

SLINKY ACTIVITY

Purpose

- 1) Be able to model transverse and longitudinal waves
- 2) Identify the relationship between amplitude, frequency and wavelength

Review:

Word bank: Frequency, Wavelength, Amplitude

_____ is the distance from the equilibrium to the crest in a transverse wave and the distance from the equilibrium to the farthest point a particle moves in a longitudinal wave

_____ is the number of waves that pass a given point in a given amount of time (usually 1 sec) Unit of measure is Hertz (1Hz = 1/s)

_____ is the distance from one point on a wave to the next identical location on the next wave (one wave cycle: crest to crest or compression to compression)

Procedure TRANSVERSE WAVE

- 1) Have two people hold the spring at both ends and stretch the spring over about 1/2 the length of the table. Make sure the center of the slinky is on the center line of the poster taped to the table.
- 2) Have one person video each wave demonstration (use app "slopro").
- 3) Have the person on the poster side SLOWLY move the slinky back and forth on the table at the 2in interval. RECORD the amplitude, frequency, and wavelength.
- 4) Repeat step 3 but QUICKLY (increase the rate of vibrations) move the slinky back and forth on the table at the 2 in interval. RECORD the amplitude, frequency, and wavelength.
- 5) REPEAT steps 3 and 4 using the 6 in interval. RECORD your information in the data table.

Interval	Amplitude		Frequency		Wavelength	
	Slow	Fast	Slow	Fast	Slow	Fast
2 in						
6 in						

Analysis

- 1) Did it take more energy to create a high amplitude wave or a low amplitude wave? _____

Relationship between amplitude and energy (circle correct word)

- Increase the amount of energy, the amplitude will (increase / decrease)
- Decrease the amount of energy, the amplitude will (increase / decrease)

- 2) What happens to the frequency when you increase the rate of vibration at which the slinky is moved back and forth? frequency (increase / decrease)

Relationship between frequency and energy

- Increase the amount of energy, the frequency (increase / decrease)
- Decrease the amount of energy, the frequency (increase / decrease)

- 3) What happens to the wavelength when you increase the frequency? wavelength (increase / decrease)

Relationship between wavelength and frequency

- Increase the frequency, wavelength (increases / decreases)
- Decrease the frequency, wavelength (increases / decreases)

Procedure LONGITUDINAL WAVE

- 1) Have two people hold the spring at both ends and stretch the spring over about $\frac{1}{4}$ the length of the table. Make sure the center of the slinky is on the center line of the poster taped to the table.
- 2) Have one person video each wave demonstration (use app "slopro").
- 3) Have the person on the poster side pull several coils on the slinky from the 2in (on the center line) to 0in (horizontal line). Release the coils and observe what happens. Record your observations.
- 4) Have one person on the poster side pull several coils on the slinky from the 4in (on the center line) to 0in (horizontal line). Release the coils and observe what happens.

Observations

2in:

4in:

5) Work together to figure out how you would need to move the slinky to increase the frequency. Explain what you did.

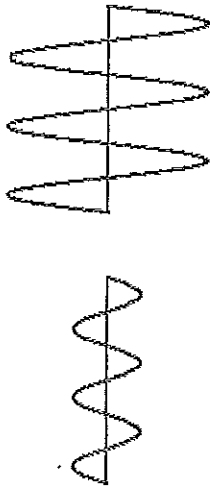
6) Figure out how you would need to move the slinky to decrease the wavelength. Explain what you did.

Review

Amplitude

For a wave to have a high amplitude the particles have to be moving more. The more the particles move, the more work there is being done on the particles. The more work there is, the more energy there is and so, a wave with a large amplitude has more energy than a wave with a small amplitude. Think about being in the ocean at the beach. Small little waves don't have the energy to knock you over, but the larger ones may sweep you off your feet.

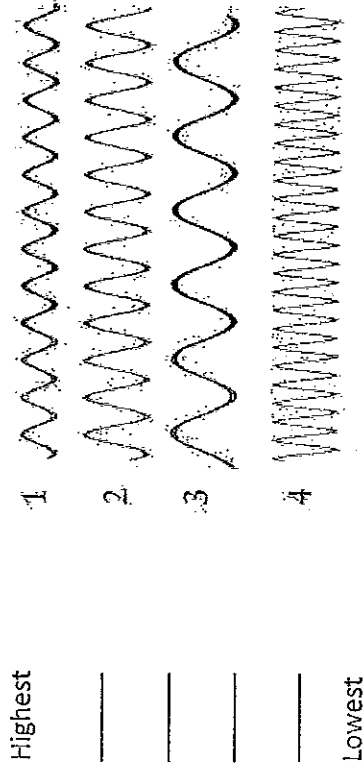
Label the waves below as low amplitude or high amplitude



Finish the following statement:

Wave _____ has the more energy than wave _____ because _____

Put the waves below in order of highest frequency to lowest frequency



If you have two waves of the same amplitude, the wave with the shorter wavelength carries _____ (more or less) energy than the wave with the longer wavelength.

Model Transverse Wave

Be ready to model the following with the slinky

- 1) Transverse wave with high and low amplitude
- 2) Longitudinal wave with high and low amplitude
- 3) Transverse wave with short and long wavelength
- 4) Transverse wave with high and low frequency
- 5) Longitudinal wave with high and low frequency

Challenge

- 6) Transverse wave with low frequency and high amplitude
- 7) Transverse wave with high frequency and low amplitude
- 8) Longitudinal wave with high frequency and high amplitude

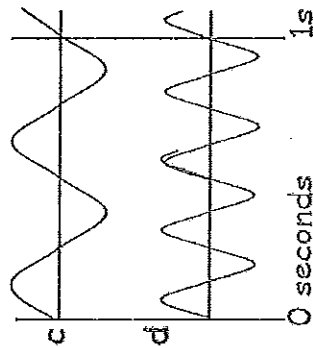
Frequency

What is the frequency of each wave?

Don't forget your units!! (Hz)

Wave C = _____

Wave D = _____



Wave _____ has the lowest frequency and wave _____ has the highest frequency.