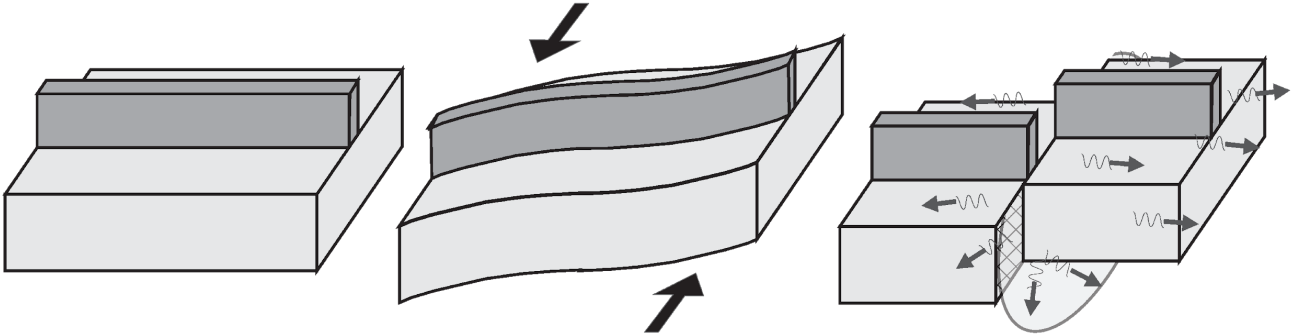


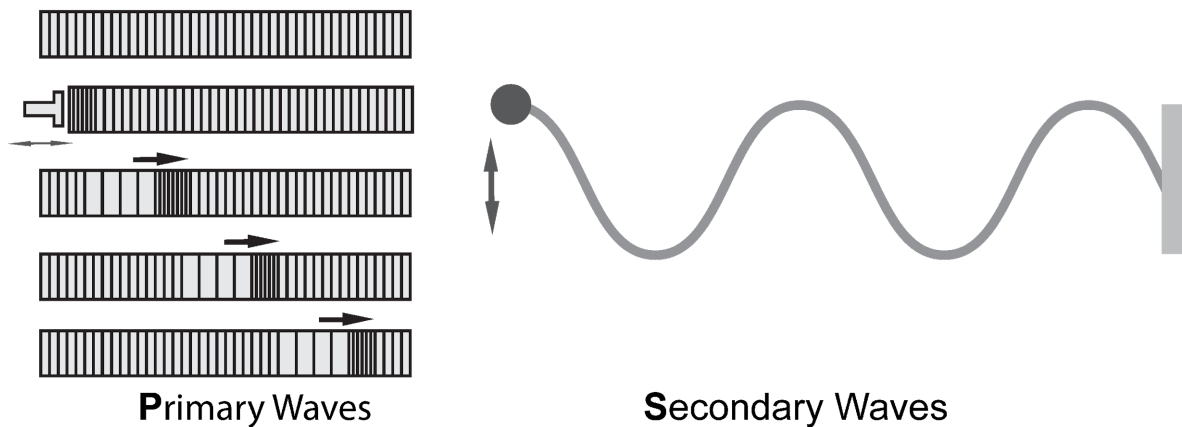
## First some review of Earthquake Waves:

### Elastic Rebound



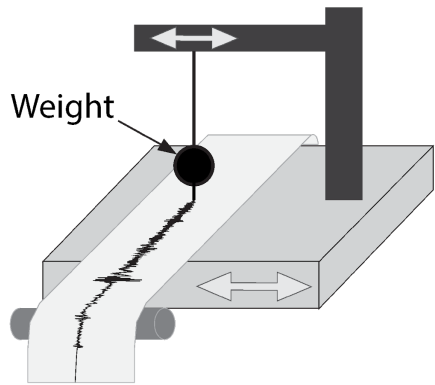
The classic explanation for the source of earthquakes. A section of the crust under some stress will build up strain. A fault rupturing will allow the crust to rebound (elastically), albeit some offset remains. As the crust rebounds, the strain that was built up in the rock is released in the form of wave energy.

### Body Waves

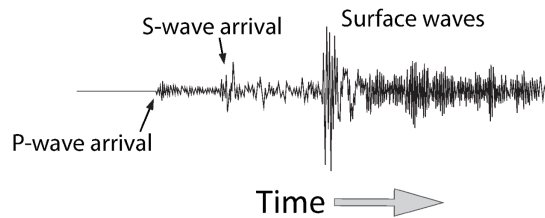


The two types of body waves, are named as such because they travel through the body of the Earth. Primary waves are compressional in nature, also referred to as P waves. Secondary waves travel by a shearing motion, not unlike a rope that is tied to a wall and shaken vertically, also referred to as S waves.

