Revision Booster
WORKSHOP
for
NEET & JEE Main

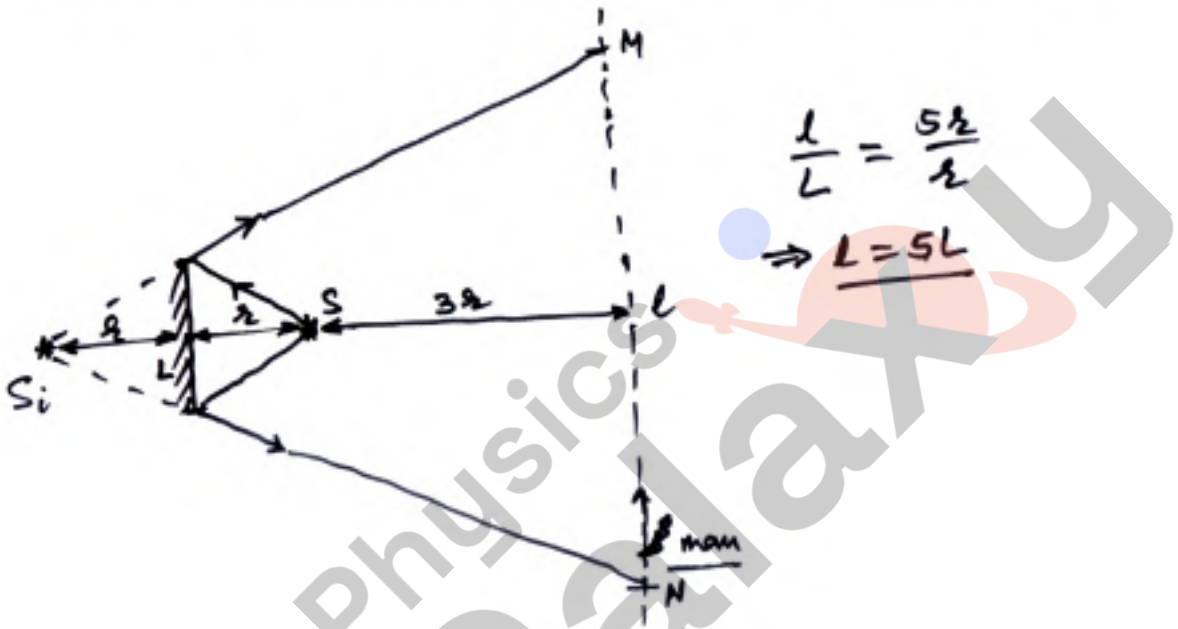
Ray Optics

Notes of Revision Booster Workshop for JEE Main & NEET

9000+ Classes available on PHYSICS GALAXY Mobile app

QUESTIONS BASED ON

A MAN WALKING IN FRONT OF A PLANE MIRROR

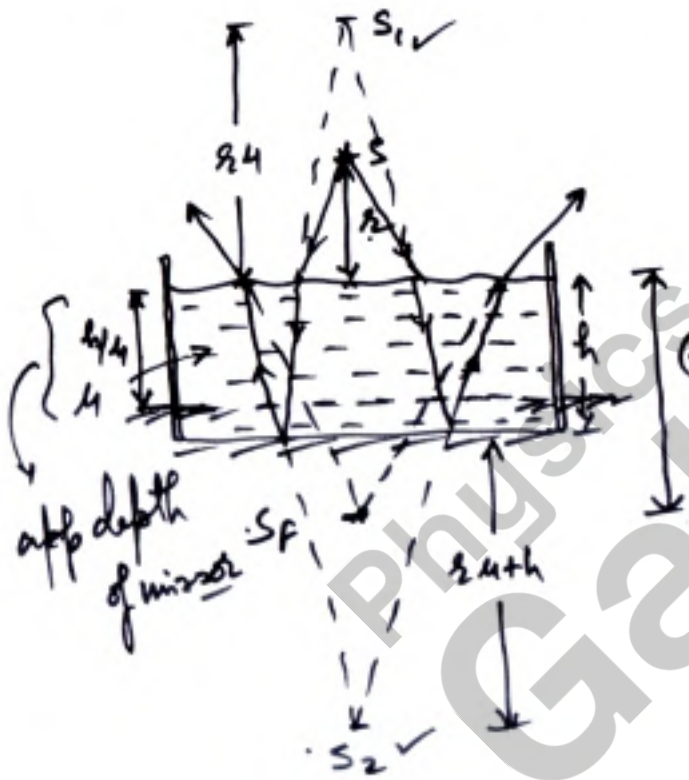


$$\frac{l}{L} = \frac{5x}{x}$$

$$\Rightarrow L = 5l$$

QUESTIONS BASED ON

MIRROR PLACED INSIDE A LIQUID



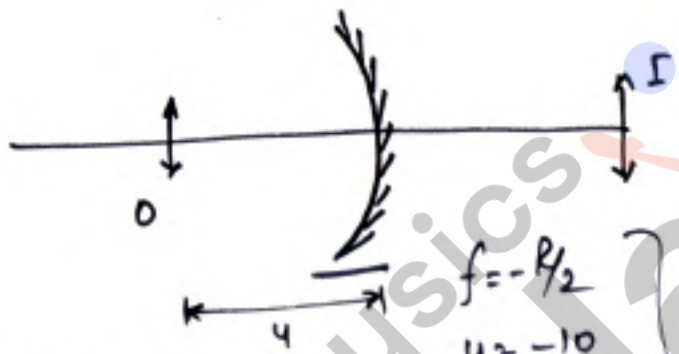
distance between S & S_F' = $(R+h/\mu)2$

