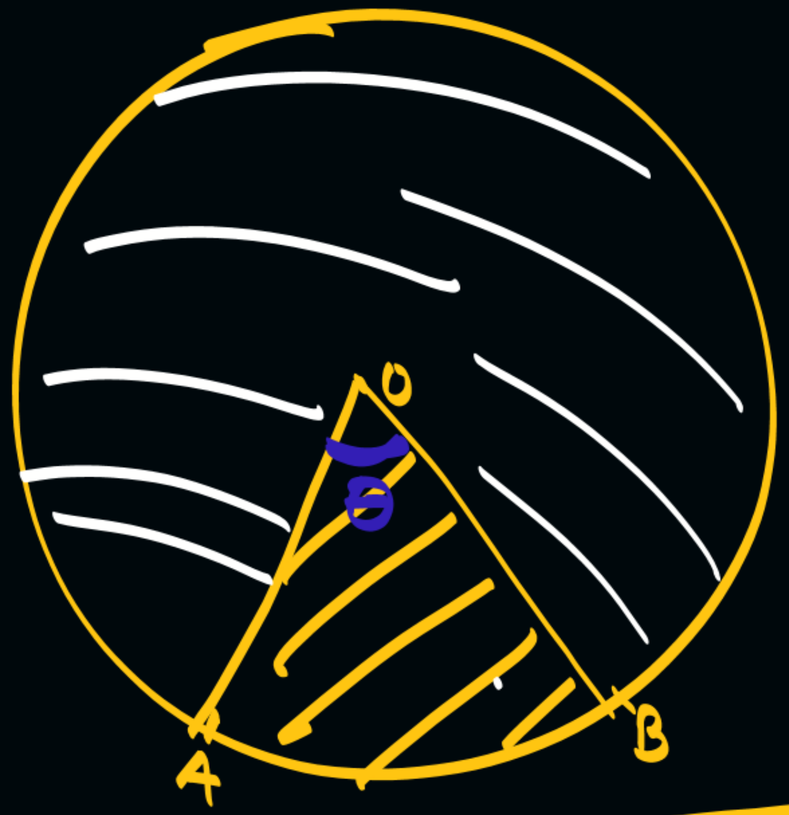
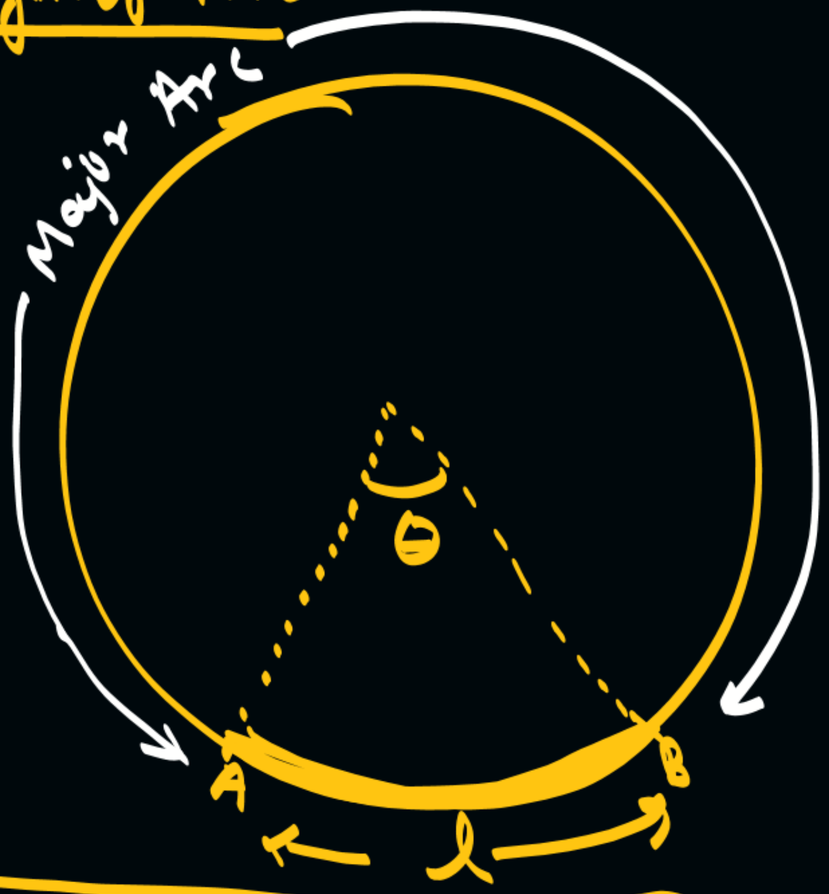
Area of Sector :-



