

Transverse & Longitudinal Waves:

Seismic waves are transverse waves (earthquakes)

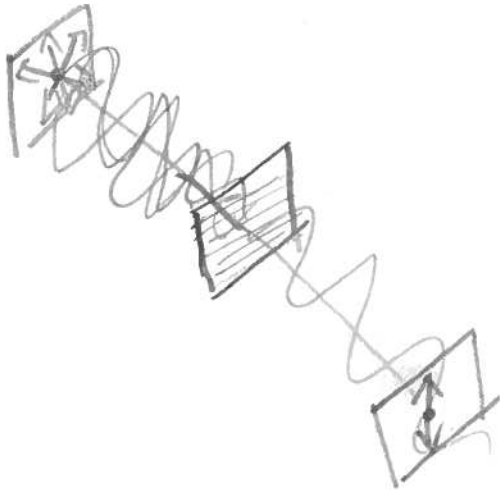
Transverse: oscillation is perpendicular or in opposite direction

Longitudinal: oscillation is parallel or in same direction

Waves: Transfer of energy through disturbances and oscillations

Medium: something to go through, just not a vacuum

Polarized waves:



2: Mechanical & Electromagnetic Waves

Mechanical: Require a medium; sound; seismic waves

Electromagnetic: Does not require a medium; light, radio

↳ Wave Amplitude

Amplitude : Maximum displacements of oscillations in a wave.

Greater Amplitudes mean greater Energy.

You can find Amplitude from comparing the density of a medium.

4: Wave Energy

Wave energy & amplitude are directly related

Higher amplitude = higher energy

5: Wave Period & Frequency

Period: Time between oscillations in a wave

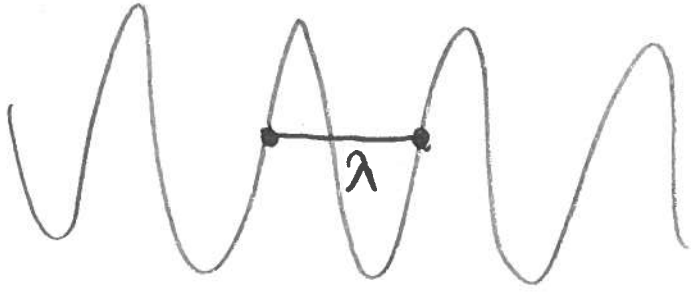
Frequency: How many times it oscillates per unit of time.

↳ Count how many waves every second

$$T = \frac{1}{f} \quad , \quad f = \frac{1}{T}$$

6: Wavelength

How to Find: Measure distance between consecutive peaks



7: Wave Speed

$v = \frac{\lambda}{T}$, waves travel at a constant speed.

Medium determines wave speed. $v = \lambda f$

If you increase tension, the speed increases.

8: Doppler Effect

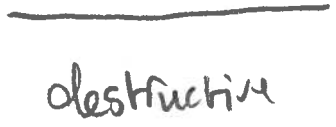
- An increase/decrease in frequency; causes change in pitch.
- Moves away / toward source.

Because the source is moving towards you, the wavefronts are closer, which results in a higher frequency.

9: Wave Superposition

Constructive interference: waves add together.

Destructive: waves cancel each other out.



Sami

10: Traveling Waves

Wind speed, wind duration, and fetch can create large traveling waves.

Standing waves move too but they look still because of interference and reflection.

waves that
move

11: Standing Waves

Nodes: points where it does not; total destructive interference

Antinodes: points where it moves the most; total constructive interference

Two fixed ends: 2 nodes

One open end: 1 node, 1 antinode

Two open ends: 2 antinodes

Rubens Tube: Longitudinal Waves

12: Harmonics

Closed-closed : A node on each end.

Open-closed : A node & an antinode on ends.

Open-open : An antinode on each end.

λ is determined by Boundary (L), & Frequency (f)

Fundamental frequency: frequency of the simplest possible standing wave that can occupy a string or tube.

$$f = \frac{v}{\lambda} \quad \lambda_1 = 2L \quad \lambda_2 = L, \quad \lambda_3 = \frac{2}{3}L$$

13) Beats

Beats = changes in amplitude (volume goes up and down)

Tightening & loosening changes the tension which changes the wave speed.

$$f_{\text{beat}} = |f_1 - f_2|$$