

Learning Target S8P4. I will be able to analyze and interpret data to predict patterns in the relationship between density of media and wave speed.

Medium & Wave Speed Interactive Activity



Objective:

Students will explore and analyze data to predict patterns in the relationship between density of media and wave speed.

Part 1: Introduction to Wave Speed

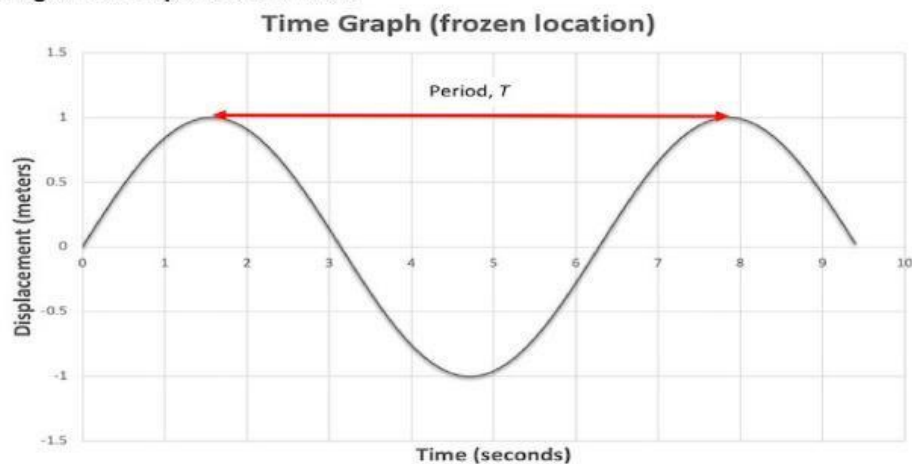
Definition: Wave speed is the distance a wave travels per unit of time. It is determined by the properties of the medium through which the wave travels.

Formula: Wave Speed (v) = Wavelength (λ) $\times$ Frequency (f)

- **Wavelength (λ):** The distance between two consecutive crests or troughs of a wave (measured in meters).
- **Frequency (f):** The number of wave cycles that pass a point in one second (measured in Hertz, Hz).
- **Medium:** The material through which the wave travels (e.g., air, water, solid).

Part 2: Diagram Analysis

Diagram 1: Properties of a Wave



Questions:

1. Identify the wavelength in the diagram. What unit would you use to measure it? _____
2. If the frequency of the wave is 5 Hz and the wavelength is 2 meters, calculate the wave speed. _____

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Part 3: Medium and Wave Speed Chart

Medium	Wave Speed (m/s)	Example
Air	343	Sound waves
Water	1,480	Ocean waves
Steel	5,960	Sound in solids

Questions:

1. Which medium allows waves to travel the fastest? _____
Why? _____
2. A sound wave travels 1,480 m in 1 second. Through which medium is it traveling? _____
3. What is the relationship between medium density and wave speed? _____

4. Predict the wave speed in a medium denser than steel. _____
Explain your reasoning. _____

Part 4: Experiment Simulation

Scenario: A student creates waves in a rope by shaking one end. The rope has a wavelength of 0.5 meters and a frequency of 2 Hz.

1. Calculate the wave speed. _____
2. If the student increases the shaking speed, how will this affect the wavelength and wave speed?
Explain. _____

Part 6: Critical Thinking Challenge

Question: Why do sound waves travel faster in solids than in gases? Use your understanding of particle arrangement and interactions to explain. _____