Area of Minor Sector $= \frac{\theta}{360} \pi r^2$

Area of Major Sector $= \pi r^2 - \frac{\theta}{360} \pi r^2$

Length of Arc



Length of minor arc $(l) = \frac{\theta}{360} \times 2\pi r$

Length of Major arc $= 2\pi r - \frac{\theta}{360} 2\pi r$

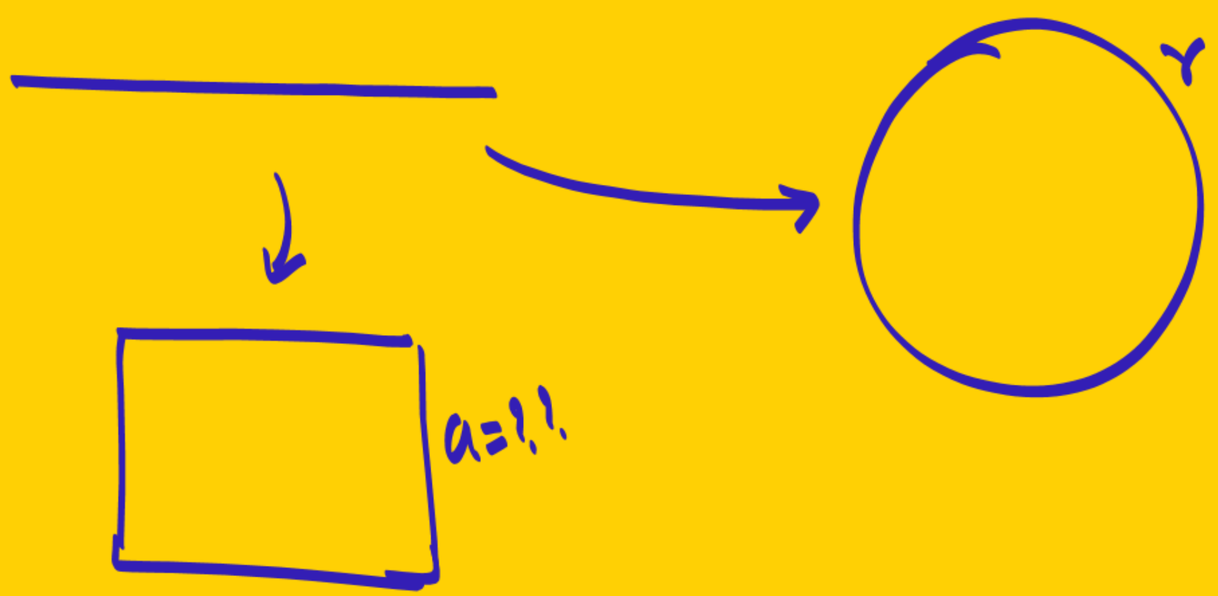
[Aim: 100/100 in Maths]

अभय CLASS 10

AREA RELATED TO CIRCLES

अभय

LP : A wire is looped in the form of a circle of radius 28 cm . It is re-bent into square form . Determine the length of the side of the square.