$+R$

$\frac{(R\mu+h)+h}{\mu} = \left(R+\frac{2h}{\mu}\right)$

QUESTIONS BASED ON

MAN'S FACE IN SHAVING MIRROR



$f = -R/2$

$u = -10$

$v = +25$

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

$R = $ ——

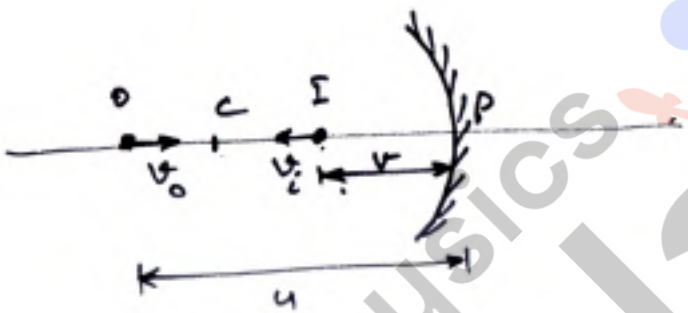
final image at say 25cm.

face is at 10cm from mirror

find R = ?

QUESTIONS BASED ON

RELATIVE SPEED OF IMAGE BY SPHERICAL MIRROR

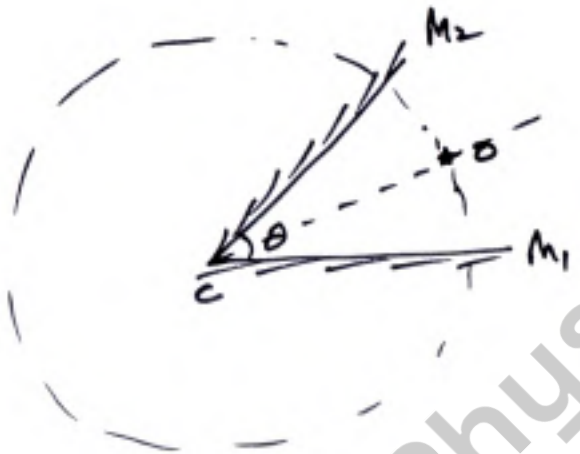


$$\left[v_i = \left(\frac{v^2}{u^2}\right) \cdot v_o \right]$$

$$v_{app} = |v_o| + |v_i|$$

QUESTIONS BASED ON

IMAGE FORMATION BY INCLINED MIRRORS

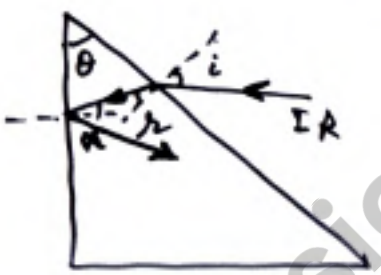


✓ $\frac{180}{\theta} \in I \Rightarrow \left[N = \frac{360}{\theta} - 1\right]$

→ $\frac{180}{\theta} \notin I \longrightarrow N \rightarrow$ Refer Complete video of PG Book vol V

