Problem 2.8

Compute the wavelength of ultrasound waves with a frequency of 500 MHz in air. The speed of sound in air is 343 m/s.

Solution

The relationship between wavelength λ, frequency ν, and speed v for any wave is

$$\lambda\nu = v.$$

Use it to calculate the wavelength.

$$\lambda = \frac{v}{\nu} = \frac{343\ \frac{\text{m}}{\text{s}}}{500\ \cancel{\text{MHz}} \times \frac{1\times10^6\ \text{Hz}}{1\ \cancel{\text{MHz}}}} = 6.86\times10^{-7}\ \text{m} = 686\ \text{nm}$$