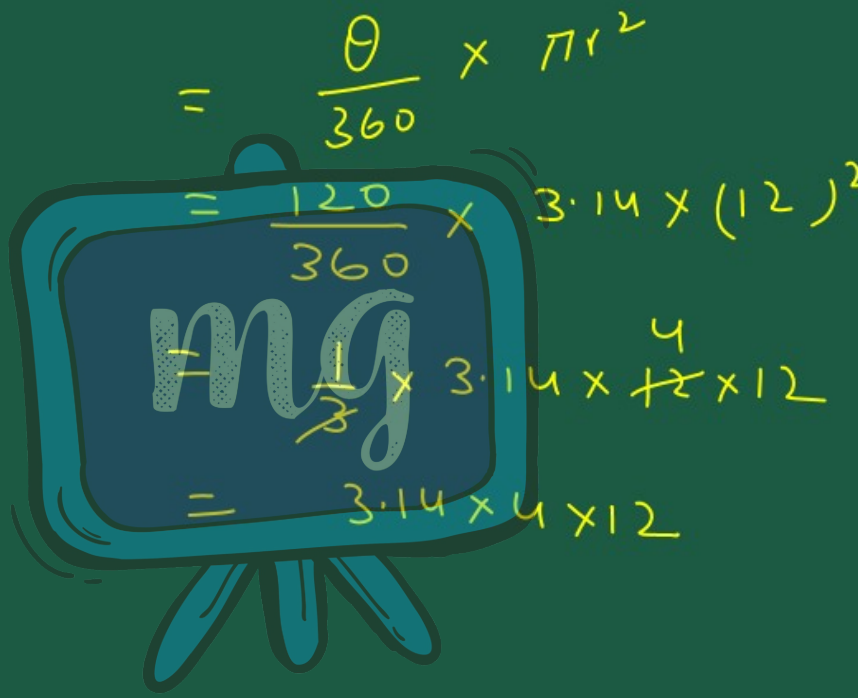
Area of the Major Segment = 686.0625 cm^2

7. 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. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$



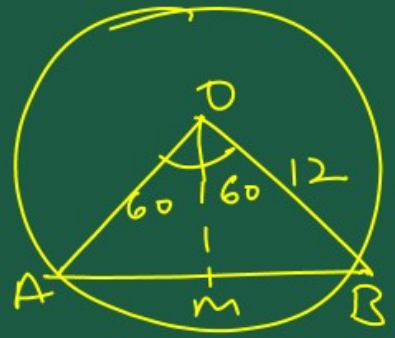
Area of sector :-

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



Area of the Sector = 150.72 cm^2

Arc AB.



$\sin\theta = \frac{mB}{H}$

$\sin 60^\circ = \frac{mB}{12}$

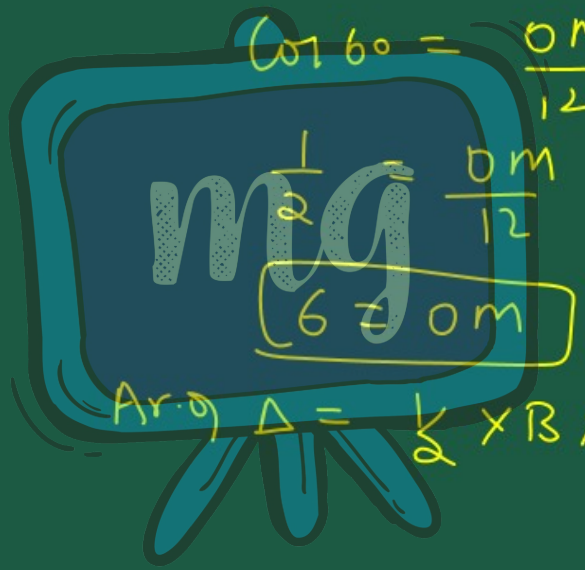
$\frac{\sqrt{3}}{2} = \frac{mB}{12}$

$= \frac{12\sqrt{3}}{2} = 6\sqrt{3} = mB$

$AB = 2mB$

$AB = 2(6\sqrt{3})$

$AB = 12\sqrt{3}$ cm



$\cos\theta = \frac{OM}{H}$

$\cos 60° = \frac{OM}{12}$

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

$6 = OM$

Ar. of $\Delta = \frac{1}{2} \times B \times h = \frac{1}{2} \times 12\sqrt{3} \times 6$

$= 36\sqrt{3}$

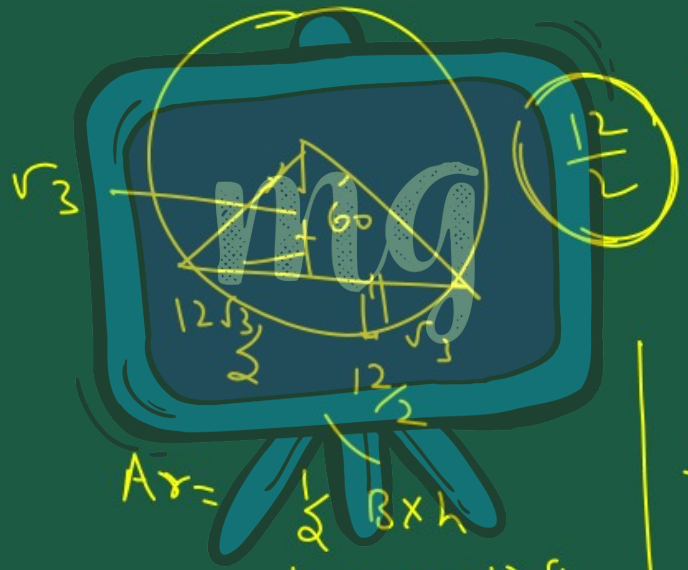
Area of the Triangle = 62.28 cm^2

Area of segment = Area of the sector − Area of Δ.

Area of the Minor Segment = 150.72 − 62.28

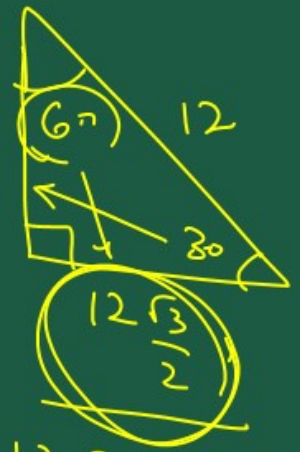
= 88.44 cm^2

Rough



$Ar = \frac{1}{2} \times b \times h$

$\frac{1}{2} \times 12 \times 12\frac{\sqrt{3}}{2}$



$12\frac{\sqrt{3}}{2} = 13$ | $\frac{12}{2} = h$

$\frac{1}{2} \times 12\sqrt{3} \times \frac{12}{2}$