QUESTIONS BASED ON

INTERNAL REFLECTION BY A PRISM



$\sin i_0 = \mu \sin r$

$\alpha > \sin^{-1}\left(\frac{1}{\mu}\right)$

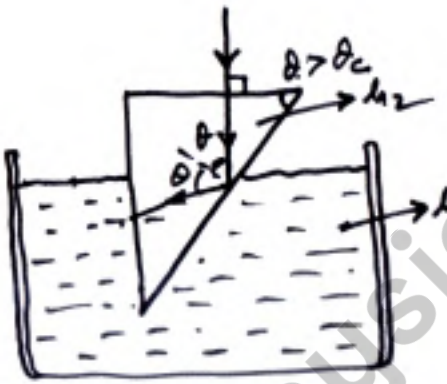
$\theta = r + \alpha$

$r = \theta - \sin^{-1}\left(\frac{1}{\mu}\right)$

for all $i < i_0$ light ray will be internally reflected from vertical face

QUESTIONS BASED ON

INTERNAL REFLECTION FROM A PRISM PARTIALLY INVERSED IN WATER

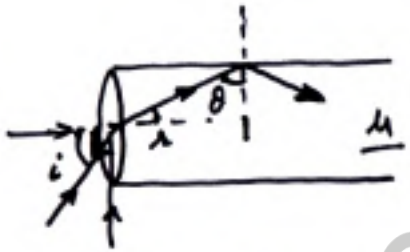


$$\mu_2 \sin\theta_c = \mu_1$$

$$\theta_c = \sin^{-1}\left(\frac{\mu_1}{\mu_2}\right)$$

QUESTIONS BASED ON

CONDITION OF RI FOR AN OPTICAL FIBER OR A ROD



θ is min when r is max $\rightarrow$ $i = 90°$

$\downarrow$

$r_{max} = \theta_c$

$\theta = 90 - \theta_c > \theta_c$ for optical fibers

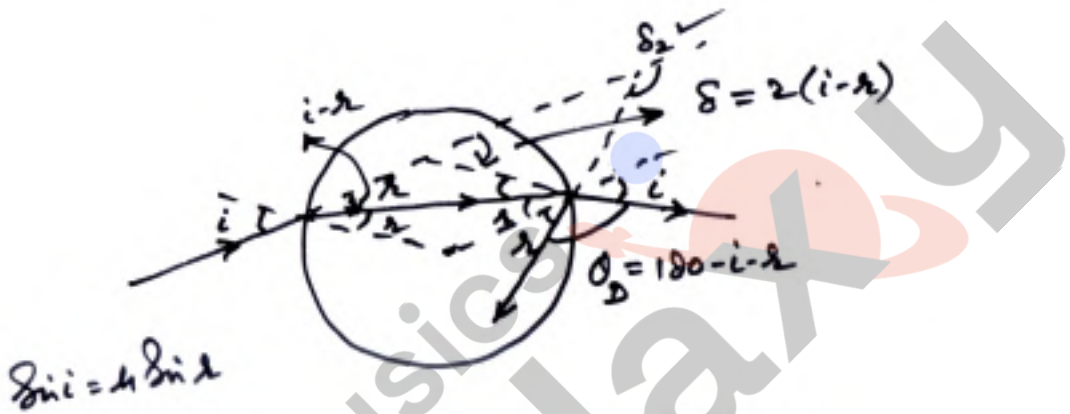
