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PRAYAS

JEE 2025

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Lecture - 2

Physics

Ray Optics

By- Saleem Ahmed Sir

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Topics to be covered

1. Plane Mirror
2. Spherical Mirror (Introduction)
3.
4.

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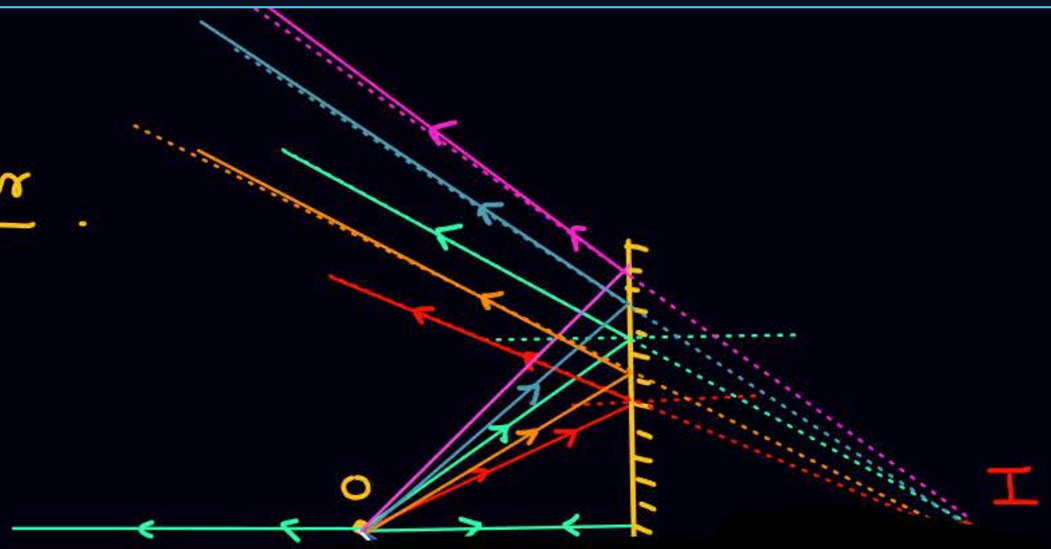
Plane Mirror



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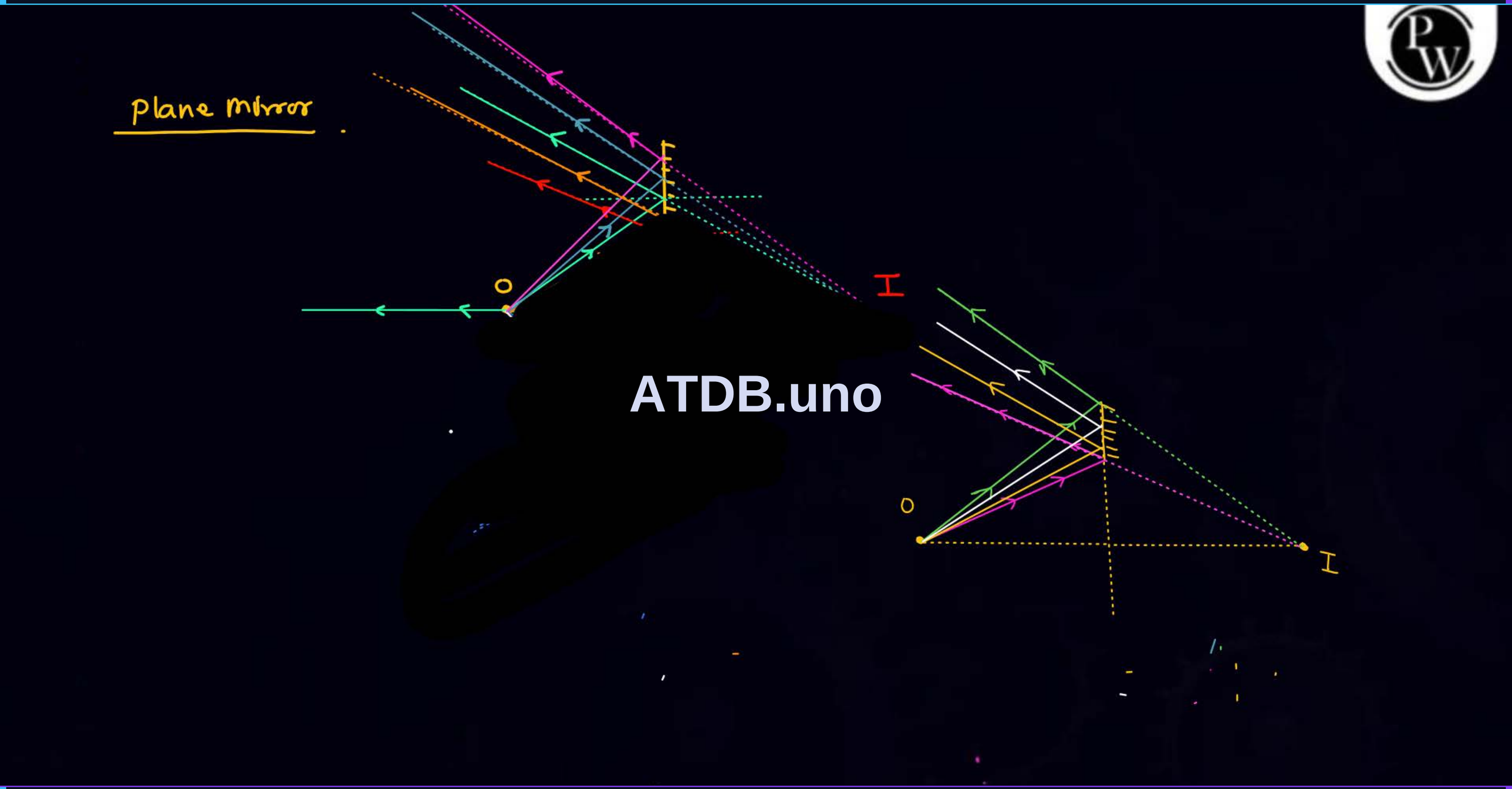

