

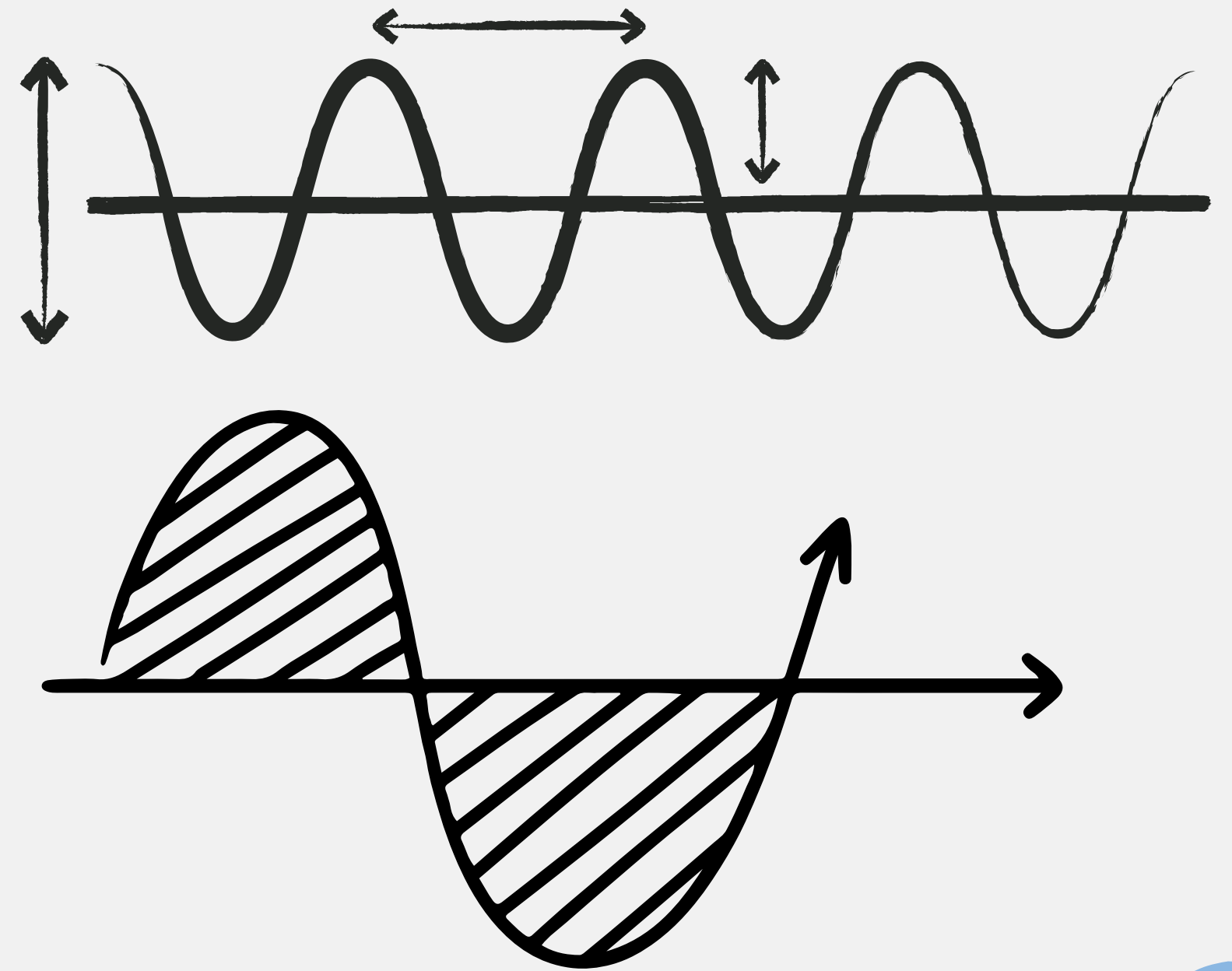


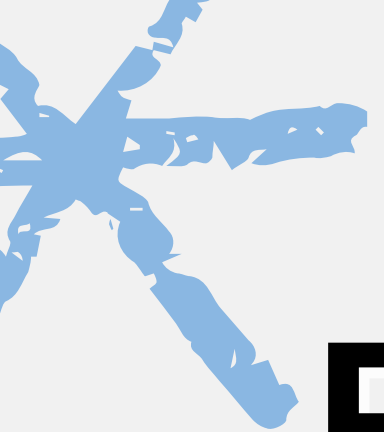
Wave

PHYSIXLAB

Definition



DEFINITION: A wave is a propagating disturbance that transfers energy from one location to another through a medium (or vacuum) without transporting matter. As the energy moves, particles of the medium oscillate around a fixed equilibrium position, creating repeating, periodic patterns.





Basic concept about waves

Transverse and longitudinal waves are two types of mechanical waves, which involve the transfer of energy through a medium (e.g. water, air, a solid).



Amplitude

01. The maximum displacement of the wave from its resting position.

Wavelength

02. The distance between identical points on consecutive waves (e.g., crest to crest).

Frequency

03. The number of waves that pass a fixed point per second, measured in Hertz (Hz).

Wave Speed

04. How fast the disturbance moves, calculated by multiplying wavelength by frequency.

Formula

01

$$v = f \cdot \lambda$$

v = Wave speed (m/s)

f = frequency (Hz)

λ = Wavelength (m)

02

$$T = 1 / f$$

T = Period (S)

1 = 1 (one)

f = frequency (Hz)

03

$$f = 1 / T$$

T = Period (S)

1 = 1 (one)

f = frequency (Hz)

Example 1

A sound wave is traveling 500 m/s. It has a wavelength of .035m. What is the frequency of the sound? What's the period?

Know:

$$v = 500\text{m/s}$$

$$\lambda = .035$$

$$f = ?$$

$$T = ?$$

$$\text{Formula: } v = f \cdot \lambda$$

Answer

$$f = 500 / .035 = 14,285.7 \text{ Hz}$$

$$1 / 14,285.7 = 0.00007 \text{ sec}$$

Example 2

A guitar string vibrates at a frequency of (the note A4). How much time does it take for the string to complete one full back-and-forth oscillation?

Know:

$$f = 440 \text{ Hz}$$

$$T = ?$$

Answer:

$$T = 1/440 = 0.00227$$

Formula: $T = 1 / f$

Example 3

A grandfather clock has a pendulum that takes to swing back and forth once. What is the frequency of the pendulum's motion?

Know:

$$T = 2\text{s}$$

$$f = ?$$

Answer:

$$f = 1/2 = 0.5 \text{ Hz}$$

Formula: $f = 1 / T$

The background features various hand-drawn blue scribbles and shapes, including loops, swirls, and zig-zags, scattered around the central text.

Thank youu

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