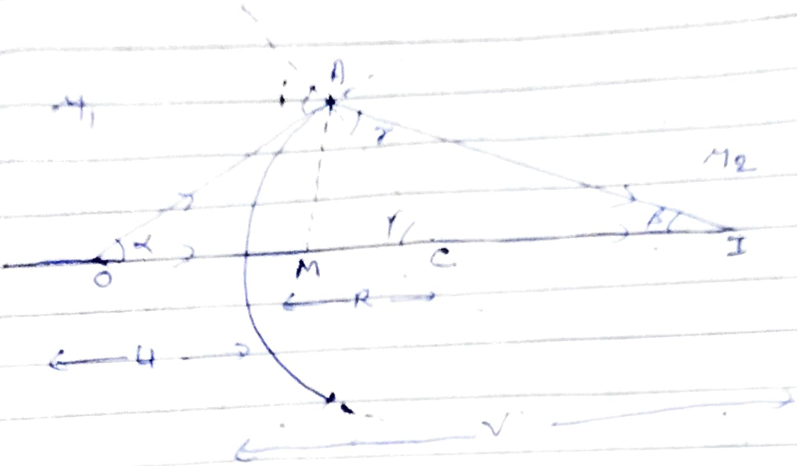
12/4/21

[illegible]

Refraction at a convex surface forms a real image

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



In $\triangle OAC$

Exterior angle = Sum of interior angle

$$i = \alpha + \gamma \quad \text{— (i)}$$

$\triangle$

$$\gamma = r + \beta$$

$$r = \gamma - \beta \quad \text{— (ii)}$$

$$\tan\alpha = \frac{AM}{OM}$$

$$\tan\beta = \frac{AM}{MI}$$

$$\tan\gamma = \frac{AM}{MC}$$

From first order if angle are small then

$\tan\alpha \simeq \alpha, \quad \tan\beta \simeq \beta$

$\tan\gamma \simeq \gamma$

$$\alpha = \frac{AM}{OM} \quad \text{---(iii)}$$

$$\beta = \frac{AM}{MI} \quad \text{---(iv)}$$

$$\gamma = \frac{AM}{MC} \quad \text{---(v)}$$

in eqn (i) and (ii)

$$i = \frac{AM}{OM} + \frac{AM}{MC} \quad \text{---(vi)}$$

$$r = \frac{AM}{MC} - \frac{AM}{MI} \quad \text{---(vii)}$$

By Snell's law

$$\frac{\sin i}{\sin r} = {}_1\mu_2 \qquad \left({}_1\mu_2 = \frac{\mu_2}{\mu_1}\right)$$

$$\frac{\sin i}{\sin r} = \frac{\mu_2}{\mu_1}$$

$$\mu_1 \sin i = \mu_2 \sin r$$

$$\mu_1 i = \mu_2 r$$

$$\mu_1\left[\frac{AM}{OM} + \frac{AM}{MC}\right] = \mu_2\left[\frac{AM}{MC} - \frac{AM}{MI}\right]$$

$$\mu_1 AM\left[\frac{1}{OM}+\frac{1}{MC}\right]=\mu_2 AM\left[\frac{1}{MC}\right.$$

$$\mu_1\left[\frac{1}{OM}+\frac{1}{MC}\right]=\mu_2\left[\frac{1}{MC}\right.\quad\frac{1}{MI}$$

$\therefore$ $OM=-u$, $MC=R$, MI

$$\mu_1\left[\frac{1}{-u}+\frac{1}{R}\right]=\mu_2\left[\frac{1}{R}-\frac{1}{v}\right.$$

$$\frac{\mu_1}{-u}+\frac{\mu_1}{R}=\frac{\mu_2}{R}-\frac{\mu_2}{V}$$

$$\frac{\mu_1}{-u}+\frac{\mu_2}{V}=\frac{\mu_2}{R}-\frac{\mu_1}{R}$$

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

$$\boxed{\frac{\mu_1}{u}-\frac{\mu_2}{V}=\frac{\mu_2-\mu_1}{R}}$$