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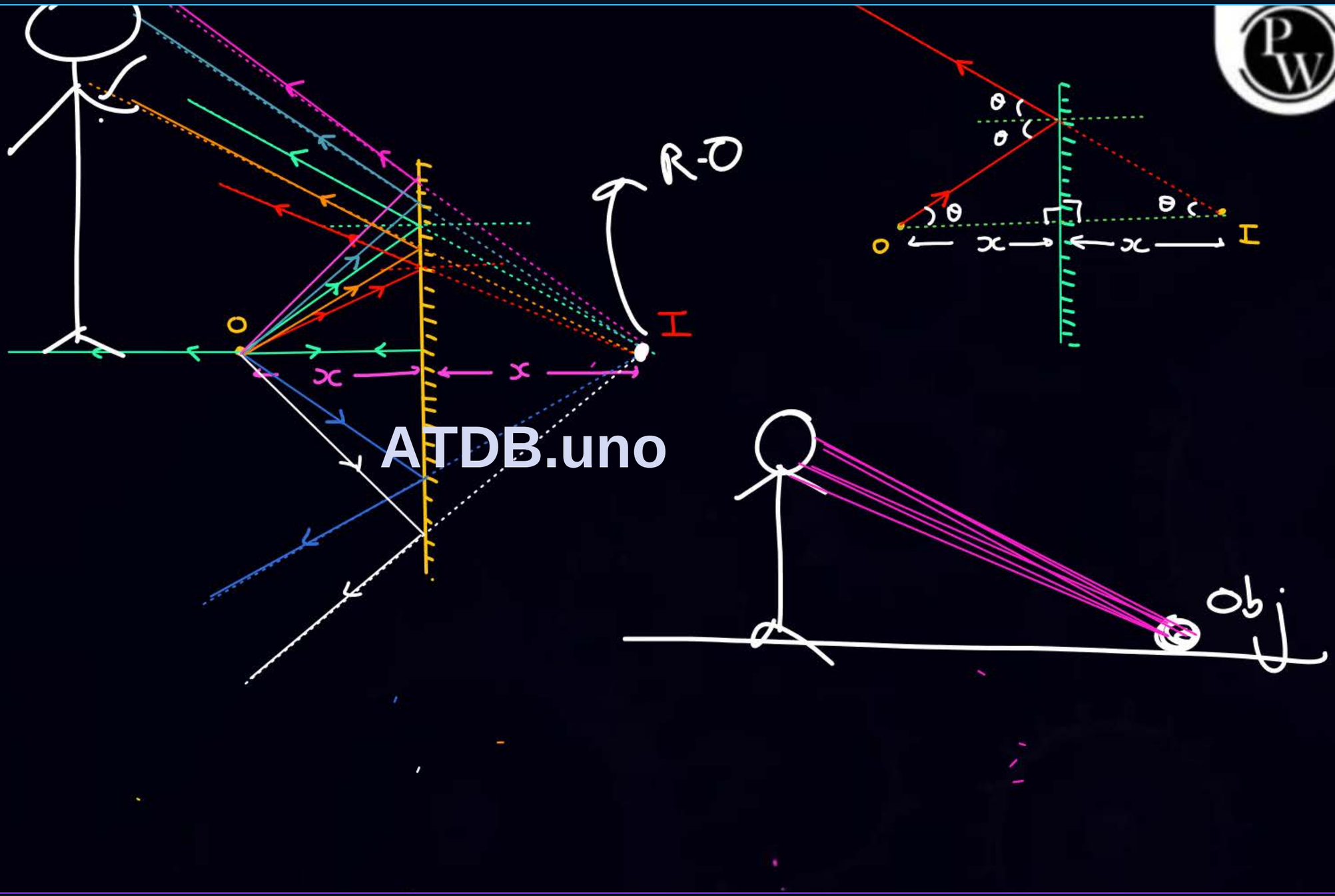

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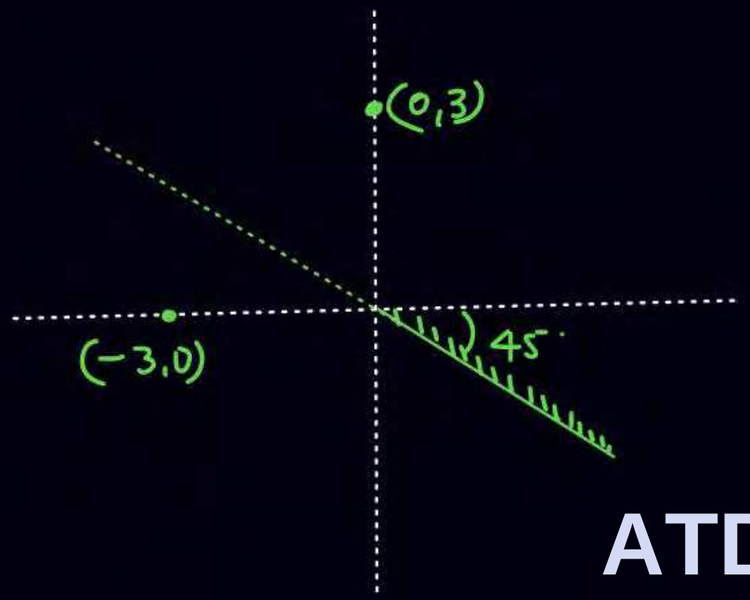

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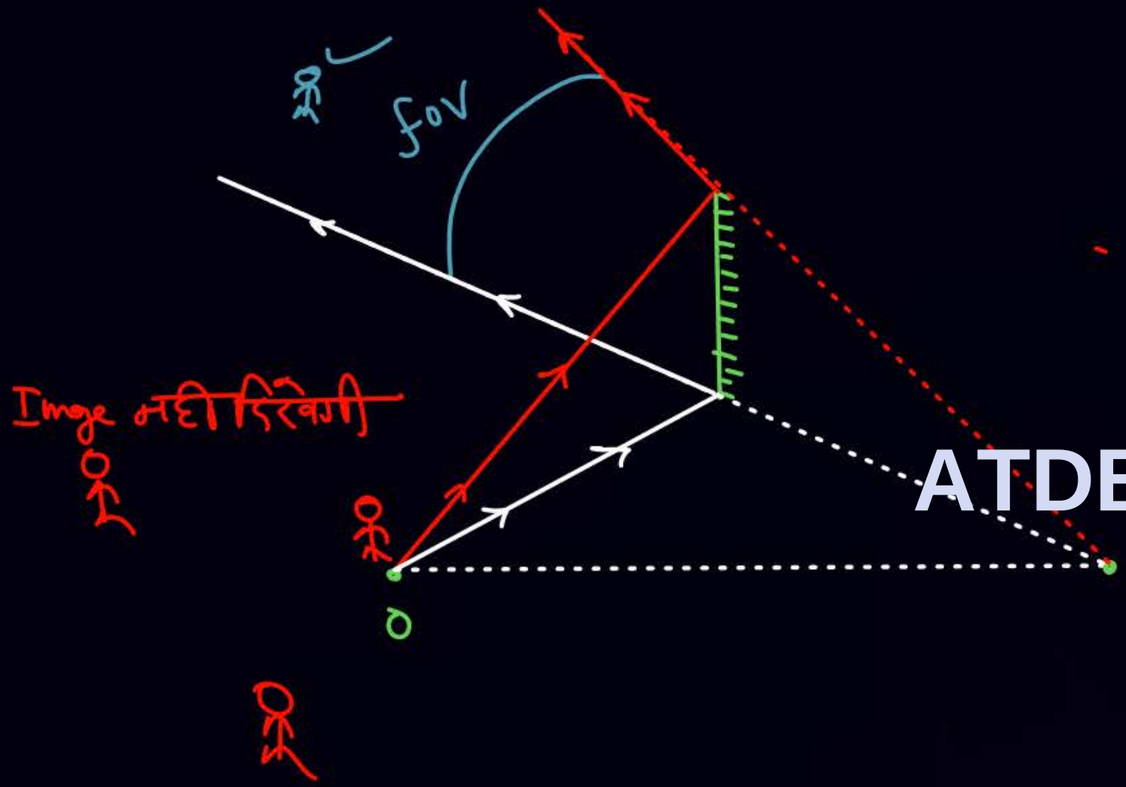
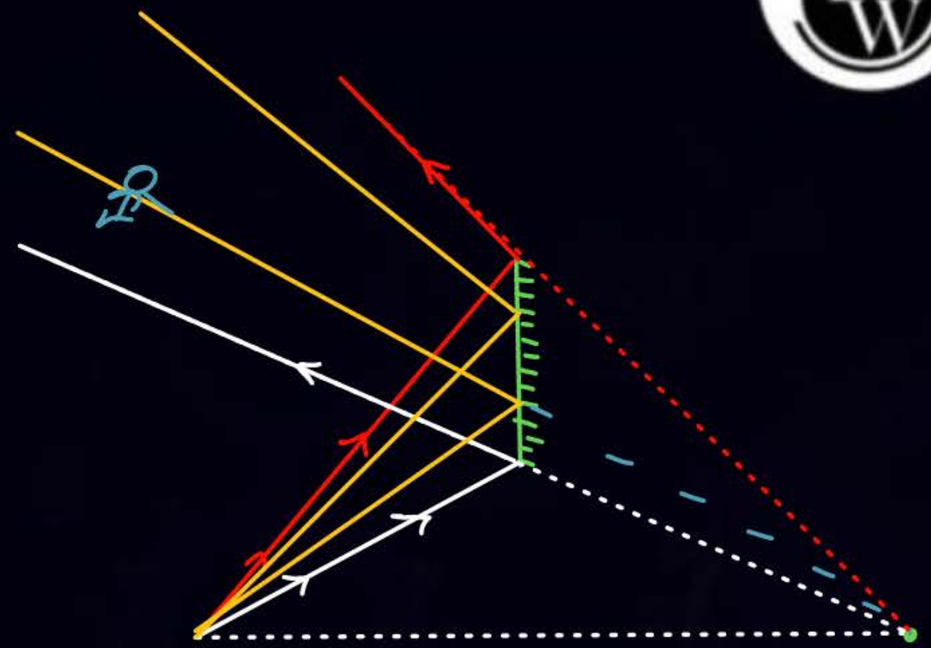
FOV (Field of View) (Image)





