BoxSand Optics Index of Refraction Quantitative Problems

Optics.Index-Refraction.**QP.BS.1:** A plate glass window (n= 1.5) has a thickness of 5.0 * 10^{-3} m. How long does it take light to pass perpendicularly through the plate?

Optics.Index-Refraction.**QP.BS.2:** In an ultra-low-temperature experiment a collection of sodium (Na) atoms enter a special state called a *Bose-Einstein Condensate* in which the index of refraction is 2.00 X 10^{7}. What is the speed of light in this condensate?

Optics.Index-Refraction.**QP.BS.3:** The reactive indices of materials A and B have a ratio of $\frac{n_A}{n_B} = 1.45$. The speed of light in material A is 1.30 X 10^{8} m/s. What is the speed of light in material B?

Optics.Index-Refraction.**QP.BS.4:** The frequency of a light wave is the same when the light travels in ethyl alcohol or in carbon dioxide Find the ratio of the wavelength of the light in ethyl alcohol to that in carbon dioxide.

Optics.Index-Refraction.**QP.BS.5:** Light travels at a speed of 2.400 X 10^{8} m/s in a certain substance. What substance could this be? For the speed of light in a vacuum use 3.0 x 10^{8}.

Optics.Index-Refraction.**QP.BS.6:** Light has a wavelength of 400 nm and a frequency of 5.00 x 10^{14} Hz when traveling through a certain substance. What substance could this be? Show your calculations.

Optics.Index-Refraction.**QP.BS.7:** In a certain time, light travels 6.40 km in a vacuum. During the same time, light travels only 3.50 km in a liquid. What is the refractive index of the liquid?

Optics.Index-Refraction.**QP.BS.8:** A flat sheet of ice has a thickness of 3.0 cm it is on top of a flat sheet of crystalline quarts that has a thickness of 1.5 cm. Light strikes the ice perpendicularly and travels through it and then through the quarts. In the time it takes the light to travel through the two sheets, how far (in centimeters) would it have traveled in the vacuum?