$\Rightarrow$ $\theta_c < 45°$

$\Rightarrow$ $\mu \sin\theta_c = 1 \Rightarrow \mu = \sqrt{2}$

for optical fibers $\mu \geq \sqrt{2}$

QUESTIONS BASED ON

REFRACTION FROM A SPHERE



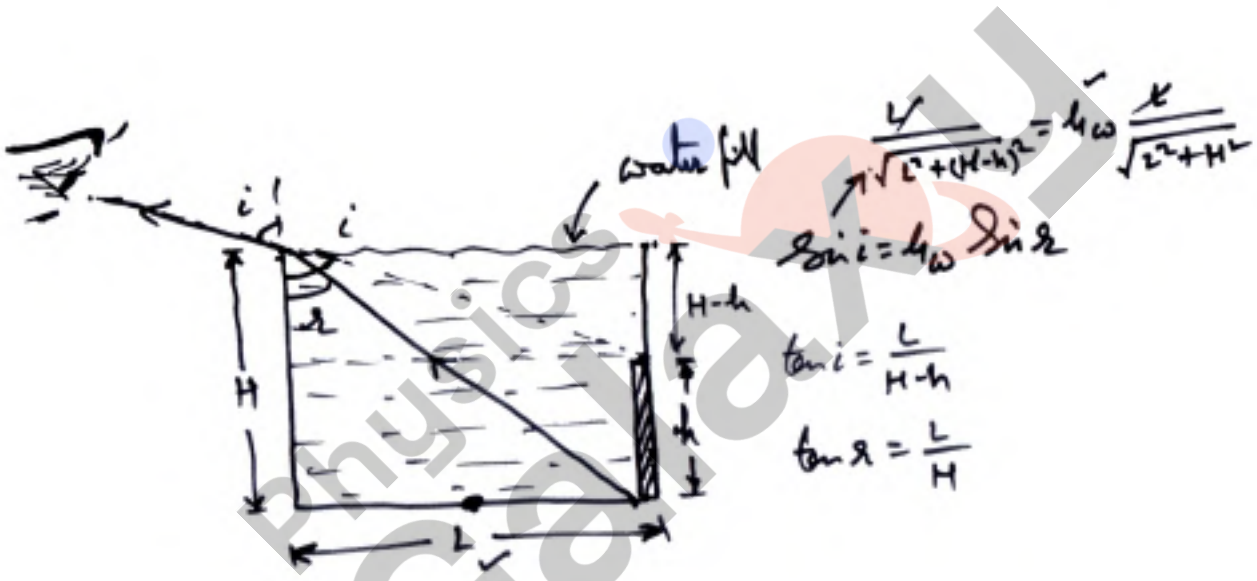
$\sin i = \mu \sin r$

Total deviation of internally reflected ray

$\delta_2 = (i-r)+(\pi-2r) = \pi - i - 3r$

QUESTIONS BASED ON

WATER FILLING IN A CONTAINER



QUESTIONS BASED ON

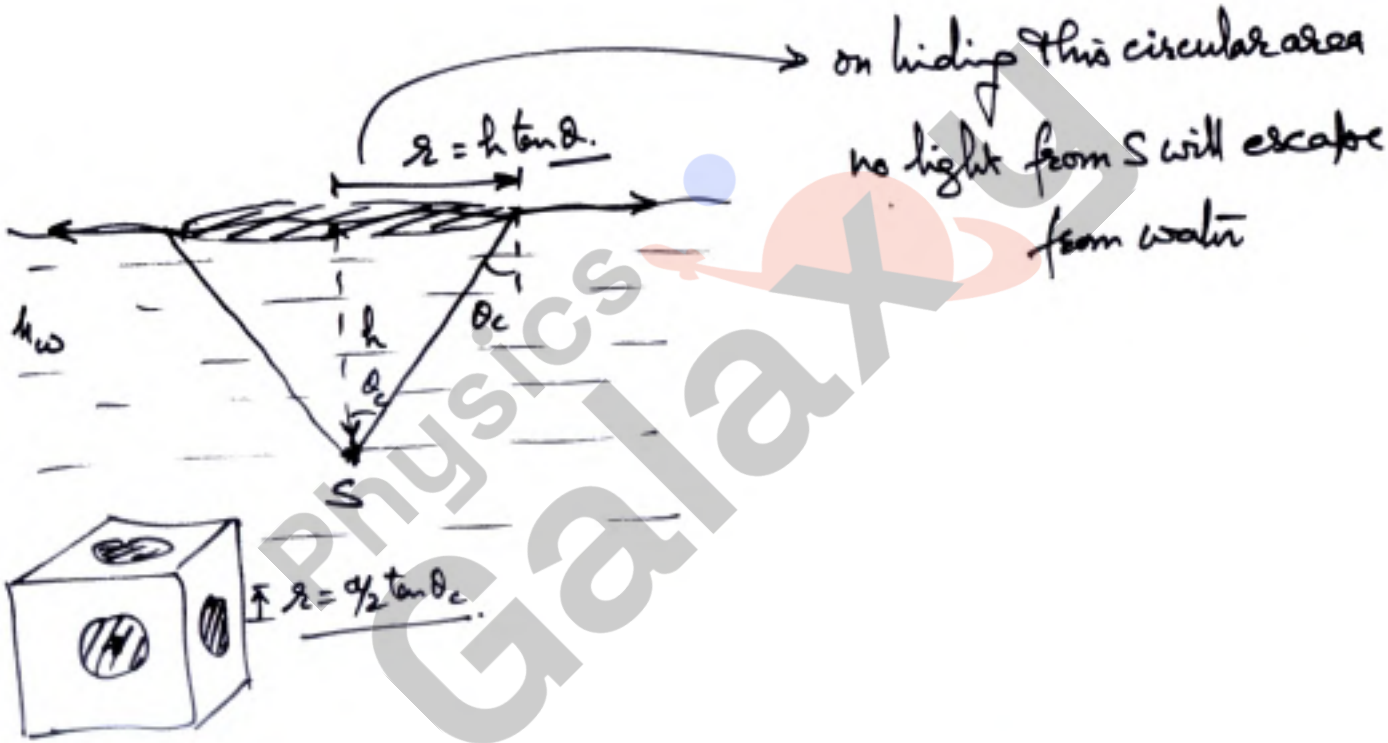
CRITICAL ANGLE IN TERMS OF ϵ_r AND μ_r

R.I of a medium $\mu = \sqrt{\epsilon_r \mu_r}$

$$\theta_c = \sin^{-1}\frac{1}{\sqrt{\epsilon_r \mu_r}}$$

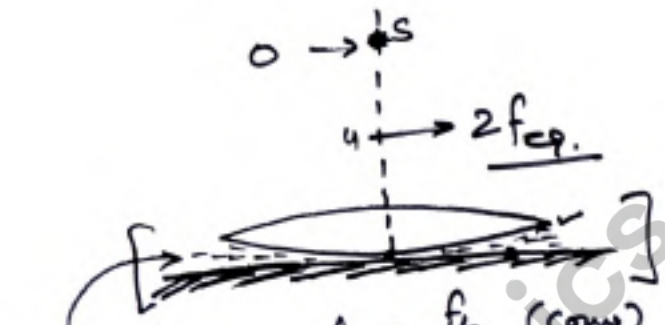
QUESTIONS BASED ON

LIGHT SOURCE INSIDE WATER



QUESTIONS BASED ON

LENS PLACED ON A MIRROR



$f_{eq} = \frac{f_L}{2}$ (conv.)

