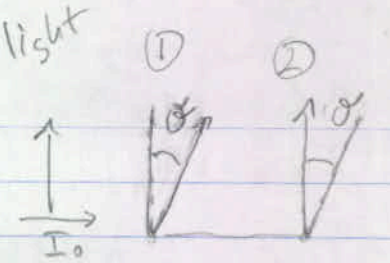
#1

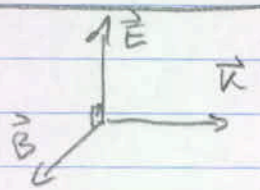


$I_1 = I_0 \cos^2(60°) = \frac{1}{4} I_0$

$I_2 = I_1 \cos^2(60°) = I_1 \frac{1}{4} = \boxed{I_0 \frac{1}{16}}$

#2 **IR, VIS, UV, Gamma**

#3 **$\vec{E}$ is perp. to $\vec{B}$**

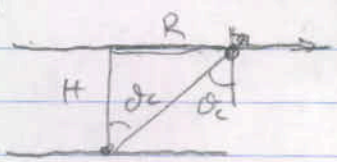


#4 From Figure, $\theta_x > \theta_y$; $\frac{\sin(\theta_y)}{\sin(\theta_x)} = \frac{\theta_x}{\theta_y} \approx \frac{n_x}{n_y} < 1$

$n_y > n_x$ ∴ $v_x = \frac{c}{n_x} = f\lambda_x$ & $v_y = \frac{c}{n_y} = f\lambda_y \Rightarrow v_x > v_y$ & $\lambda_x > \lambda_y$

$\Rightarrow$ **λ, v decrease**

#5 $n_a = 1$



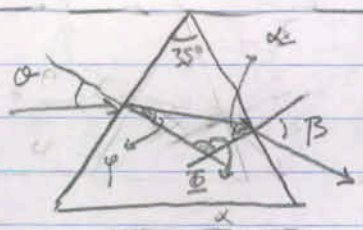
$\sin(\theta_c) = 1/n_w = 3/4 \Rightarrow \theta_c = 49°$

$R = H \tan(\theta_c) = 10ft$

$D = 2R = \boxed{20\ ft}$

#6 $f_n = \frac{nv}{4L} = \frac{v}{4L} = \frac{340}{8} = \boxed{42.5\ Hz}$, $n = 1$

#7



$1 \cdot \sin(20°) = (1.6)\sin(\varphi)$

$\Rightarrow \varphi = 12.3°$

$35° + 180° + \Phi = 360°$

$\Rightarrow \Phi = 145°$

$\Phi + \varphi + \alpha = 180°$

$\alpha = 22.7°$

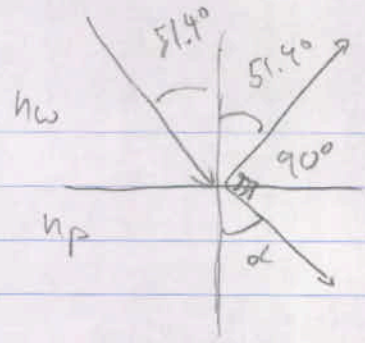
$1.6 \sin(\alpha) = 1 \cdot \sin(\beta) \Rightarrow \boxed{\beta = 38°}$

#8 $\sin(\theta_2) = n_1/n_2 < 1$ w/ $\theta_1 = 90° \Rightarrow n_1 < n_2$

as we go from ② → ① ⇒ high to low or

glass (high) → low (water)

#9



$\alpha = 180° - 51.4° - 90°$

$\alpha = 38.6°$

$n_p = \dfrac{n_w \sin(51.4°)}{\sin(38.6°)} = \boxed{1.67}$

#10 6 antinodes $\Rightarrow$ $n = 6$

$$f_6 = \frac{6v}{2L} = \frac{6.78}{2.02} = 117 \approx \boxed{120\ \text{Hz}}$$