$(\text{Circumference})_{\text{circle}} = (\text{Perimeter})_{\text{square}}$

$2\pi r = 4a$

$2 \times \pi \times (28) = 4a$

$a = 14\pi$

$a = 14 \times \frac{22}{7}$

$a = 44$ cm

Minute Hand:

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

60 min → 360°

1 min → $\left(\frac{360}{60}\right)°$

10 min → $10 \times \frac{360}{60}°$

$\theta = 60°$

Seconds Hand :- ($r = 10cm$)

Eg (15 seconds)

$60\ sec \longrightarrow 360^\circ$

$1\ sec \longrightarrow \left(\frac{360}{60}\right)^\circ$

$15\ sec \longrightarrow \left(15 \times \frac{360}{60}\right)^\circ = \theta$

Hour hand :- (1 = 12 um)

↳ eg:- 4 hr

12 hr ⟶ 360°

1 hr ⟶ $\left(\frac{360}{12}\right)^\circ$

4 hr ⟶ $\left(4 \times \frac{360}{12}\right)^\circ = 120^\circ = \theta$

अभय

LP : The minute hand of a clock is 84 cm long . The distance covered by the tip of minute hand from 10 : 10 am to 10 : 25 am is :

a. 44 cm
b. 88 cm
c. 132 cm
d. 176 cm

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

