

Speed of Sound

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speedSoundWkst

Worksheet - Speed of Sound

$$V = f \cdot \lambda$$

- The speed of sound, like all waves, depends on the material, medium through which it travels. Sound travels fastest in solids (solids, liquids, gases) and slowest in gas.
- The speed of sound in air depends on the temperature of the air. At 0°C, the speed of sound in air is 330 m/s m/s. For every degree above 0°C, the speed increases by 0.6 m/s. For every degree below 0°C, the speed decreases by 0.6 m/s.

The equation is:

$$v_{\text{sound}} = \underline{330 \text{ m/s}} + 0.6 \underline{T} \text{ m/s}$$

T - temperature

- What is the speed of sound at 35°C? 330 + (0.6)(35) = 351 m/s
- What is the speed of sound at -20°C? 330 + (0.6)(-20) = 318 m/s
- Other than the velocity/temperature equation, there are two important equations involving the speed of sound:

$$v = \underline{f} \times \underline{\lambda}$$

$$v = \frac{\underline{d}}{\underline{t}}$$

Rearrange one equation to solve for: $f = \underline{\hspace{2cm}}$; $\lambda = \underline{\hspace{2cm}}$

Rearrange the other to solve for: $d = \underline{\hspace{2cm}}$; $t = \underline{\hspace{2cm}}$

- A 320 Hz tuning fork will produce a wave of what wavelength in air at 22°C?
- We see a bolt of lightning and 4 s later we hear the thunderclap. If the speed of sound in air is 0.2 mi/s, how far away is the lightning?
- How many seconds will it take an echo to reach your ears if you yell toward a mountain 82 m away on a day when the air temperature is 0°C?