Answer on Question #47915-Physics-Mechanics-Kinematics-Dynamics

The wavelength of a certain sound wave in air is $\lambda_{air} = 2.88\ m$ at $T = 20.0$ degrees C. What is the wavelength of this sound wave in fresh water, which has a speed of sound of $v_{water} = 1482\frac{m}{s}$?

Solution

Assume that the frequency is the same.

$$f = \frac{v}{\lambda}.$$

$$f_{air} = f_{water} \to \frac{v_{air}}{\lambda_{air}} = \frac{v_{water}}{\lambda_{water}}.$$

The wavelength of this sound wave in fresh water is

$$\lambda_{water} = \lambda_{air}\frac{v_{water}}{v_{air}} = 2.88 \cdot \frac{1482}{343} = 12.4\ m.$$

Answer: $12.4\ m$.