$= \frac{90}{360} \times 2 \times \frac{22}{7} \times 84$

$= 11 \times 12$

$= 132$

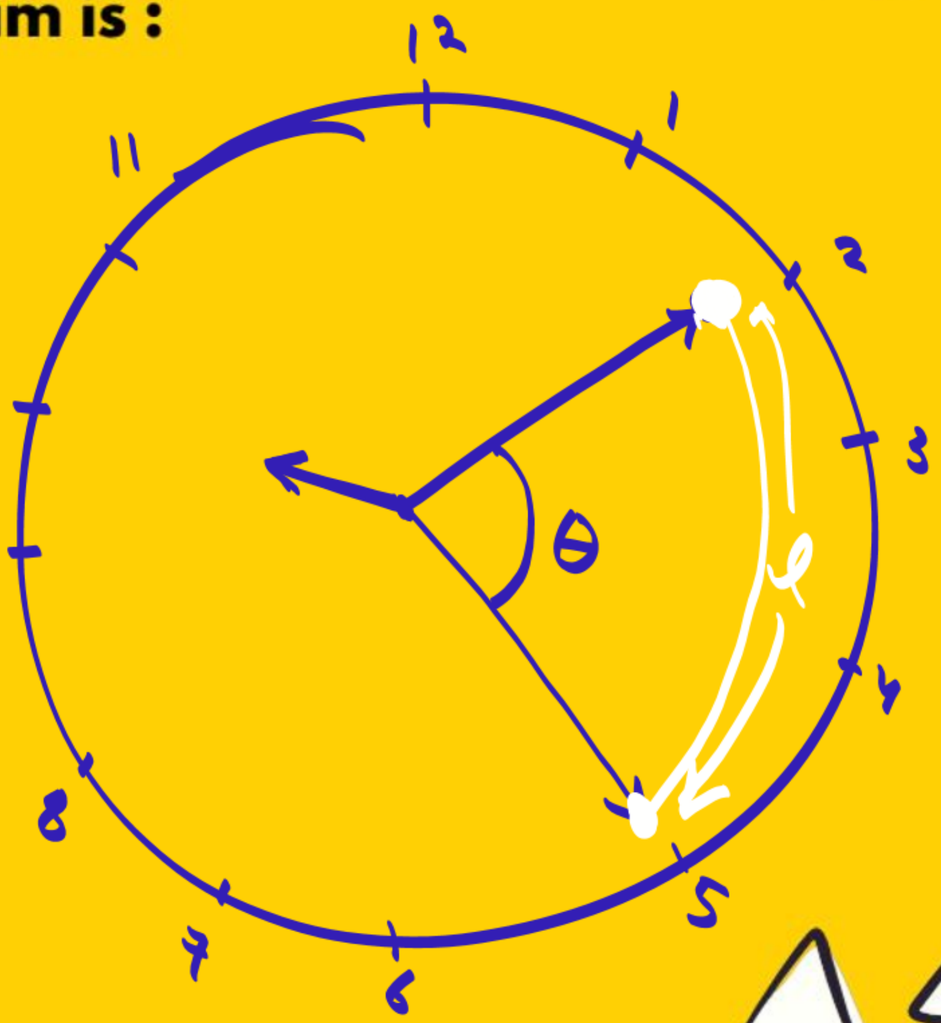
$r = 84\text{cm}$

60 min $\rightarrow 360^\circ$

1 min $\rightarrow \frac{360}{60}$

15 min $\rightarrow 15 \times \frac{360}{60}$

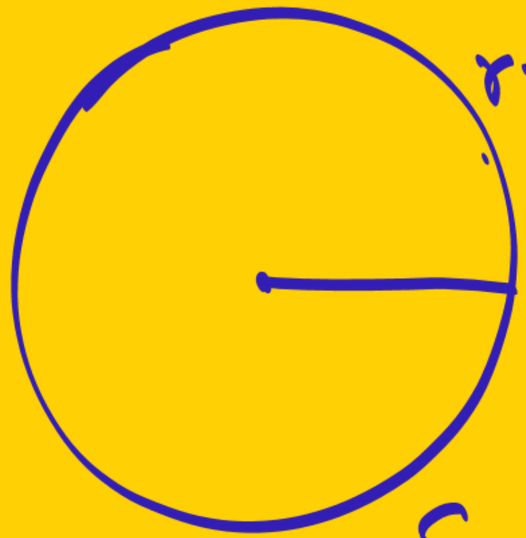
$\theta \Rightarrow 90^\circ$



अभय

ASSERTION : A wire is looped in the form of a circle of radius 28 cm. If it is bent into a form of a square , then the area of the square is 1400 cm^2. F

REASON : Minute hand of a clock describes 360° in 60 minutes . T



r = 28 cm

a =

C = 4a

$2\pi r = 4a$

$2 \times \frac{22}{7} \times 28 = 4a$

$a = 44$

P

Area = a^2

$= 44 \times 44$

$= 1400$

अभय

LP : In figure , is shown a sector OAP of a circle with centre O , containing $\angle\theta$. AB is perpendicular to the radius OA and meets OP produced at B . Prove that the perimeter of shaded region is $r\{\tan\theta + \sec\theta + \pi\theta/180 - 1\}$

