

Slinky Lab

Name _____ Date _____ Core _____

- Begin by stretching the Slinky 2 meters (6 feet) between your partner and yourself. One person will hold each end.
- You will be timing the waves on the Slinky (one complete trip, back and forth).

P-WAVES (PUSH-PULL):

1. Practice first by pulling the Slinky toward you a bit and then pushing it away. Notice that a wave travels along the Slinky from you to your partner.
2. You will do 3 trials of the P-wave, timing the wave as it does one complete trip back and forth. Record the information on the STUDENT SHEET and sketch the movement of the Slinky.
3. Take the average (find the mean) of the 3 trial times.

You should see that the vibrating parts of the Slinky move back and forth along the same direction in which the wave is traveling. This type of wave is called a longitudinal wave or a compression wave, and it is a model for seismic **primary waves**, or **P-waves**. They're known as primary waves because they are the fastest of the earthquake waves, arriving first at distant points.

S-WAVES (SIDE TO SIDE):

1. Shake one end of the Slinky from side to side. Notice that a different type of wave travels along the Slinky. This time the sections of the Slinky move from side to side (horizontally), but the movement of the Slinky is at right angles to the direction of the progressing wave.
2. You will do 3 trials of the S-wave, timing the waves as it does one complete trip back and forth. Record the information on the STUDENT SHEET and sketch the movement of the Slinky.
3. Take the average (find the mean) of the 3 trial times.

This time you should see a type of wave is called a transverse wave. A transverse wave can move through the bulk of a solid although it cannot move through liquid or gas. The transverse wave you made with the Slinky proves a model for seismic waves called **secondary waves**, or **s-waves** that travel through solid rock. There are really 2 types of S waves. S-H (S-Horizontal) waves (which you just demonstrated) and S-V waves (S-Vertical) which you could demonstrate by moving the Slinky up and then down and watching the wave.

COMPLETE THE BOTTOM OF STUDENT SHEET

SO WHAT IS GOING ON???

When an earthquake begins the stress on large blocks of rock becomes greater than the strength of the rock. The rock breaks, releasing large amounts of energy. This energy is carried outward in all directions by various seismic waves, some of which can reach the opposite side of the earth in about twenty minutes. The further the waves travel from the focus of the earthquake, the weaker they become.

P-waves push and pull the underground rocks, causing structures on the surface to move back and forth. SH-waves move the rocks beneath the earth's surface from side to side, giving buildings on the surface a good shaking, often with very damaging effects. With SV-waves, the shaking is in a vertical direction-which sometimes can be enough to launch you out of your seat. S-waves and P-waves cause high-frequency vibrations that tend to cause low buildings to vibrate more than tall structures.

Surface waves are long, slow waves. The low-frequency vibrations that they induce in buildings have more effect on tall buildings than on low ones. Love waves shake things from side to side. The slowest seismic waves, Rayleigh waves, are rolling waves that make you feel as if you're struggling to keep your balance on a ship in the open ocean.

Student Sheet

Slinky Lab – Earthquakes and Waves

Directions: Sketch the motions of the waves and fill in the table below for each trial.

Type of earthquake wave	Sketch of the movement of the spring
Pull and Push (Compressional or P-wave)	
Side to Side (Shear or S-wave)	

Wave speed

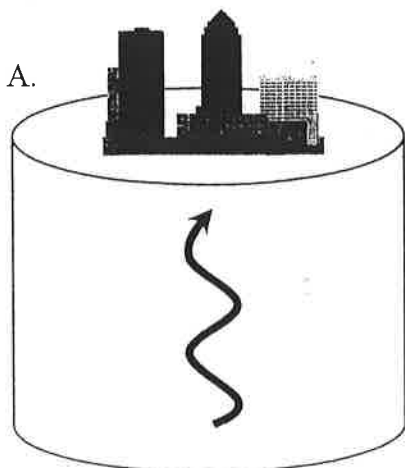
Type of earthquake wave	Time for one complete trip of the wave – back and forth (seconds)			
	Trial 1	Trial 2	Trial 3	Average
P-wave				
S-wave				

A. Which of the seismic waves move fastest? _____

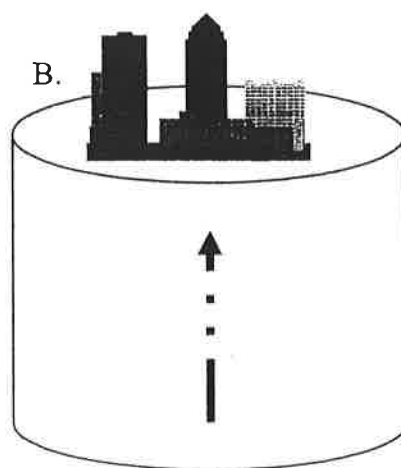
B. Which wave do you think would be more destructive? _____

Why? _____

C. For the pictures below, indicate on the line by each picture if the wave shown is a P-wave or an S-wave. Draw on the buildings how the earthquake wave might move the ground (use arrows).



A. _____



B. _____