

Answer on Question #47916, Physics, Mechanics | Kinematics | Dynamics

Question:

A trumpet plays a note with a frequency of 537 Hz. At room temperature (25°C) what is the wavelength of this sound?

What is the wavelength of this sound?

One very cold day the temperature was -23°C. What is the wavelength of the sound at this temperature?

Answer:

Wavelength equals:

$$\lambda = \frac{c}{f}$$

where c is speed of sound, f is frequency.

The approximate speed of sound in dry air, in meters per second ($m \cdot s^{-1}$), at temperatures near 0 °C, can be calculated from:

$$c = (331 + 0.6t) \frac{m}{s}$$

where t is the temperature in degrees Celsius.

For room temperature 25 °C:

$$\lambda = \frac{331 + 0.6 \cdot 25}{537} \frac{m}{s} = 0.64 \text{ m}$$

For room temperature -23 °C:

$$\lambda = \frac{331 - 0.6 \cdot 23}{537} \frac{m}{s} = 0.59 \text{ m}$$