Perimeter = AB + PB + AP

$\tan\theta = \frac{P}{B}$

$\tan\theta = \frac{AB}{OA}$

$\tan\theta = \frac{AB}{r}$

$r\tan\theta = AB$

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

$\sec\theta = \frac{OB}{r}$

$\sec\theta = \frac{r + PB}{r}$

$r\sec\theta = r + PB$

$r\sec\theta - r = PB$

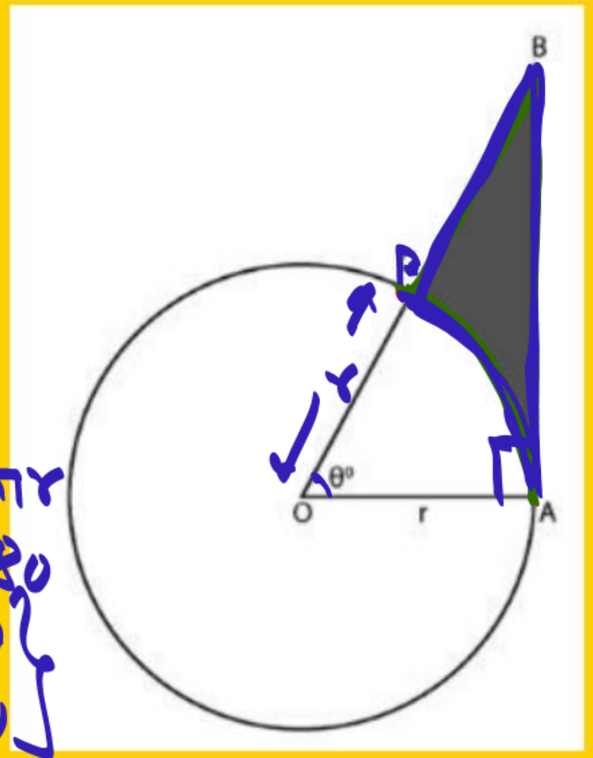
$AP = \frac{\theta}{360} 2\pi r$

$AP = \frac{\theta}{360} 2\pi r$

$\therefore Per = AB + PB + AP$

$= r\tan\theta + r\sec\theta - r + \frac{\theta}{360} 2\pi r$

$\Rightarrow r\{\tan\theta + \sec\theta - 1 + \frac{\pi\theta}{180}\}$

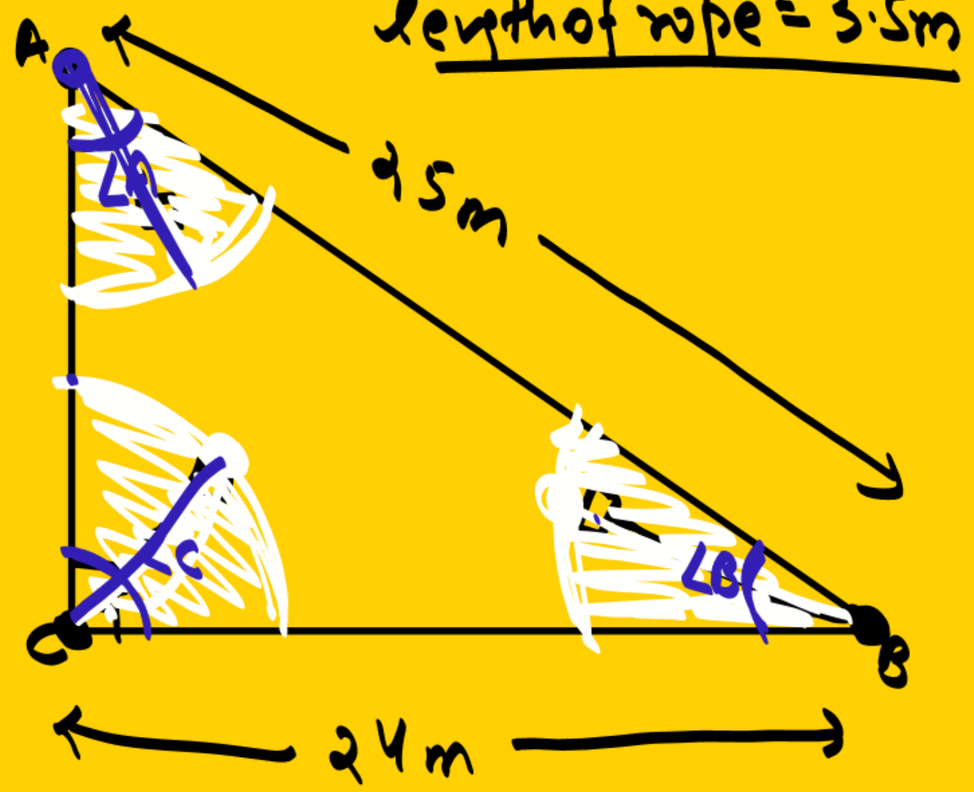


HP

GRAZING

अभय

 # LP : Sides of a right triangular field are 25 m , 24 m and 7 m . At the three corners of the field , a cow , a buffalo and a horse are tied separately with ropes of 3.5 m each to graze in the field . Find the area of the field that cannot be grazed by these animals .