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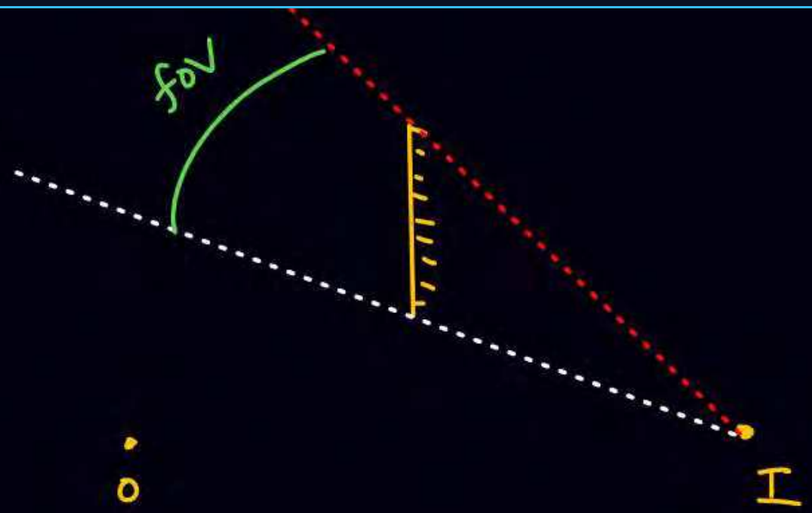

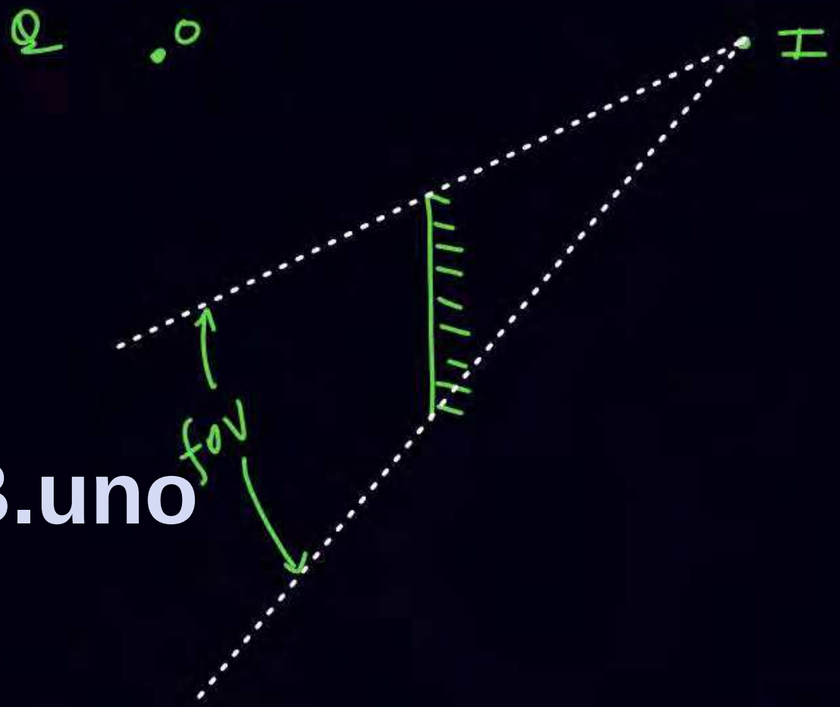

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Q

find the time interval in which man can see image of obj 'o' inside mirror.