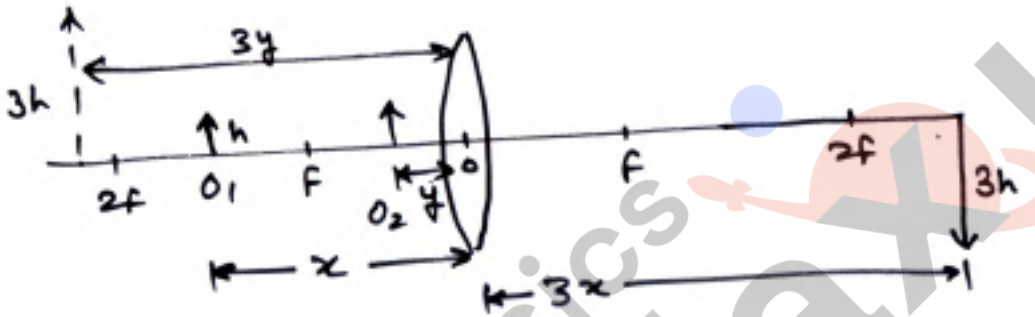
$f_L' = \frac{R}{\mu_L - 1}$

$f_{eq}' = \frac{f_L f_L'}{2(f_L + f_L')}$

$\frac{1}{f_{eq}} = \frac{2}{f_L} + \frac{1}{f_M} + \frac{2}{f_L'} = \frac{(f_L + f_L')2}{f_L f_L'}$

QUESTIONS BASED ON

SAME MAGNIFICATION FOR TWO POSITIONS OF OBJECT



Say $m = 3$.

$x - y =$ ____

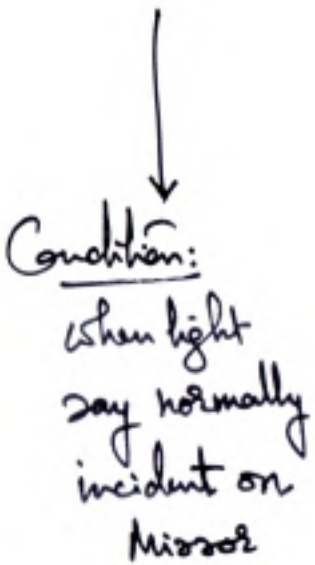
$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\left[\frac{1}{3x} + \frac{1}{x} = \frac{1}{f_L} \right]$$

$$\left[-\frac{1}{3y} + \frac{1}{y} = \frac{1}{f_L} \right]$$

QUESTIONS BASED ON

RETRACING OF A LIGHT RAY BY A PRISM



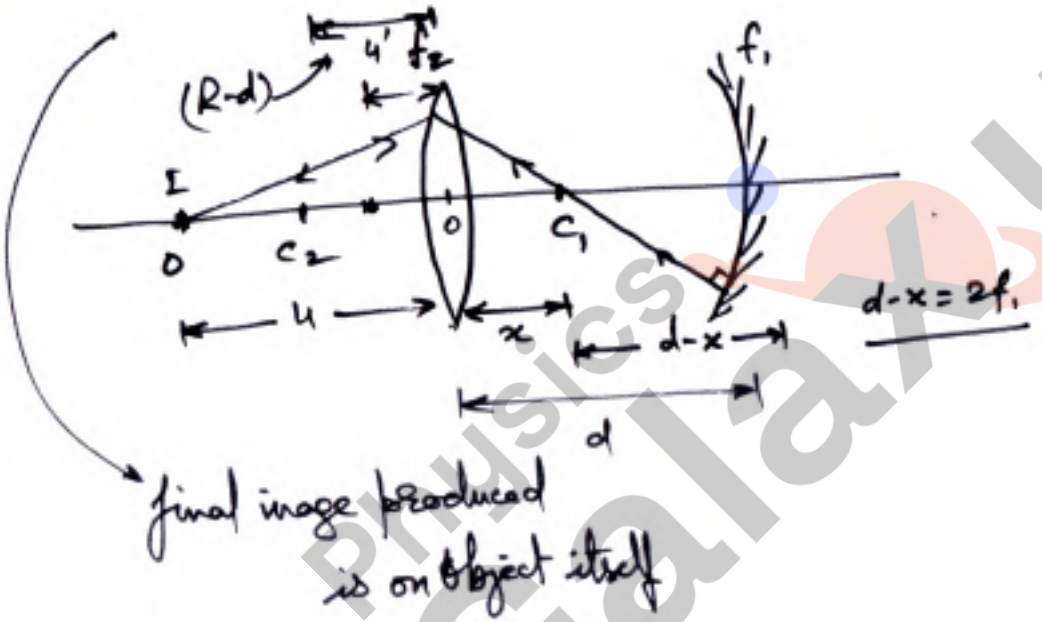
Condition:
When light ray normally incident on Mirror

$\sin i = \mu \sin\theta$

$i = \_\_\_$

QUESTIONS BASED ON

RETRACING FOR A SPHERICAL MIRROR



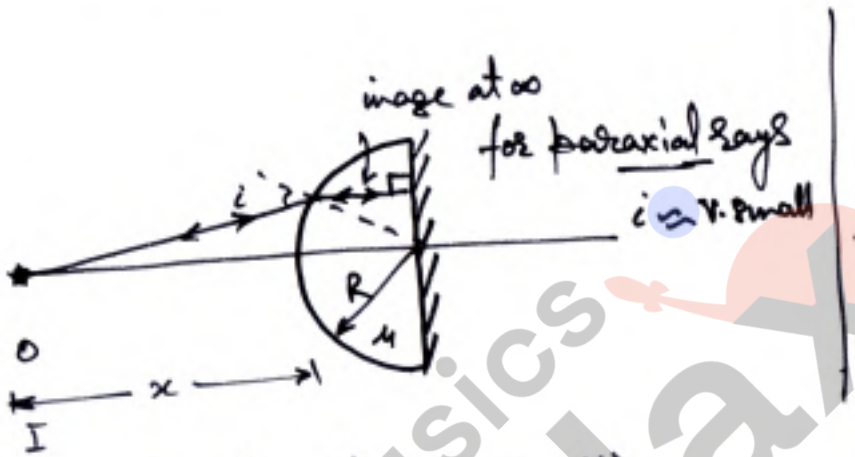
$\frac{1}{x} + \frac{1}{u} = \frac{1}{f_2}$