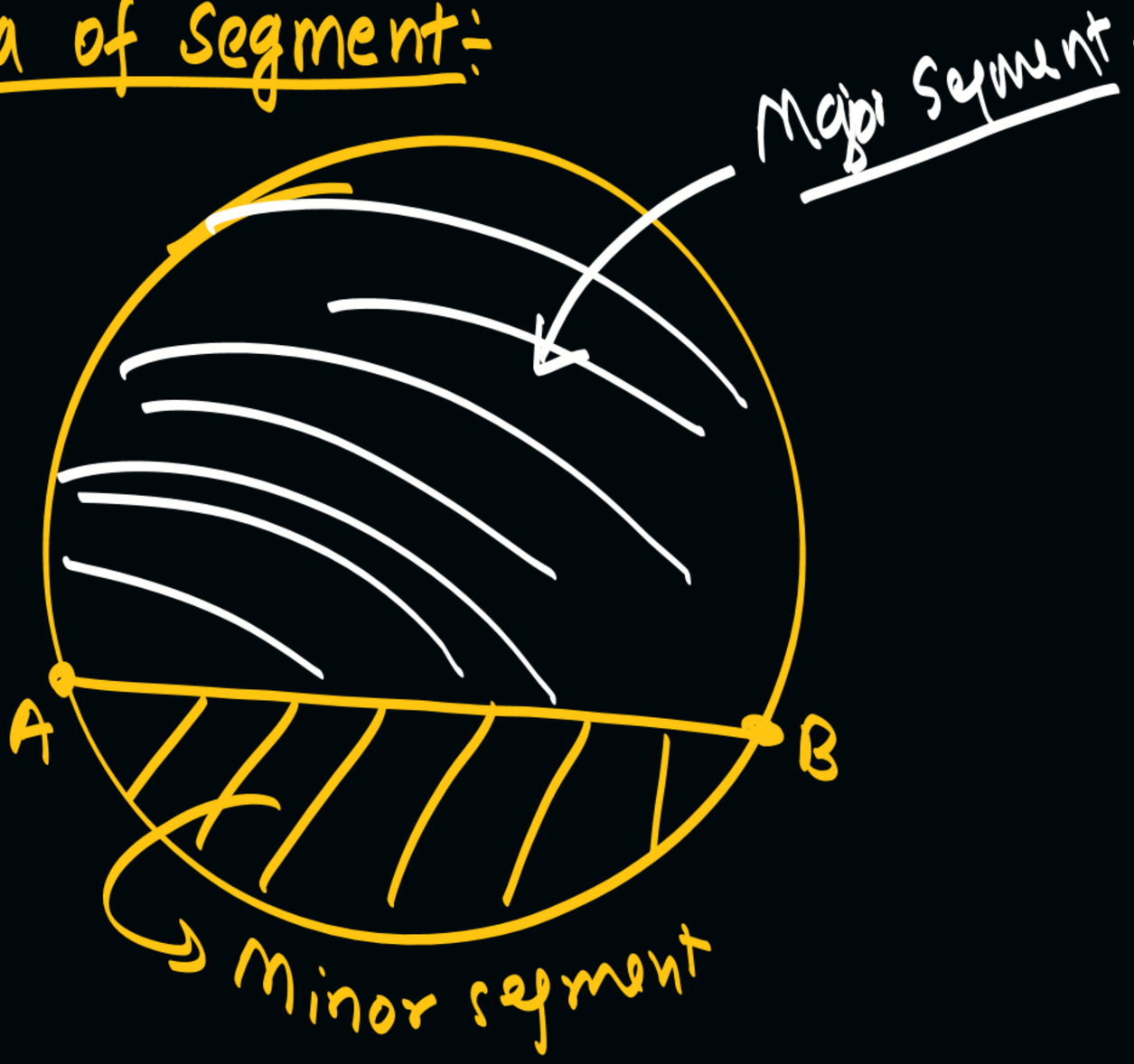
Area not grazed ⇒ Ar. of Δ − { Area grazed by all 3 }