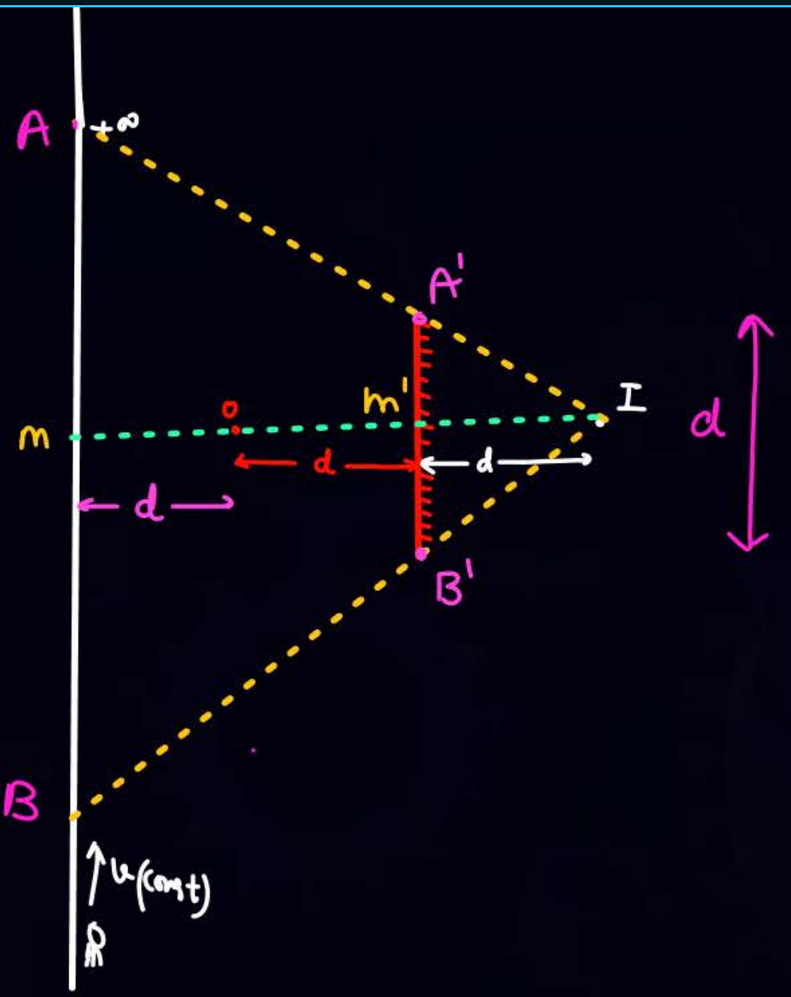
$$A_w = \frac{AB}{v} = \frac{3d}{v}$$

$\Delta IAB \sim \Delta IA'B'$

$$\frac{AB}{A'B'} = \frac{mI}{m'I}$$

$$\frac{AB}{d} = \frac{3d}{d}$$

$$AB = 3d$$



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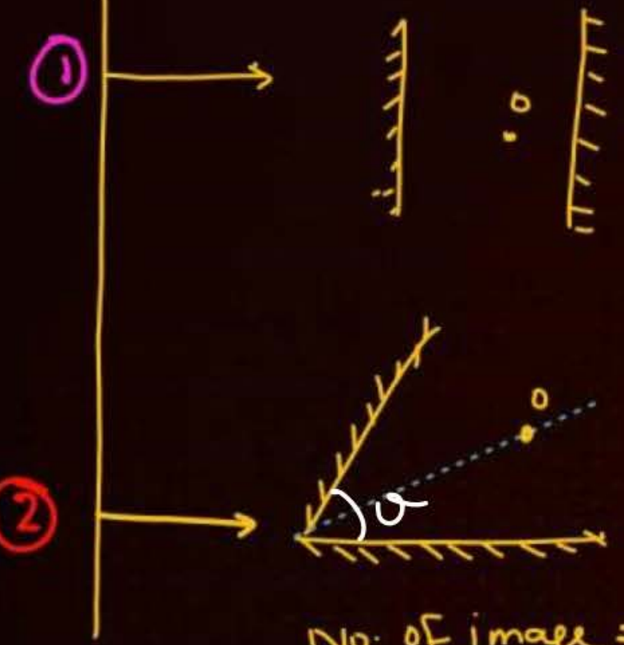
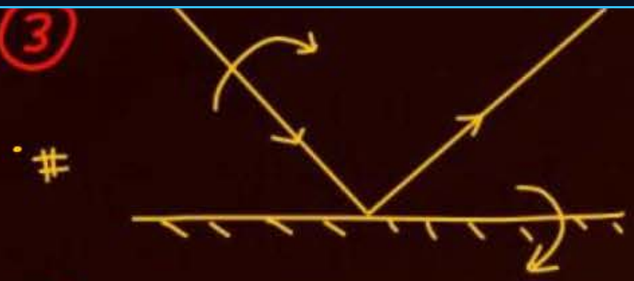
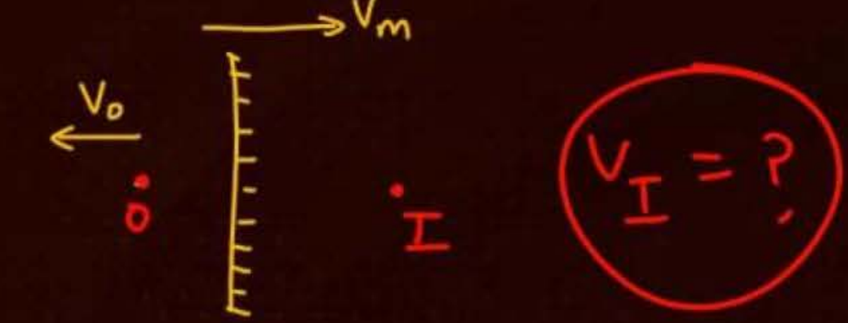
Plane Mirror



Location of image
Complete





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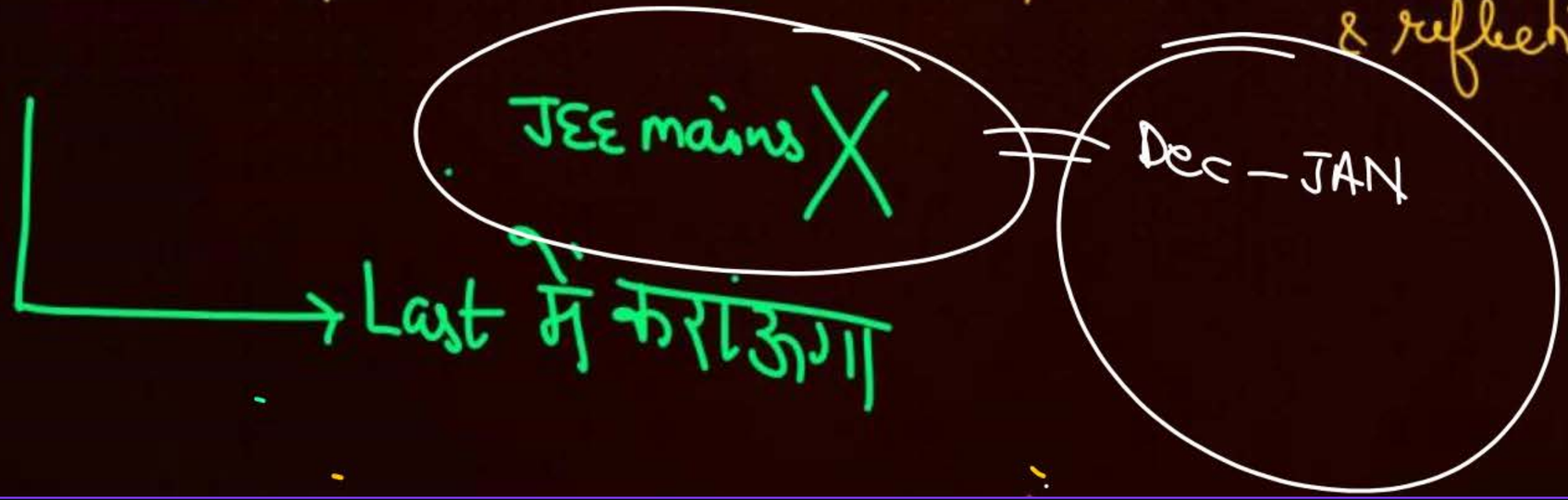
5 - Ques practice on plane mirror & reflection



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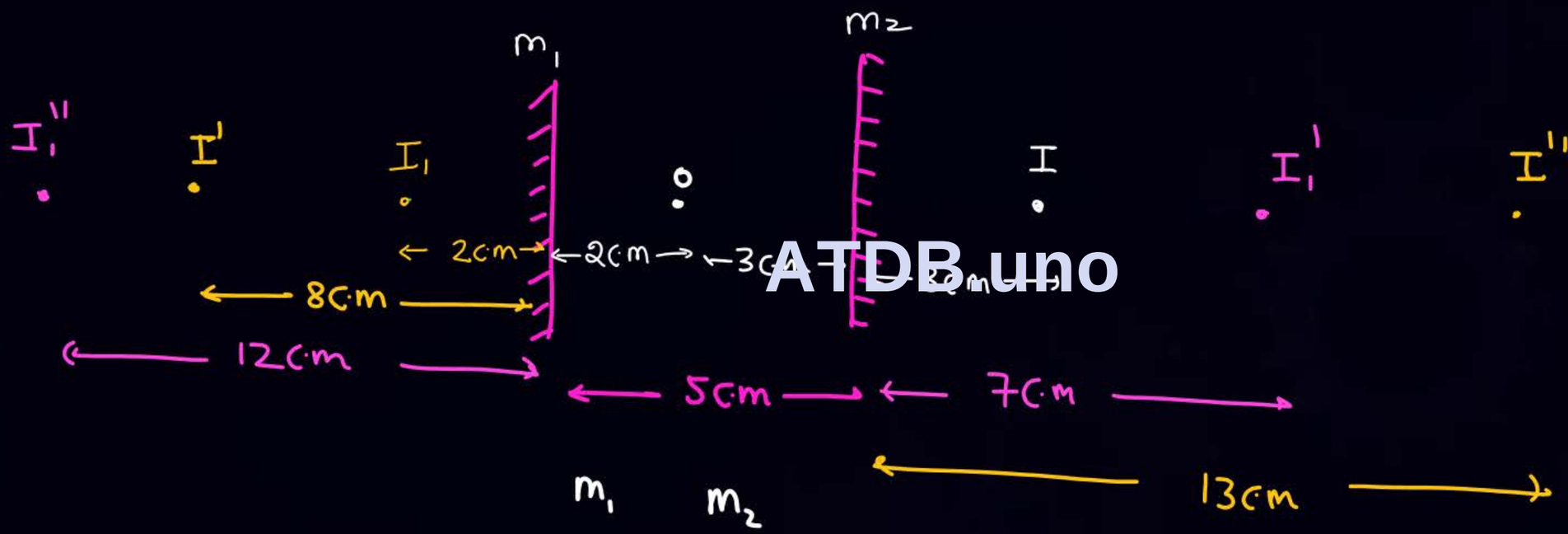
Location of image when plane mirror are parallel

∞ images



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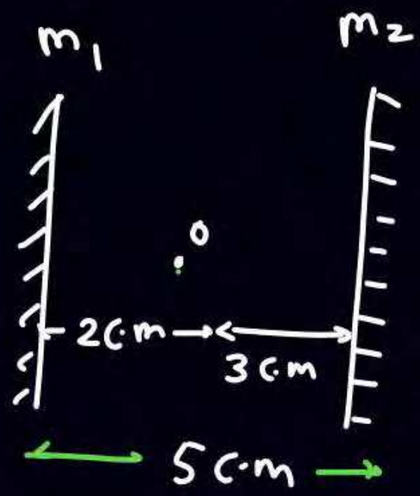

