

Name \_\_\_\_\_

Favorite mode of non-motorized transportation \_\_\_\_\_

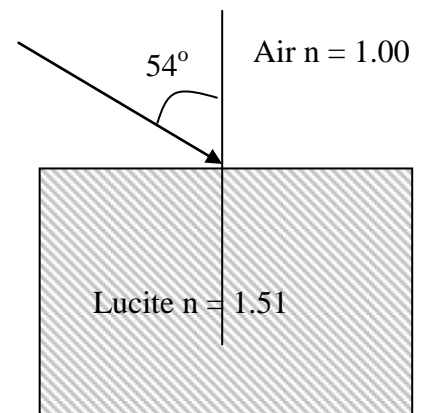
1. You hear the sound of a hammer striking concrete 1.21 seconds sooner in the concrete than through the air. If the speed of sound through the air is 339 m/s, and the hammer is 724 m away, what is the speed of sound in the concrete? (782 m/s)

**Questions 2-5 are about the light from a 640 nm laser. (640 nm is its wavelength,  $1 \text{ nm} = 10^{-9} \text{ m}$ )**

2. What is the **speed** of the laser light in Lucite? ( $n = 1.51$ ) ( $1.99 \times 10^8 \text{ m/s}$ )

3. What is the **wavelength** and **frequency** of the light in Lucite? ( $n = 1.51$ ) (424 nm,  $4.69 \times 10^{14} \text{ Hz}$ )

4. The laser goes from air into the Lucite. It makes the angle shown in the diagram below. Calculate the **refracted angle** in the Lucite, **draw** the refracted beam, and label the angle. ( $32.4^\circ$ )



5. What is the **critical angle** between air and Lucite? In which substance does it occur? ( $41.5^\circ$  – in the Lucite)