Wave Motion

Wednesday, February 5, 2014 2:51 PM

- A tuning fork produces a sound with a frequency of 256 Hz and a wavelength in air of 1.35 m.
  - What value does this give for the speed of sound in air?
  - What would be the wavelength of the same sound in water?

$f = 256\ Hz$

$\lambda = 1.35\ m$

$v = f \cdot \lambda = 256 \cdot 1.35 = 346\ m/s$

$\lambda = ?$

$f = 256\ Hz$

$v = 1100\ m/s$

$v = f\lambda$

$\lambda = v/f = \frac{1100}{256} = 4.3\ m$

- The red light emitted by a He-Ne laser has a wavelength of 633 nm in air and travels at 3 * 10 ^8 m/s. Find the frequency of the laser light.

$\lambda = 633\ nm = 633 \times 10^{-9}\ m$

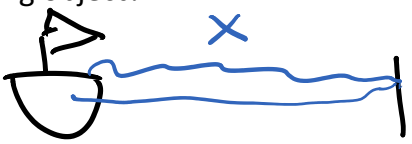
$v = 3 \times 10^8\ m/s$

$f = ?$

$v = f\lambda$

$f = v/\lambda = \frac{3 \times 10^8}{633 \times 10^{-9}} = 6.0 \times 10^{14}\ Hz$

- A sound wave traveling at 343 m/s is emitted by the foghorn of a tugboat. An echo is heard 2.60 s later. How far away is the reflecting object?



$v = 343 m/s$

$t = 2.6 s$

$x = ?$

$v = x/t$

$x = v \cdot t$

$= 343 \cdot 2.6$

$= 892 m$

$2x = vt$

$x = \frac{vt}{2} = \frac{343 \cdot 2.6}{2} = 446 m$