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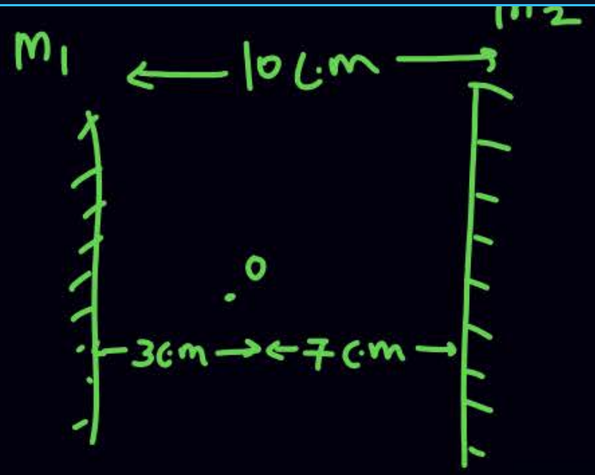

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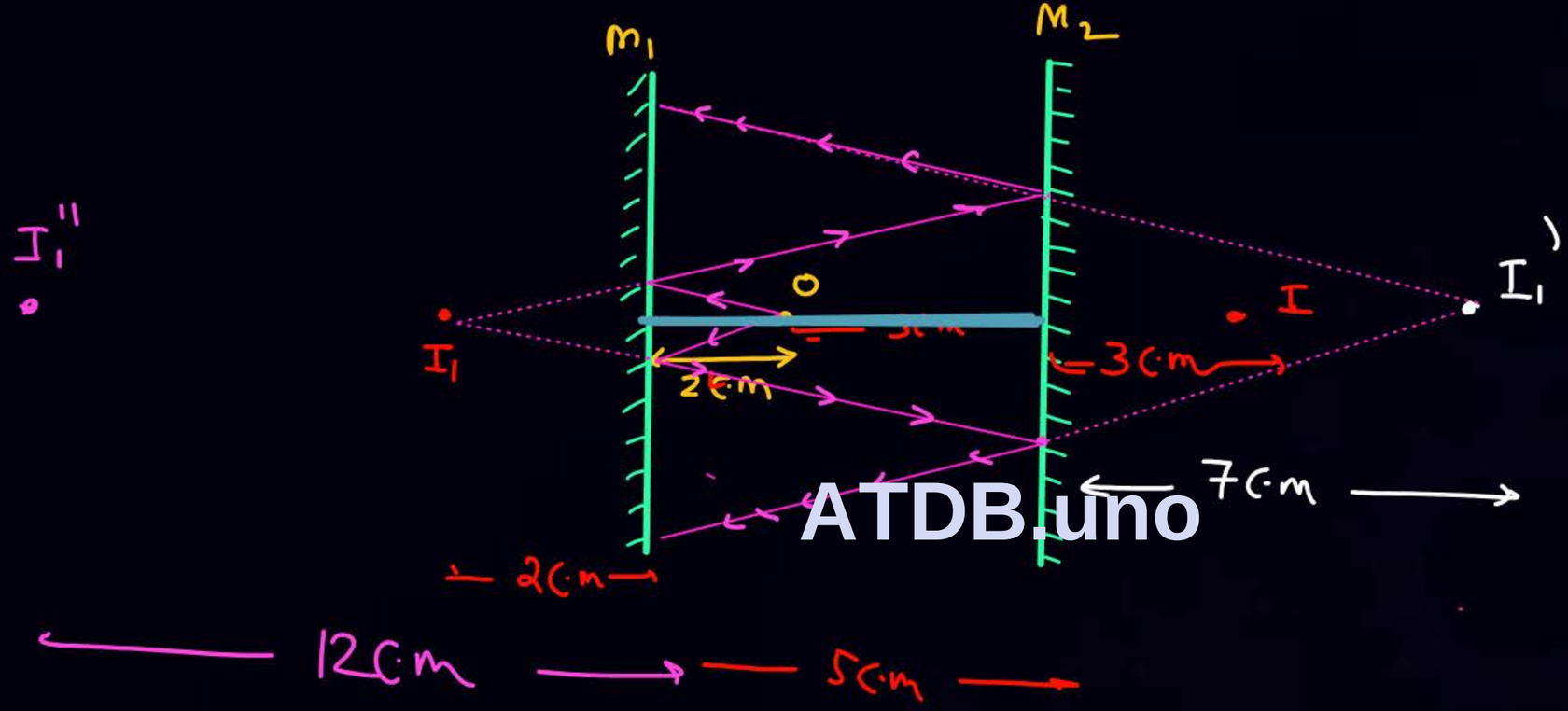

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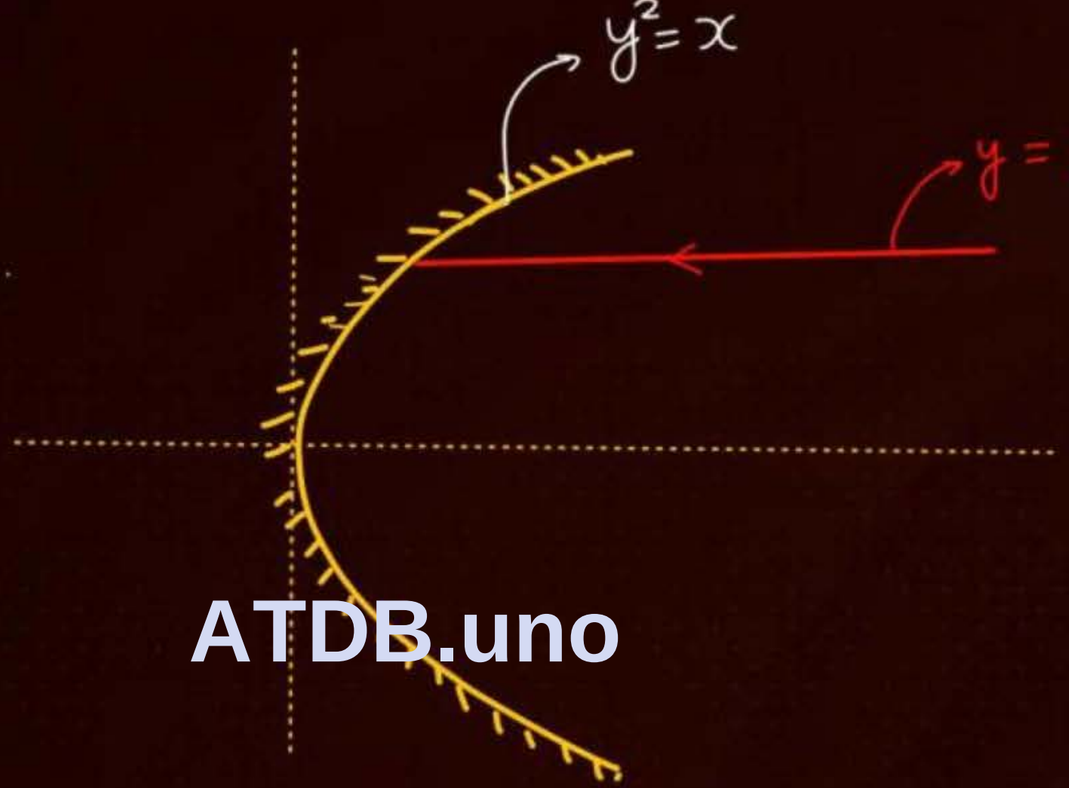
Q

Find δ_{net} aftr all possible reflection.



