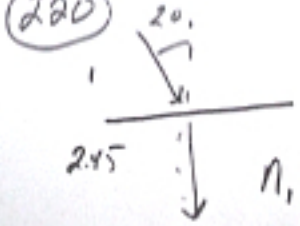
(220)



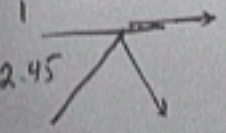
$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\sin\theta_2 = \frac{n_1}{n_2} \sin\theta_1$

$= \frac{1}{2.45} \sin(20)$

$\theta_2 = 8°$

$n = \tan\theta_B = 2.45 \Rightarrow \theta_B = 68°$



$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\sin\theta_2 = \frac{n_2}{n_1} = \frac{1}{2.45} \Rightarrow \theta = 24°$

$s_o = 25 \quad M = +2$

$$M = -\frac{s_i}{s_o} = +2 \Rightarrow s_i = -2s_o$$

$$s_i = -50$$

$$\frac{1}{s_o} + \frac{1}{s_i} = \frac{1}{f} \Rightarrow \frac{1}{25} - \frac{1}{50} = \frac{2}{50} - \frac{1}{50} = \frac{1}{50}$$

$$f = +50 \text{ cm}$$

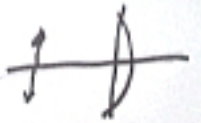
$$\frac{1}{s_i} = \frac{1}{f} - \frac{1}{s_o} = \frac{1}{50} - \frac{1}{10} = \frac{1}{50} - \frac{5}{50}$$

$$\frac{1}{s_i} = -\frac{2}{25} \Rightarrow s_i = -12.5$$

$$M = -\frac{s_i}{s_o} = +\frac{12.5}{10} = +1.25$$

Virtual ($s_i < 0$) Upright ($M+$)
Enlarged ($|M| > 1$)

$S_o = +20$

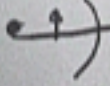


$S_i = +20$

$$\frac{1}{S_i} + \frac{1}{S_o} = \frac{1}{f} = \frac{1}{20} + \frac{1}{20} = \frac{2}{20} = \frac{1}{10}$$

$f = +10\ cm \quad f = \frac{R}{2}$

$R = 2(10) = +20$



$$M = -\frac{S_i}{S_o} \qquad \frac{1}{S_i} = \frac{1}{f} - \frac{1}{S_o} = \frac{1}{10} - \frac{1}{5}$$

$S_i = -10\ cm \qquad = \frac{1}{10} - \frac{2}{10} = -\frac{1}{10}$

$$M = -\frac{S_i}{S_o} = -\frac{-10}{5} = +2$$

Enlarged ($|M| > 1$) upright ($M+$)

Virtual ($S_i < 0$)

$f_1 = -25\,cm$

$s_o = +50\,cm$

$M = -1 \qquad M = -\frac{s_i}{s_o} = -1$

$\Rightarrow s_i = s_o = +50$

$\frac{1}{s_i} + \frac{1}{s_o} = \frac{1}{f_{eff}} \Rightarrow \frac{1}{50} + \frac{1}{50} = \frac{2}{50} = \frac{1}{25}$

$f_{eff} = +25cm$

$\frac{1}{f_1} + \frac{1}{p_2} = \frac{1}{f_{eff}} \Rightarrow \frac{1}{f_2} = \frac{1}{25} - \frac{1}{-25} = \frac{2}{25}$

$f_2 = +12.5$

~~Real (5.30) Image~~

$f_{eff} = +25$

$S_o = +10\ cm$

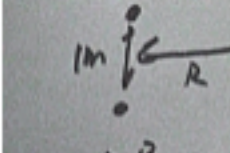
$\frac{1}{S_i} = \frac{1}{f_{eff}} - \frac{1}{S_o} = \frac{1}{25} - \frac{1}{10} = \frac{2}{50} - \frac{5}{50}$

$= -\frac{3}{50} \Rightarrow S_i = -16.7$

$M = -\frac{-16.7}{10} = +1.67$

Virtual ($S_i < 0$) Enlarge ($|M| > 1$)

Upright ($M +$)

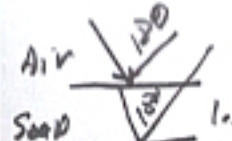


$\Delta\theta = 1.22 \frac{\lambda}{D}$

$= 1.22 \frac{500 \times 10^{-9}}{\cdot 1} = 6 \times 10^{-6}$

$S = R\Delta\theta \Rightarrow R = \frac{S}{\Delta\theta} = \frac{1}{6 \times 10^{-6}}$

$= 1.6 \times 10^{5}\ m$

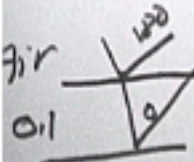


$2n_2 t = m\lambda$ Const

$m = 1, 2, \ldots$

$t = \frac{\lambda}{2n_2} = \frac{500\,nm}{2(1.5)}$

$= 166.7\,nm$



Last

$2n_2 t = m\lambda$; $m = 1, 2, \ldots$

$t = \frac{\lambda}{2n_2} = \frac{500\,nm}{2(1.7)}$

$= 147\,nm$