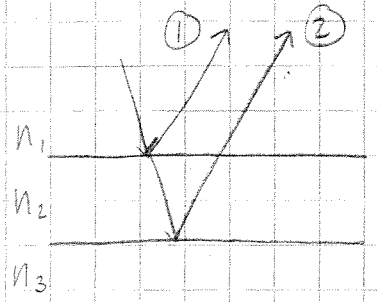
P # C

Ch 24 - Worksheet

$n_1 = 1.00$
$n_2 = 1.38$
$n_3 = 1.33$

$t = 300\ nm$



$n_2 > n_1$ so Ray 1 is 180° out of phase

$n_3 < n_2$ so Ray 2 is in phase

Net Result is 180° out of phase

For constructive interference (on out of phase waves)

$2 \cdot t = \frac{1}{2} \cdot \lambda,\ 1\frac{1}{2} \cdot \lambda,\ 2\frac{1}{2}\lambda \ldots$

$2 \cdot (300 \times 10^{-9}\ m) = \frac{1}{2} \cdot \lambda \qquad \lambda_2 = 1200\ nm$

$= 1\frac{1}{2} \cdot \lambda \qquad \lambda_2 = 400\ nm$

$= 2\frac{1}{2} \cdot \lambda \qquad \lambda_2 = 240\ nm$

Find these λ's in air:

$n = \frac{c}{v} \qquad 1.38 = \frac{3 \times 10^8\ m/s}{v_2}$

$v_2 = 2.17 \times 10^8\ m/s$

f is constant, so $\frac{v_1}{\lambda_1} = \frac{v_2}{\lambda_2}$ OR $\lambda_1 = \frac{v_1 \cdot \lambda_2}{v_2}$

$\lambda = \frac{c \cdot (1200 \times 10^{-9}\ m)}{(2.17 \times 10^8\ m/s)}$ OR $\frac{c \cdot (400 \times 10^{-9}\ m)}{(2.17 \times 10^8\ m/s)}$ OR $\frac{c(240 \times 10^{-9}\ m)}{(2.17 \times 10^8\ m/s)}$

$\lambda_1 = 1660\ nm$ OR 550 nm (Visible - green) OR $330\ nm$