Soln

[redacted]

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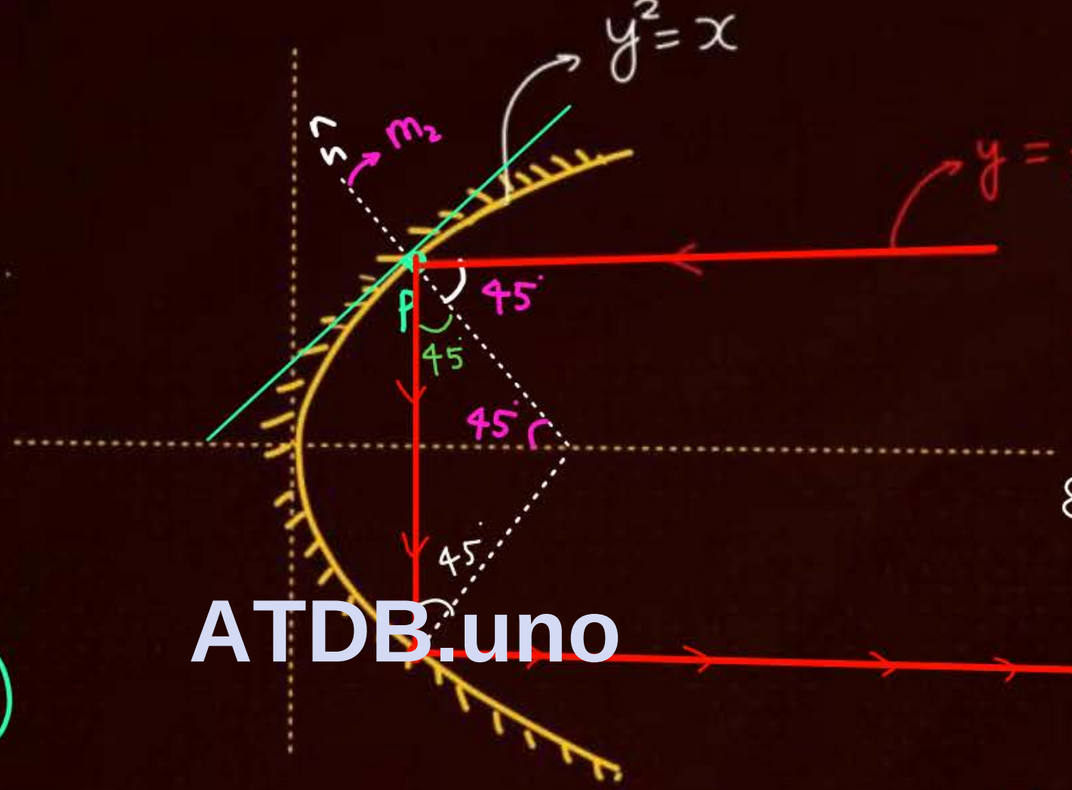
(*) Q

Find δ_{net} after all possible reflection.



Soln $y^2 = x$

$2y\frac{dy}{dx} = 1$

$\frac{dy}{dx} = \frac{1}{2y}$ $\left(y = \frac{1}{2}\right)$

$\left(\frac{dy}{dx}\right)_{at\ 'P'} = \frac{1}{2\times\frac{1}{2}} = 1 = m_1$

$\theta = 45°$

$m_1 m_2 = -1$

$1 \times m_2 = -1$

$m_2 = -1$

$\delta_{net} = 180$

$\delta_{net} = \delta_1 + \delta_2$

$= (180 - 2\times 45) + (180 - 2\times 45)$

$= 180°$

$m_2 = -1 \Rightarrow \angle i = 45°$

$\angle r = 45°$

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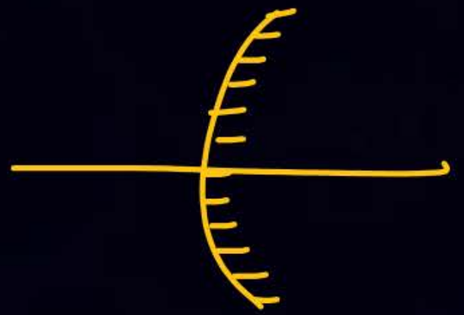
Spherical mirror.

- Concave mirror
- Convex mirror

Concave mirror

Convex mirror.



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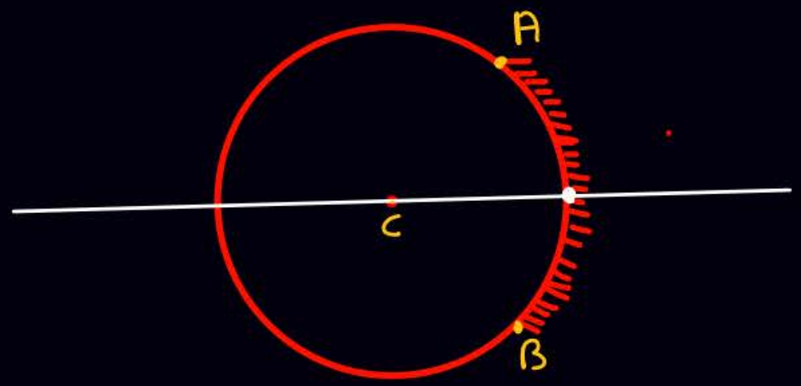
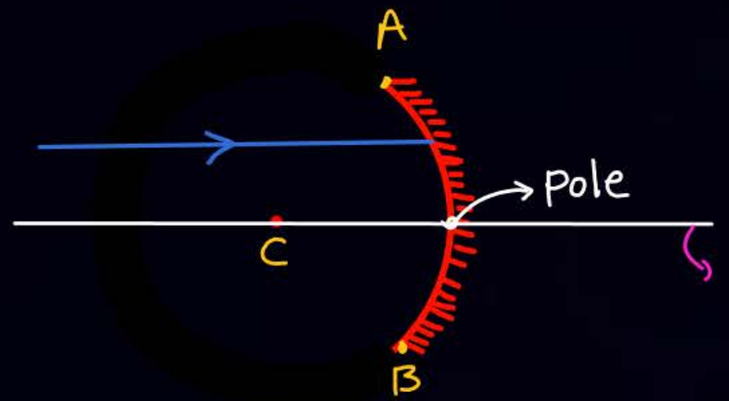


concave mirror



C → center of curvature.

↳ Principle Axis (PA)

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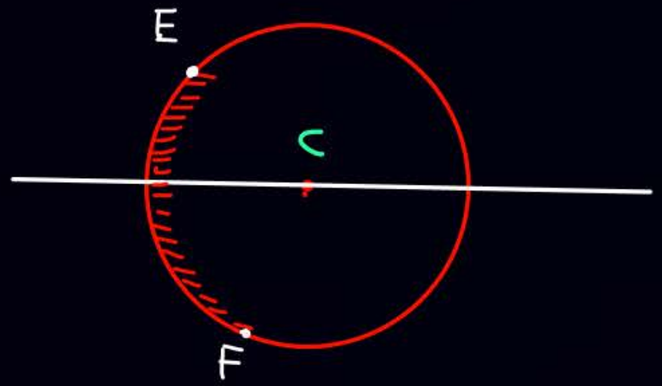