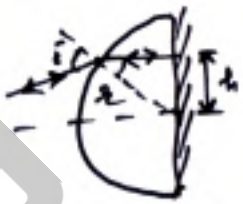
$u = \frac{\quad}{\quad}$

$d - x = 2f_1$

QUESTIONS BASED ON

RETRACING FOR REFRACTION





$\sin i = \mu \sin r$

$\sin i = \mu \frac{h}{\sqrt{R^2 - h^2}}$

$i =$ ——

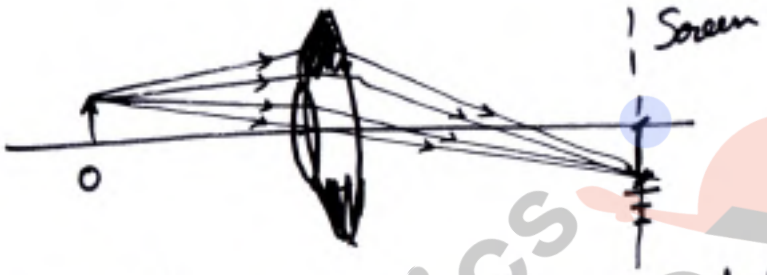
by Refraction formula (μ is small)

$$\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R} \Rightarrow 0 + \frac{1}{x} = \frac{\mu - 1}{R}$$

$$\Rightarrow x = \frac{R}{\mu - 1}$$ ✓

QUESTIONS BASED ON

ERRECT ON IMAGE BY COVERING A LENS



due to lens covering → less no of light rays will produce image

⇒ image intensity will be decreased!

long f' image location & size will remain same!

QUESTIONS BASED ON

FOCAL LENGTH OF PLANO CONVEX & PLANO CONCAVE LENS COMBINED

$f_1 = \frac{R}{\mu_1 - 1}$

$\frac{1}{f_{eq}} = \frac{1}{f_{L_1}} + \frac{1}{f_{L_2}}$

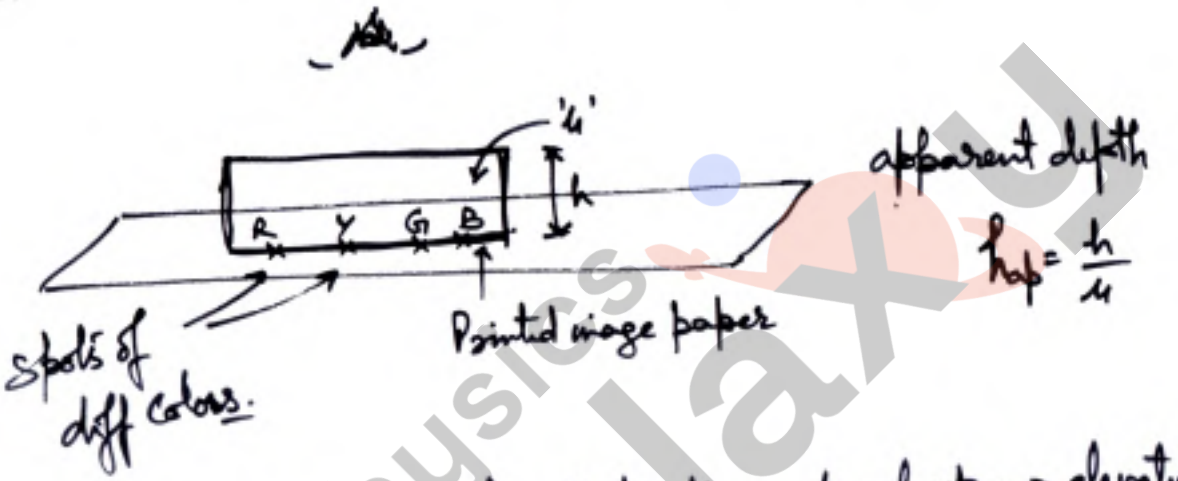
$= \frac{\mu_1 - 1}{R} - \frac{\mu_2 - 1}{R}$

