

Waves and Sound Review

Name Key

Waves-General

Vocabulary: crest, trough, wavelength, period, frequency, pitch, amplitude, node, anti-node, transverse wave, longitudinal wave, standing wave, compression, rarefaction, infrasonic, ultrasonic, resonance, harmonics, Doppler Effect, red shift, shock wave

Period = time for one wave cycle (unit = seconds); **Frequency** = # waves/time (unit = 1/sec = hertz)

Pendulum: The period is affected only by length, not by mass or the arc of swing

Types of waves:
Transverse: water waves, S-waves in earthquakes
Longitudinal: sound waves, P-waves in earthquakes

Interference: amplitudes add together

Constructive Interference: crests add to crests, and troughs add to troughs, increasing the amplitude

Destructive Interference: crests add to troughs, decreasing the amplitude

Energy of a wave: amplitude measures the amount of energy in a wave

Water: taller waves have more energy

Sound: louder sounds have more energy

Wave Speed: depends on the medium it travels through: **speed = wavelength x frequency**

Denser mediums = faster wave speed (i.e. sound traveling through air vs. through solids)

Tension: increasing the tension in a medium will increase the wave speed (i.e. guitar string)

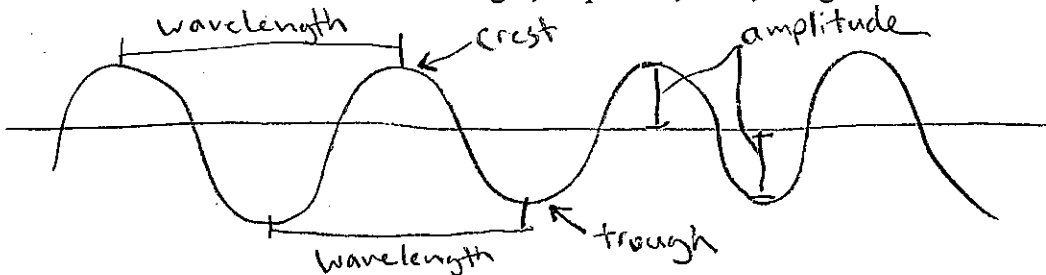
Standing Waves: created when a whole number of wavelengths fit between two fixed points. The fixed endpoints that the wave is traveling between must be located at nodes in order for the wave being reflected back and forth to create a standing wave. The higher the frequency, the more nodes will be created (shorter wavelength)

Speed of waves in various media

- Waves need a medium.
- Waves travel at a measurable speed (speed is fixed for a specific medium).
- Waves travel fastest and best (lose less energy) through solids, then liquids, and they travel slowest and die out the quickest in gases.

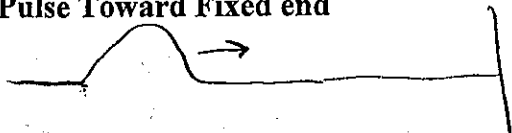
Practice Problems:

1. Draw a transverse wave and label: Wavelength, amplitude, crest, trough.

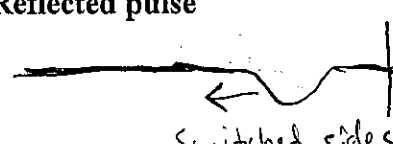


2. Draw a spring pulse moving toward a fixed end **then** draw the reflected pulse as it travels back. (include direction arrows).

Pulse Toward Fixed end



Reflected pulse



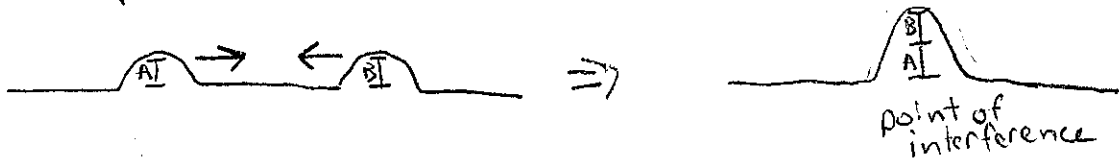
Smaller - some energy transferred as heat due to friction.

c. inverted pulse

3 Describe what constructive and destructive interference is and include a picture in your explanation.

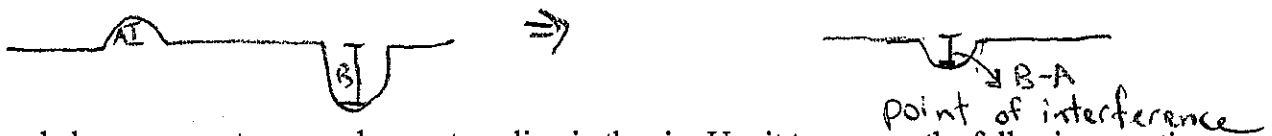
Constructive Interference:

- When pulses combine to increase amplitude



Destructive Interference:

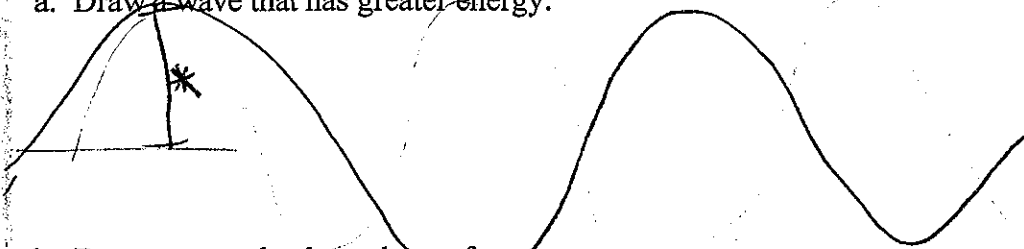
- when pulses combine a crest & a trough & decreases amplitude



4 The wave below represents a sound wave traveling in the air. Use it to answer the following questions:

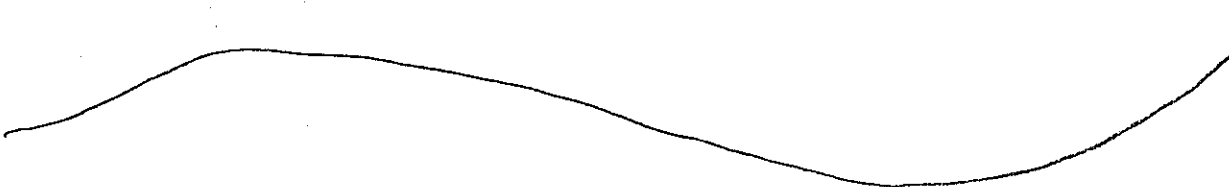


a. Draw a wave that has greater energy:



* Bigger Amplitude

b. Draw a wave that has a lower frequency:



* Longer wave length

e. Which of the waves that you drew has the longest wavelength (a, b)? B