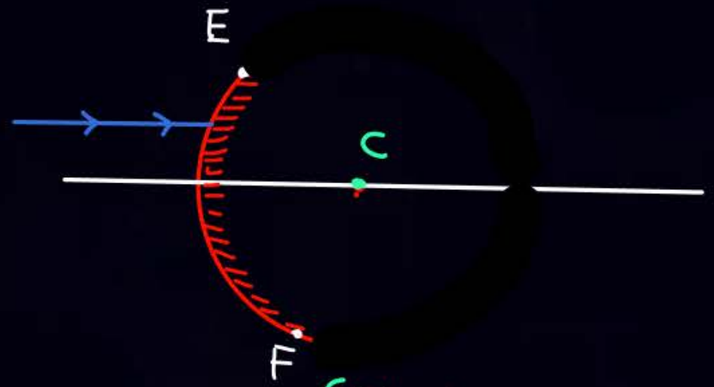

Convex mirror

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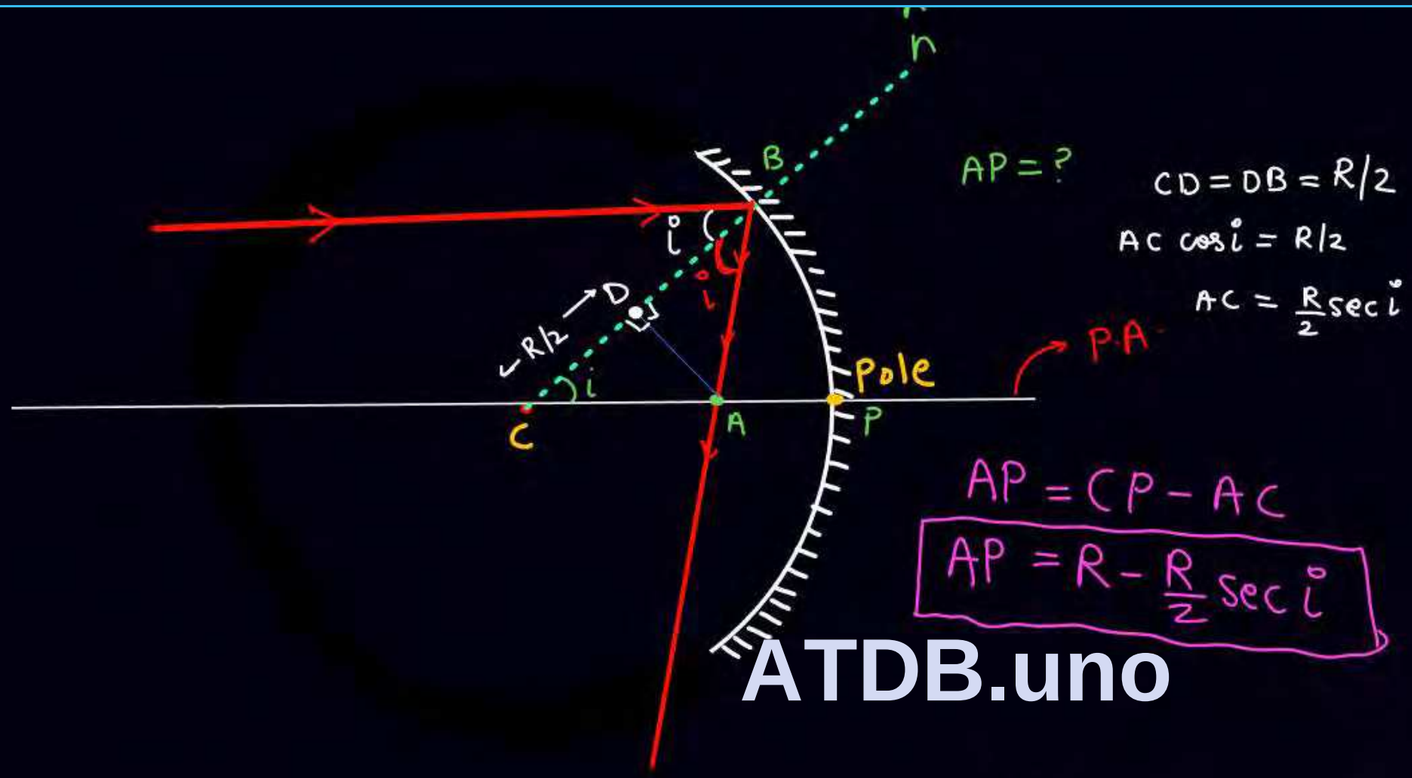


AP = ?

CD = DB = R/2

AC cos i = R/2

AC = $\frac{R}{2}$ sec i

AP = CP − AC

$\boxed{AP = R - \frac{R}{2}\sec i}$

(Paraxial rays)

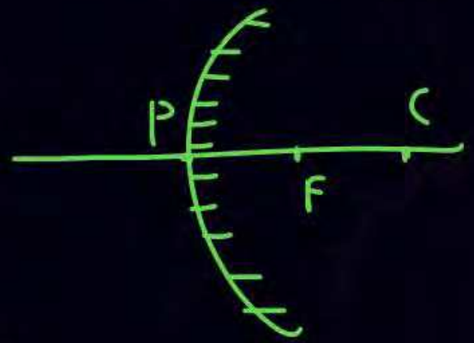
If ∠i is very very small

cos i ⟶ 1

AP ≃ R − $\frac{R}{2}$ × 1

$\boxed{AP = R/2}$

A ⟶ focus (F)



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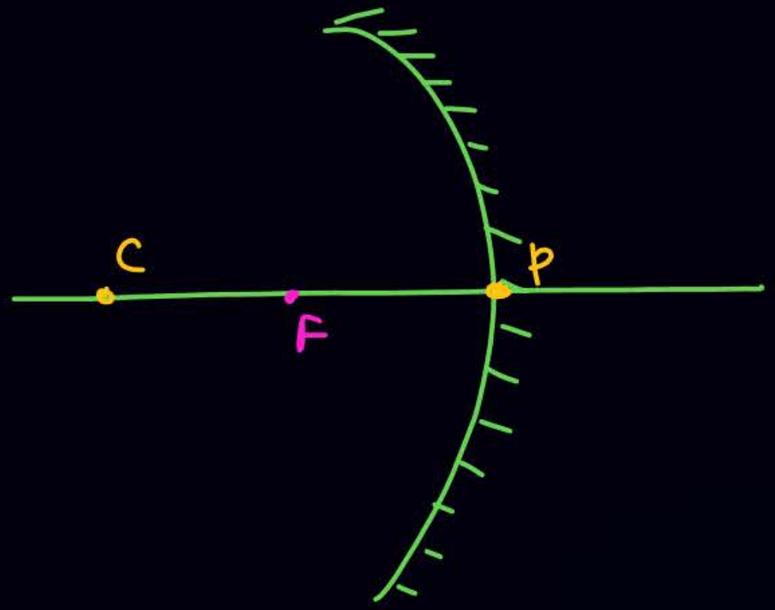

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FP → focal length = R/2

↳ Dist. b/w focus & pole

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

Mirror formula

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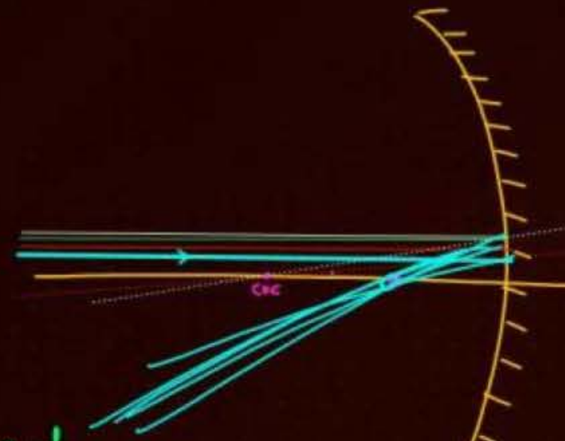
paraxial rays

- small aperture.
- $\angle i$ ⟶ very very small
- which are very close to PA
- If rays are parallel to PA & paraxial they they intersect the P.A. at a common point called focus.