$= \frac{\mu_1 - \mu_2}{R}$

$f_{eq} = \frac{f_1 f_2}{f_1 + f_2} = \frac{R}{\mu_1 - \mu_2}$

QUESTIONS BASED ON

APPARENT DEPTH OF COLOURED OBJECTS



$\mu = a + \frac{b}{\lambda^2}$

for Red colour $\mu \leftarrow$ least. $\rightarrow$ elevated least

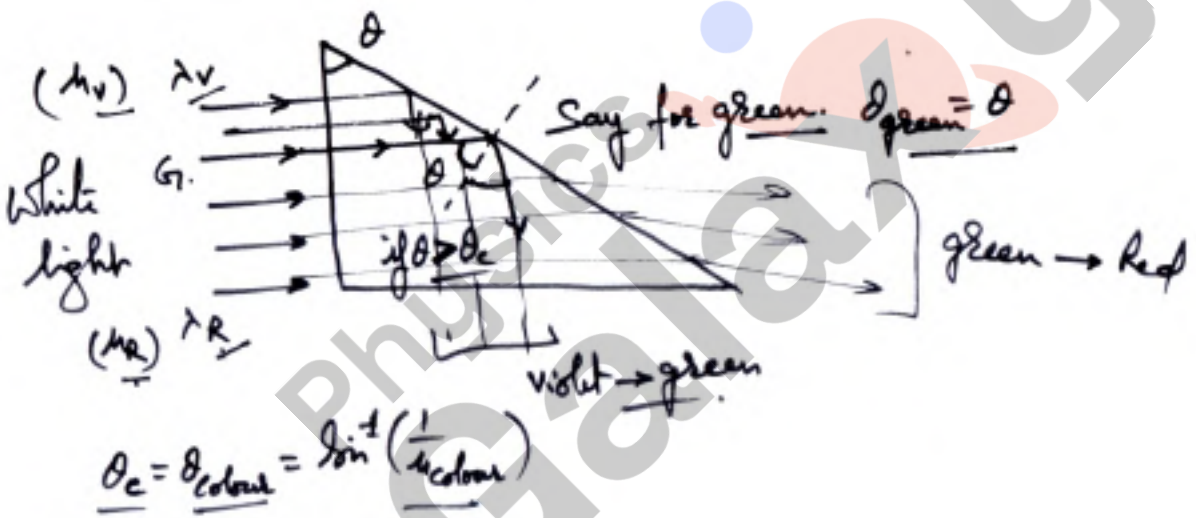
for blue Colour $\mu \leftarrow$ max $\rightarrow$ elevated most

