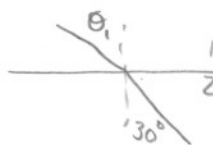


$$1. (a) \frac{c}{v} = n \quad \frac{3.0 \times 10^8}{v} = 1.33 \quad v = 2.3 \times 10^8 \text{ m/s}$$

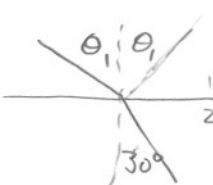
$$(b) \frac{3.0 \times 10^8}{1.5} = 2.0 \times 10^8 \text{ m/s}$$

$$(c) \frac{3.0 \times 10^8}{2.42} = 1.2 \times 10^8 \text{ m/s}$$

2.  $\frac{\sin \theta_1}{\sin \theta_2} = \frac{n_2}{n_1} \quad \frac{\sin 50}{\sin \theta_2} = \frac{1.33}{1} \quad \theta_2 = 35^\circ$

3.  $\frac{\sin \theta_1}{\sin 30} = \frac{1.33}{1} \quad \theta_1 = 42^\circ$

4.  $\frac{\sin \theta_1}{\sin \theta_2} = \frac{n_2}{n_1} \quad \frac{\sin 30}{\sin 20} = \frac{n}{1} \quad n = 1.46$

5.  $\frac{\sin \theta_1}{\sin \theta_2} = \frac{n_2}{n_1} \quad \frac{\sin \theta_1}{\sin 30} = \frac{1.46}{1} \quad \theta_1 = 47^\circ$

6. $v = f \lambda \quad 3 \times 10^8 = f(400 \times 10^{-9}) \quad 3 \times 10^8 = f(750 \times 10^{-9})$
 $f = 7.5 \times 10^{14} \text{ Hz} \quad f = 4.0 \times 10^{14} \text{ Hz}$

7. $\lambda = \frac{\Delta x d}{L} \quad \Delta x = \frac{6 \text{ cm}}{6} = 1 \text{ cm}$
 $= \frac{(1 \times 10^{-2})(220 \times 10^{-6})}{3} = 7.3 \times 10^{-7} \text{ m}$

8. $\lambda = \frac{\Delta x d}{L} \quad \Delta x = \frac{9.0 \text{ mm}}{3} = 3 \text{ mm}$
 $= \frac{(3 \times 10^{-3})(.12 \times 10^{-3})}{0.8} = 4.5 \times 10^{-7} \text{ m}$

$\lambda = \frac{\Delta x d}{L} \quad \Delta x = \frac{5 \text{ cm}}{9} = 0.56 \text{ cm}$
 $600 \times 10^{-9} = \frac{(0.56 \times 10^{-2})d}{3} \quad d = 3.2 \times 10^{-4} \text{ m}$

$$10. \lambda = \Delta x \frac{d}{L}$$

$$\Delta x = \frac{2 \text{ cm}}{10} = 0.2 \text{ cm}$$

$$6 \times 10^{-7} = \frac{(0.2 \times 10^{-2}) d}{1.5}$$

$$\underline{d = 4.5 \times 10^{-4} \text{ m}}$$