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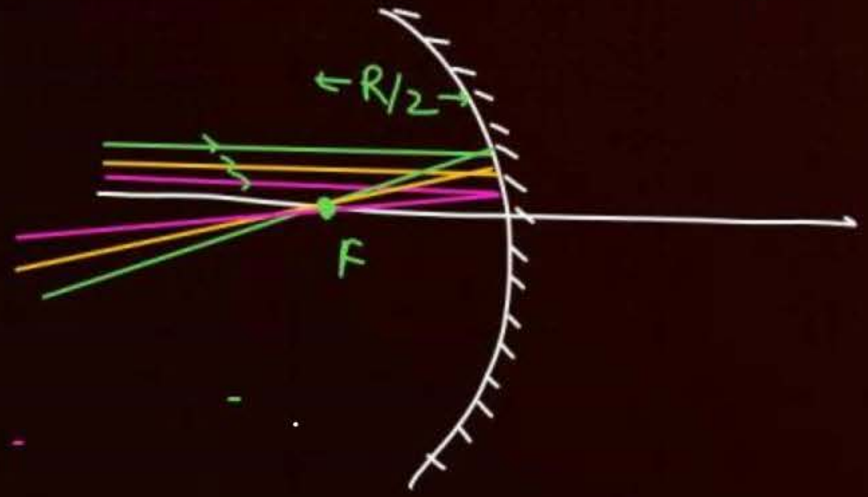

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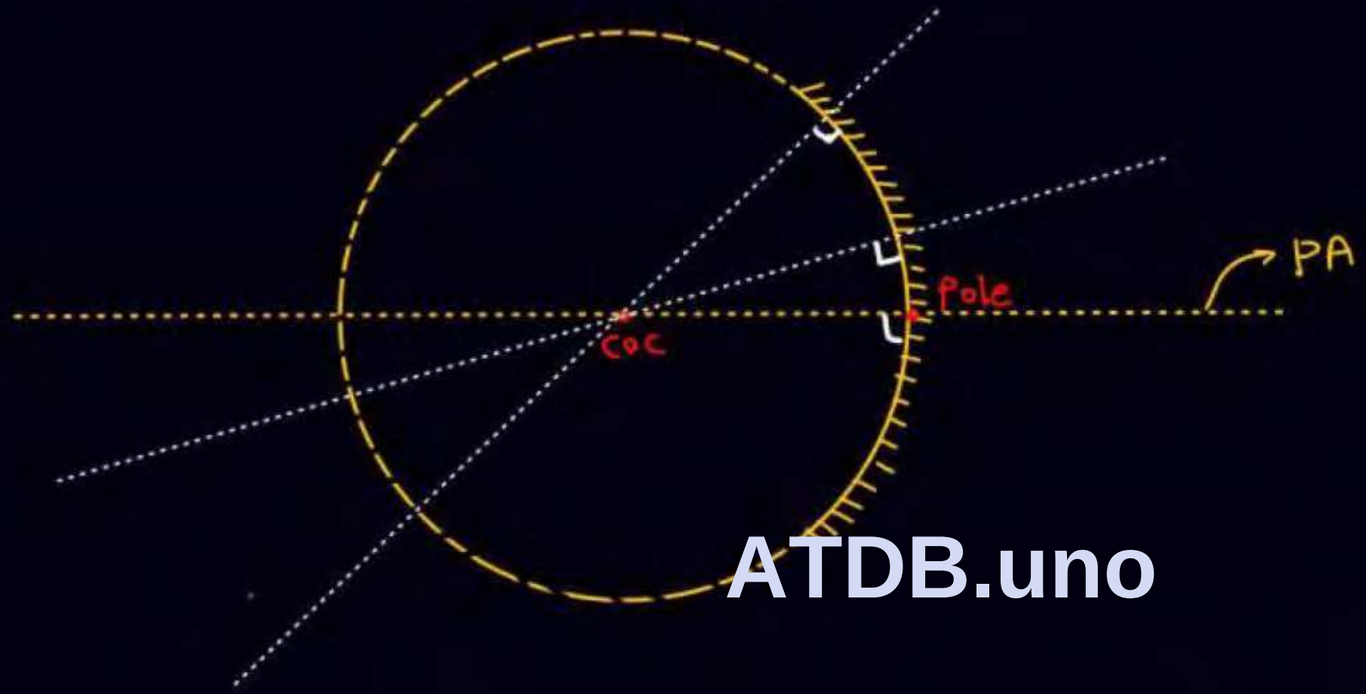

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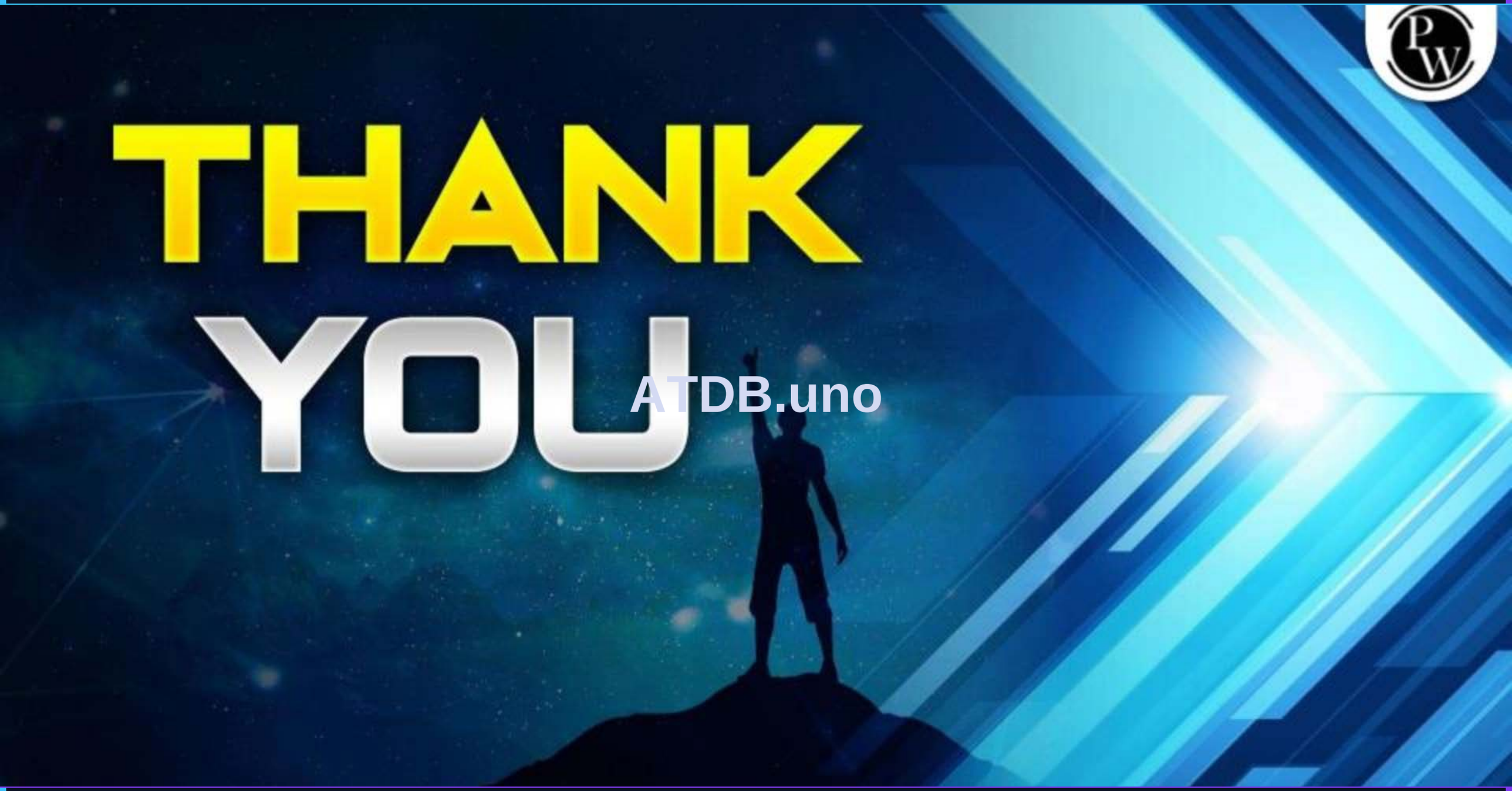

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