QUESTIONS BASED ON

CHANGE IN FOCAL LENGTH OF LENS BY LIGHT COLOUR

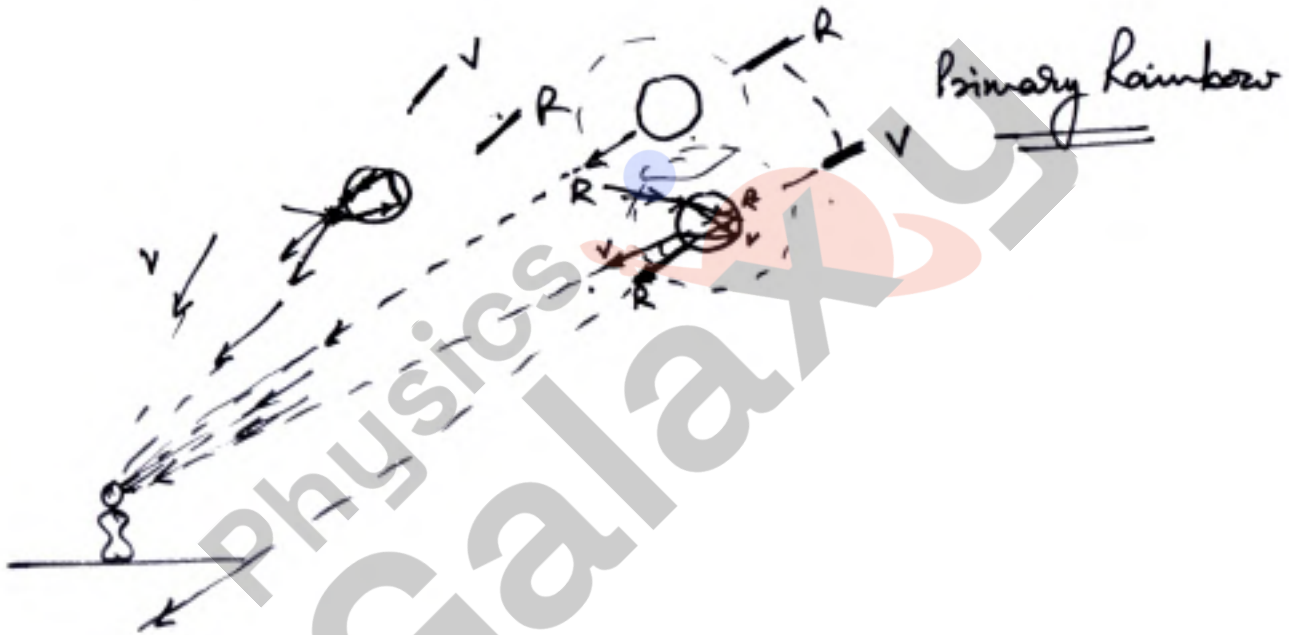
QUESTIONS BASED ON

SEPARATION OF LIGHT COLOURS BY A PRISM



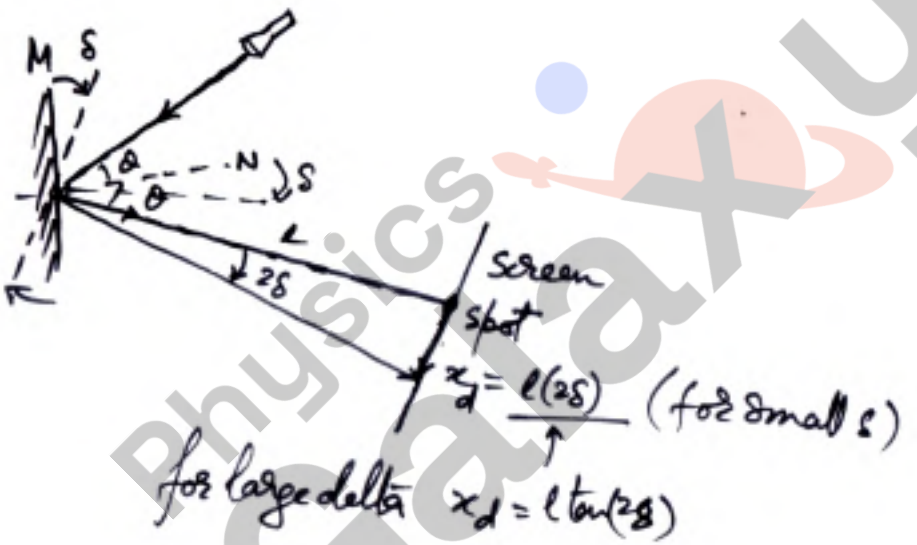
QUESTIONS BASED ON

FORMATION OF RAINBOW



QUESTIONS BASED ON

DISPLACING A REFLECTED SPOT BY A PLANE MIRROR



QUESTIONS BASED ON

ANGULAR WIDTH OF RESOLUTION

$$\theta = \frac{d}{x} = \frac{1.22\lambda}{D}$$

$$d = \_\_\_\_$$

QUESTIONS BASED ON

COMPARISON OR RESOLVING POWERS

$$\downarrow$$

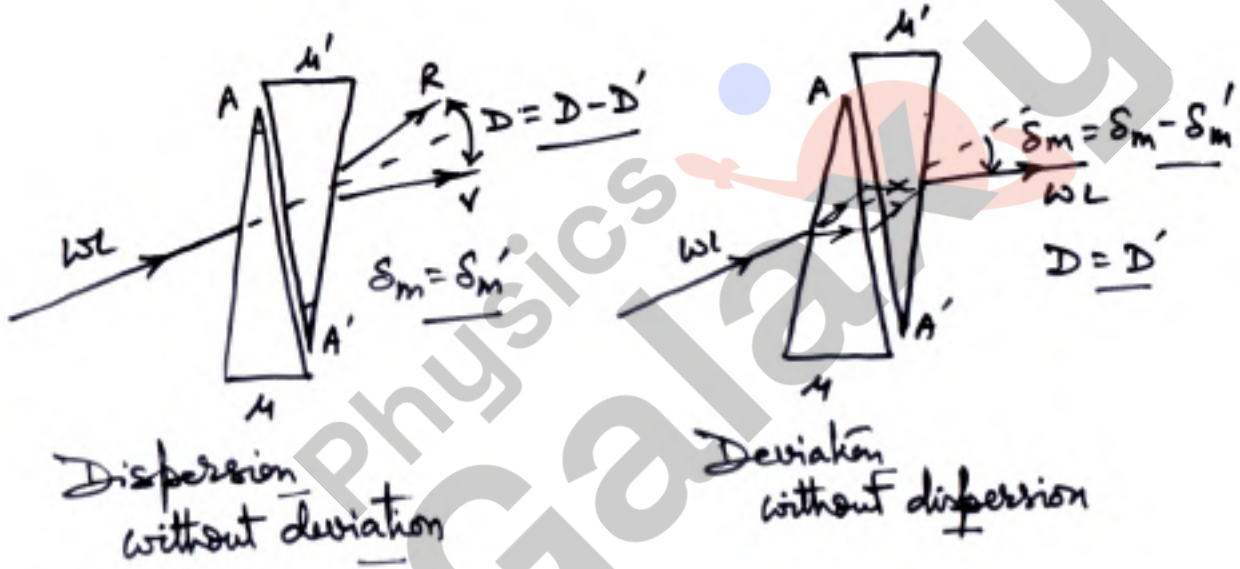
$$R = \frac{1}{\theta} = \frac{D}{1.22\lambda}$$

or $R \propto \frac{1}{\lambda}$.

for same dia of lens for two (mic/teles) $\rightarrow$ $\frac{R_1}{R_2} = \frac{\lambda_2}{\lambda_1}$

QUESTIONS BASED ON

ACHROMATIC COMBINATION OF THIN PRISMS



QUESTIONS BASED ON

SUBMERGING A LENS IN A MEDIUM