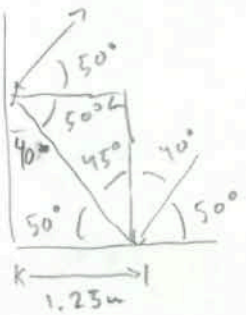
#11



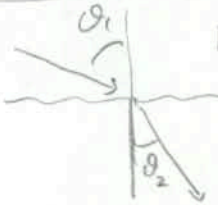
(A) $1.25m = d\sin(40°)$

$d = 1.94m$

(B) 50° above horiz.

1/

#7



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

$\theta_1 = 45° \Rightarrow \theta_2 = 70.5°$

or 19.5° abov horiz.

#10 (A) $n_1\sin(\theta_1) = n_2\sin(\theta_2) \Rightarrow$ $n_2 = 1.52$

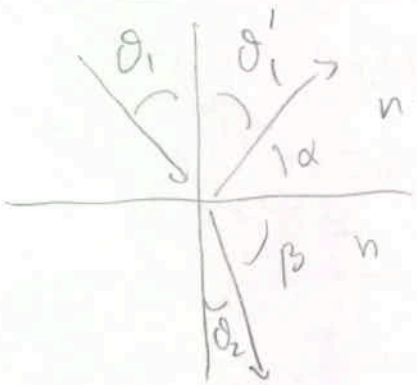
(B) $f = \frac{c}{\lambda} =$ 4.74×10^{14} Hz

(C) $v = \frac{c}{n} = \frac{c}{1.52} =$ 1.98×10^{8} m/s

(D) $\lambda = v/f =$ 417nm

#12 $n_1\sin(\theta_1) = n_2\sin(\theta_2) \Rightarrow n_2 = 1.90 = \frac{c}{v} \Rightarrow v = \frac{c}{1.9} =$ 158 Mm/s

#15



$\alpha + \beta = 90°$

$\theta_1' + \alpha + \beta + \theta_2 = 180°$

$\theta_1' = \theta_1$

$1\sin(\theta_1) = n\sin(\theta_2)$

$\sin(\theta_1) = n\sin(90-\theta_1)$

$= n\cos(\theta_1)$.

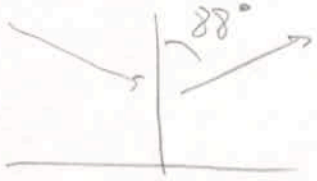
Solve for θ_1:

$\frac{\sin(\theta_1)}{\cos(\theta_1)} =$ $n = \tan(\theta_1)$

#18 $h = \frac{2\,cm}{\cos(17.5)} = 2.12\,cm$, $v = \frac{c}{n} = 2\times10^8\ m/s$

$t = \frac{h}{v} = 106\ ps$

#31 $\sin(\theta_c) = \frac{n_2}{n_1}$



$n_2 = n_1 \sin(88°)$

$n_2 = 1.00008$

#30 (A) $\frac{\sin(\theta_2)}{\sin(\theta_1)} = \frac{v_2}{v_1}$ w/ $\theta_2 = 90° \Rightarrow \theta_c = 10.7°$

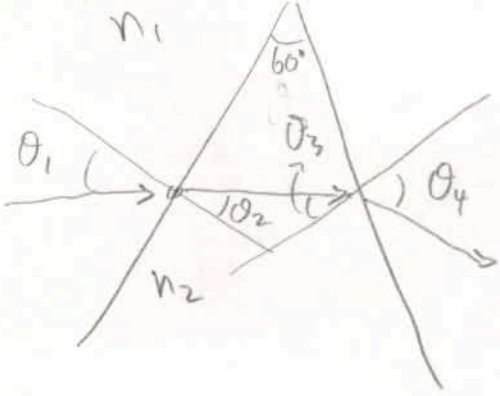
$\theta_1 = \theta_c$

(B) will totally reflect when medium makes it travel slower: air

(C) 100% reflection

#34 $\theta_2 = 90° \Rightarrow n_1 \sin(\theta_1) = n_2 \Rightarrow \theta_1 = 62.4°$

#24



- $\theta_2 = 19.5°$ ($n_1 \sin(\theta_1) = n_2 \sin(\theta_2)$)
- $(90° - \theta_2) + (90° - \theta_3) + 60° = 180°$

$\Rightarrow \theta_3 = 40.5°$

$n_2 \sin(\theta_3) = n_1 \sin(\theta_4) \Rightarrow \theta_4 = 77.1°$