

## Seismic Wave Races

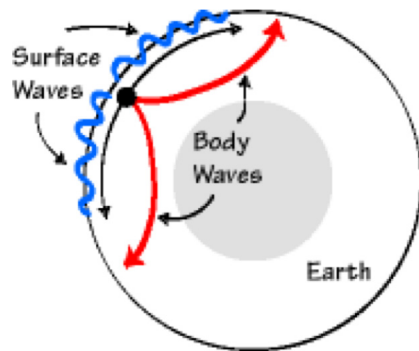
### Objectives:

- Understand what happens during an earthquake
- Understand seismic waves – the types and how they move through the Earth, including wave propagation and speed

### Standards:

- Science (5-8/9-12):
  - Science as Inquiry: Abilities necessary to do scientific inquiry
  - Physical Science: Transfer of energy and interactions in energy and matter.
  - Earth and Space Science: Changes in the Earth; energy in the earth system
  - Science in Personal and Social Perspectives: Natural hazards

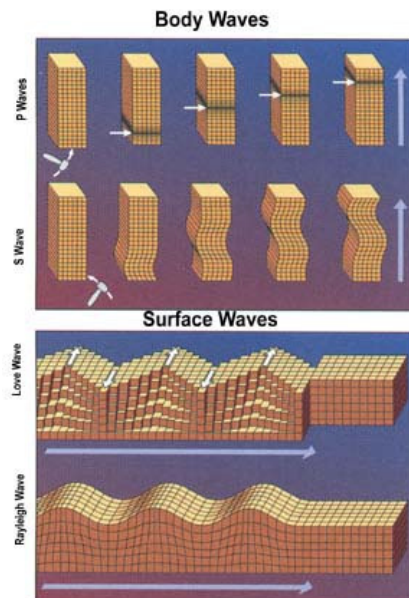
### Background:



Seismic waves come in two major types, body waves which can travel through the interior of the Earth, and surface waves which are confined to the Earth's surface. Body waves travel the fastest but their strength diminishes quickly; surface waves travel slower but retain their strength over greater distances.

Body waves themselves

come in two types: P (primary) waves and S (secondary) waves. They get these names because they are the first two wave types that reach seismographs after an earthquake. The P-wave is a compressional wave like a sound wave, alternating compression and extension of the rock mass in the direction that the wave is traveling. P-waves can travel through both solids and fluids and can travel through all parts of the Earth and even through the ocean. S-waves are shear waves whose motion is perpendicular to the direction the wave is traveling. S-waves can travel through solid materials but not fluids. P-waves have the fastest seismic wave speed and S-waves are the second fastest.



### Classroom Activity:

Line up the students standing shoulder to shoulder in two parallel equal length lines, make sure the two lines face each other (one is the P-wave line the other is the S-wave line). Have the students link arms and tell the

students they cannot move until they feel the student next to them push or pull on them. Using an assistant to start the P-wave line begin the wave motion on each line simultaneously and see which line reaches the end first. P-motion: the assistant pushes gently on the shoulder of the first student pushing them into the student next to them. S-motion: you pull the first student forward into a bow—which should transfer to the next student.

**Possible questions/inquiry for learners:**

Compare and contrast the wave motion for the P and S-waves.

Describe which line reaches the end first and describe why in terms of the wave.

What would these different types of motion do to building structures, roads, bridges, land, etc.?