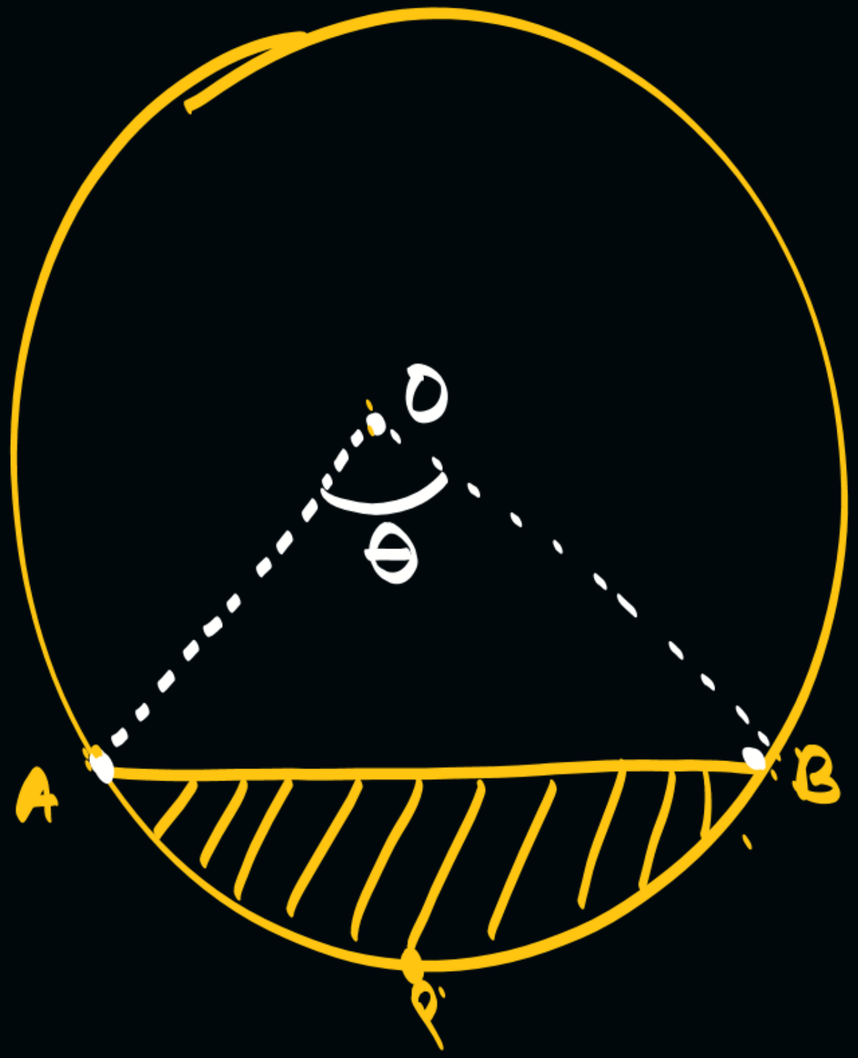
$= \frac{1}{2} \times 24 \times 7 - \left\{ \frac{\angle A}{360} \pi (3.5)^2 + \frac{\angle C}{360} \pi (3.5)^2 + \frac{\angle B}{360} \pi (3.5)^2 \right\}$

$\Rightarrow 12 \times 7 - \frac{\pi (3.5)^2}{360} \{ \angle A + \angle B + \angle C \}$

$\Rightarrow 12 \times 7 - \frac{\pi (3.5)^2}{360} (180)$ { ∵ Δ is right }

Area of segment:-





Area segment (APB)

= Ar sector (OAPB) − Ar(ΔOAB)

[Ar. of Major segment =

= Ar. of circle − Ar of minor segment]

अभय

LP : A chord AB of a circle of radius 10 cm makes a right angle at the centre of the circle . Find the area of the major and minor segment . (pi = 3.14)

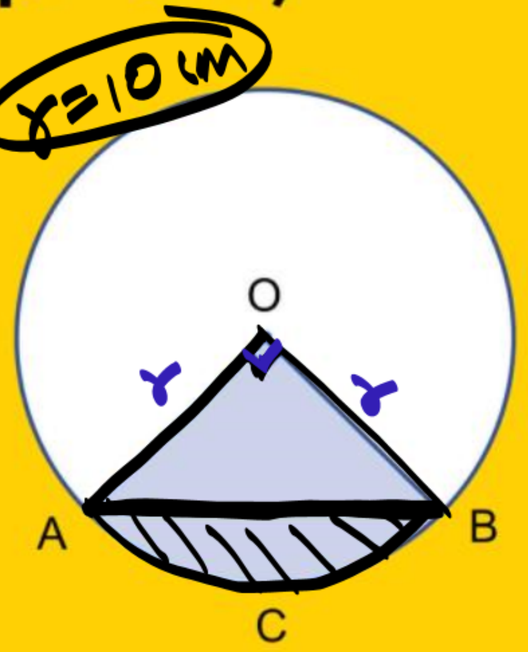
(i) Ar. of Minor segment ⇒ Ar of sector - Ar. of Δ

⇒ $\left[\frac{90}{360}(3.14)(10)^2\right] - \left[\frac{1}{2}\times(10)\times(10)\right]$

