Name _____   Date _____

# PH 102 Quiz 7: Reflection & Refraction

$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \qquad n = \frac{c}{v} \qquad v = \lambda f \qquad c = 3 \times 10^8 \, \text{m/s} \qquad E = hf = \frac{hc}{\lambda}$$

1. In experimenting with a beam of white light and an acrylic prism, you found that the critical angle for total internal reflection for red light was *less* than that for blue light. What does this imply about the difference betwen the index of refraction for red and blue light (n_r and n_b, respectively) in the acrylic?

○ $n_r < n_b$
○ $n_b < n_r$
○ $n_r = n_b$
○ nothing, one also needs the wavelengths

2. As light travels from a vacuum ($n = 1$) to a medium such as glass ($n > 1$), which of the following properties remains the same?

○ wavelength
○ wave speed
○ frequency
○ none of the above
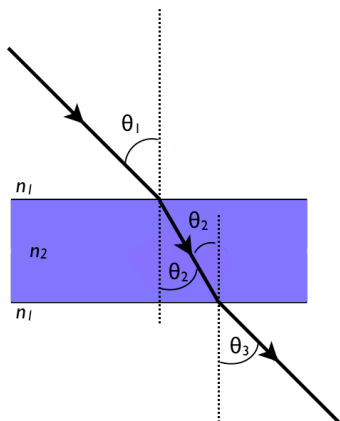
3. A light beam traveling through a transparent medium of index of refraction n_1 passes through a thick transparent slab with parallel faces and an index of refraction n_2. Which expression correctly gives the angle θ_3?

○ $\sin^{-1}(n_1 \sin \theta_2)$
○ θ_2
○ $\sin^{-1}(n_2 \sin \theta_2)$
○ θ_1

4. If $n_1 = 1.0$ and $n_2 = 1.923$ in the figure above, what is θ_2 if $\theta_1 = 28°$?

○ 14°
○ 28°
○ 16°
○ 42°

5. If the thickness of the middle layer in the figure above is 2 cm (0.02 m), how long does it take for the light to pass through the transparent medium?

○ 7.2×10^{-11} s
○ 2.5×10^{-9} s
○ 1.3×10^{-10} s
○ 5.8×10^{-8} s