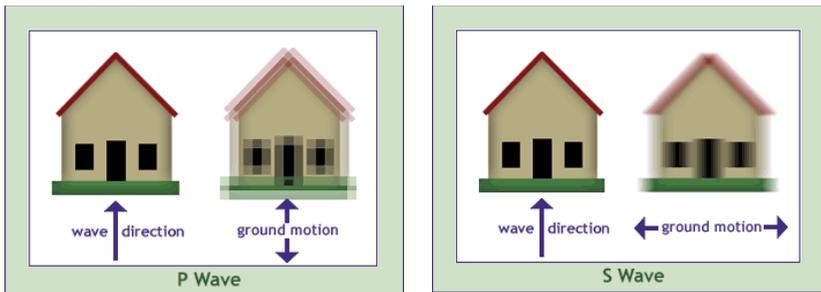


Seismic Waves

Chapter 11

Seismic waves are energy waves that are produced by all earthquakes. Different types of energy waves are released during an earthquake. All large and small earthquakes produce P waves and S waves. Geologists have set up special instruments to record these waves.

- P waves are primary waves because they reach reporting stations first.
- S waves are transverse waves and are the second waves to be recorded by seismographs.
- Large earthquakes only produce Love waves and Rayleigh waves.

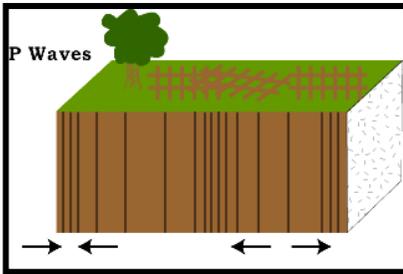


USGS

P waves

P waves passing through the interior of the Earth are the fastest earthquake waves. P waves are a signal to reporting stations that an earthquake has occurred. P waves travel through all parts of the Earth. They can move through solids, liquids, and gases.

P waves move through the Earth as the particles in rocks compress and expand as they rebound back to their original shape.



The arrival of P waves is like a sharp thud during an earthquake.
USGS

How rocks expand and contract

To understand how material can compress and expand take a piece of sponge and place it on a table. Place a heavy book on top of the sponge. The sponge will compress because it is not a solid. The spaces inside a sponge are designed to absorb water and will compress, flattening the sponge.

Lift the book off the sponge and watch the sponge expand and rebound to its original shape. This is like what happens to rocks as P waves travel through the Earth from the focus of an earthquake.

P waves inside the Earth

P waves travel between 4 and 8 km/sec in the crust. The waves speed up at the Moho boundary between the crust and the mantle. The precise speed of the P waves traveling through the Earth varies with the type of rock and density of the rocks. The P waves speed up as they travel toward the Earth's core. They reach speeds of 13 km/s near the outer core.

Shear waves

S waves are the second waves to arrive at reporting stations and are used to determine the distance the reporting station is from the earthquake. Shear waves are the second type of waves produced by all earthquakes.

Seismic Waves

Quiz 11

Fill in the blanks using words from the Word Bank

1. Rayleigh waves are like the _____ that form when you drop a pebble in a pond of water.
2. Scientists placed a series of stakes in the ground to observe plate _____ on the San Andreas Fault.
3. P waves are created by the _____ and compression and of rock particles as the waves travel through the Earth.
4. A _____ core was proved by Beno Gutenberg using S waves that are stopped at a boundary 2883 km beneath the Earth's surface.
5. The arrival of _____ is like a sharp thud during an earthquake.
6. P waves are _____ into surface waves upon reaching the Earth's surface.
7. The distance from the _____ to the Earth's surface is used to determine the focal depth of an earthquake.
8. P waves move through _____, solids, and liquids as they travel through body of the Earth.
9. Large earthquakes produce _____ waves and Rayleigh waves.
10. Love waves move back and forth in a horizontal motion like S waves without _____ movement.

Word Bank

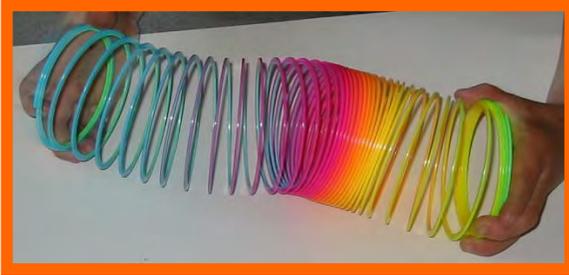
expansion	movement	focus	gases	vertical
transformed	ripples	Love	liquid	P waves

P Waves & S Waves

Activity 11

Introduction

You will see how P waves and S waves travel through the Earth.



Materials

- Plastic slinky
- Rope 3 to 4 meters long

Directions

P waves

1. Two people hold a slinky at each end.
2. One person gathers up several coils and then lets them loose.
3. The second person repeats the activity.
4. Draw a picture of the motion produced by the slinky on a sheet of paper.

S waves

1. Two people hold a thick rope at each end.
2. One person moves the rope quick in an up and down motion to simulate an S wave.

More science activity ideas

- Try this experiment with a metal slinky and plastic slinky taped together.
- Create S waves with different thicknesses of rope.

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