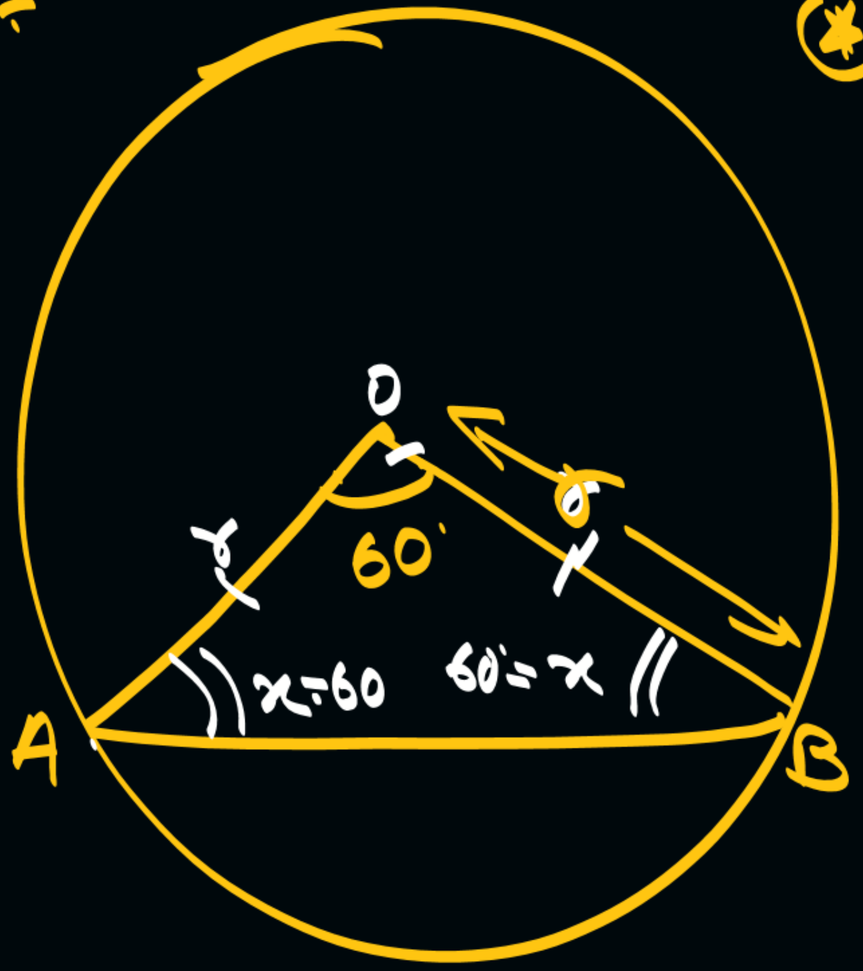
⇒ 28.5 cm²

(ii) Ar. of Major Seg ⇒ Ar. of circle - Ar. of Minor seg

⇒ $(\pi r^2) - [$ ——— $]$



Ar. of Δ :-



* [if right angle Δ]

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

* [if 60°]

$x + x + 60 = 180$

$2x + 60 = 180$

$2x = 180 - 60$

$2x = 120$

$x = 60$

Equilateral Δ → $A = \frac{\sqrt{3}}{4} a^2$ → side of Δ

⊛ Any Random angle :- (r = 10cm)

θ → 120°

Ar. Δ = $\frac{1}{2}$ × b × h

Ar. Δ ⇒ $\frac{1}{2}$ × AB × OP

In ΔOPA & ΔOPB

∠OPA = ∠OPB (both 90°)

OA = OB (both r)

OP = OP (common)

RHS ⇒ ΔOPA ≅ ΔOPB

∠1 = ∠2 (by cpct)

AP = PB (by cpct)

$\cos 60° = \frac{P}{H}$

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

OP = 5cm

$\sin 60° = \frac{P}{H}$

$\frac{\sqrt{3}}{2} = \frac{AP}{10}$ ⇒ AP = 5√3

AB = 2 × 5√3 = 10√3

HW

अभय

[illegible] : Find the area of the segment of circle , given that the angle of the sector is 120° and the radius of the circle is 21 cm . Take pi = 22/7

HW → Revise formulaes of S.A. & V Chapter

THANK YOU COODIES