## Seismogram



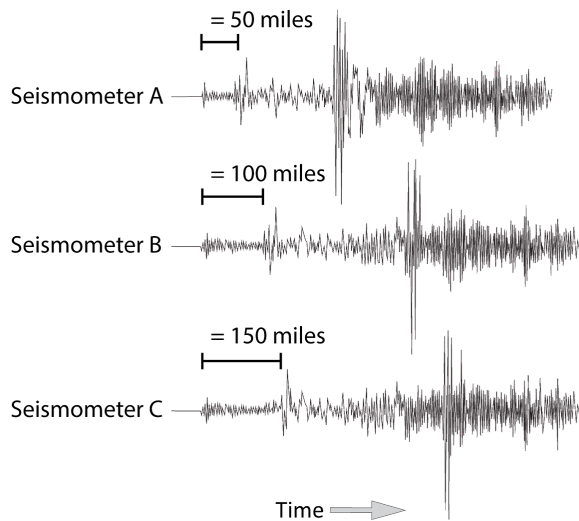
Seismometer/Seismograph



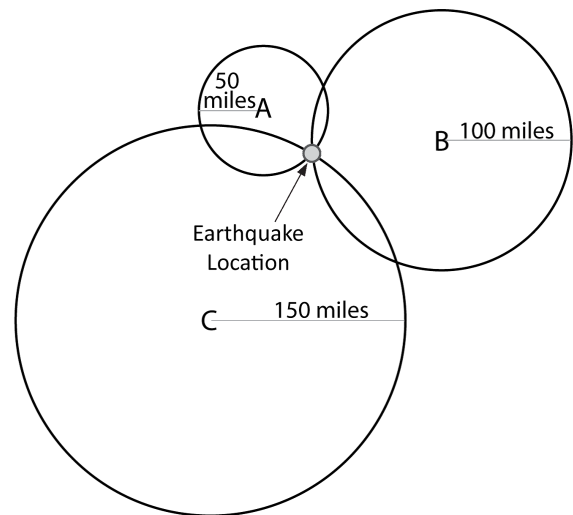
Seismogram

Seismometers are positioned across the Earth's surface. Attached to the Earth, they record the local movement felt by earthquake waves. The seismogram is the record of earthquake waves having influenced the seismometer. The arrival of different wave types can be identified in the record.

## Triangulating Earthquake Location



Difference between  
P- and S-wave arrival



Triangulation on a map

Because the speed of P- and S-waves is known, the difference in their arrival indicates the distance the seismometer is located from the earthquake location. In practice; 100's to 1,000's of seismographs can be used to find a very precise location.

## Now, test your knowledge:

Briefly define the following terms:

**elastic rebound -**

**body wave -**

**p-wave -**

**s-wave -**

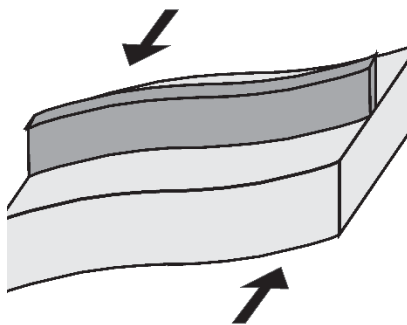
**surface wave -**

**seismometer -**

**seismograph -**

**seismogram -**

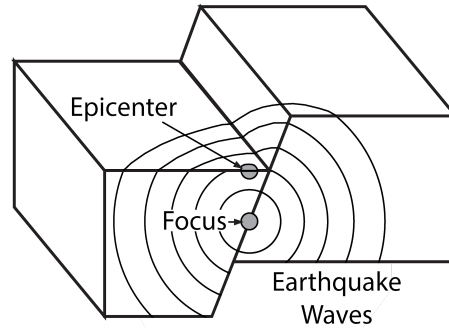
Answer the following:



1. True/False. The above image shows a block of crust that is experiencing an earthquake.
  - A. True
  - B. False

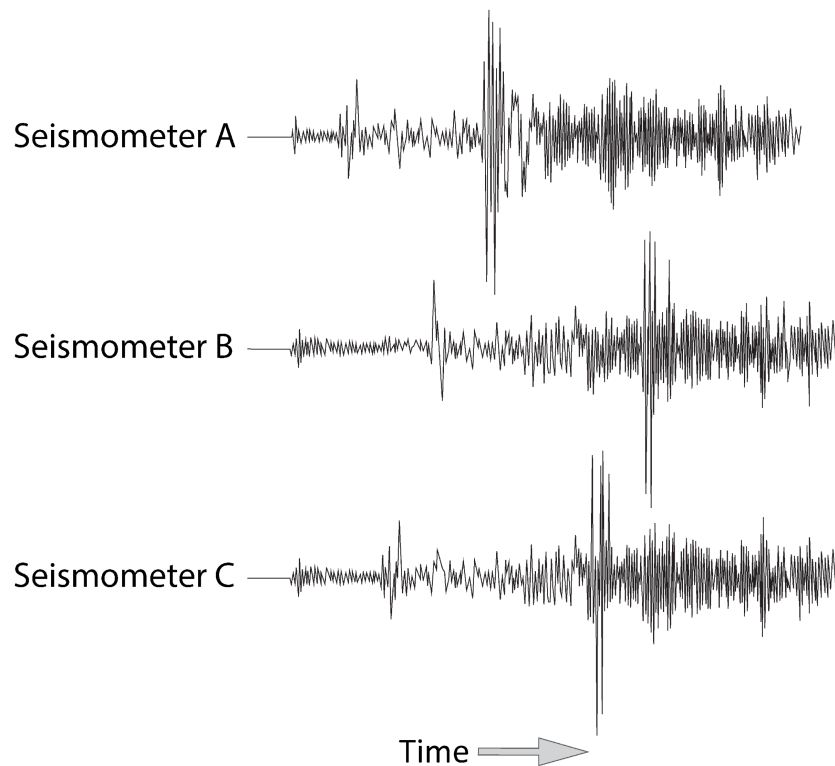
Physical Geology Lecture Tutorials  
Earthquake Waves

2. When the friction on a fault is overcome, the adjacent blocks will rebound to their original shape, albeit offset in locations along the fault. This is due to a release of \_\_\_\_\_ built up in the blocks.
- A. Stress
  - B. Strain
  - C. Brittle Friction
  - D. Elastic



3. Earthquake waves travel outward from the fault “focus”, the precise point on the fault surface where the earthquake propagates from. These waves will \_\_\_\_\_.
- A. Travel outward along the fault only, as far as the fault stretches.
  - B. Travel outward in all directions along the surface of the Earth.
  - C. Travel outward in all directions, along the fault, along the surface of the Earth and throughout the body of the Earth.
  - D. Travel only through the body of the Earth.
4. True/False. The Epicenter is the location on the surface, directly above the focus of an Earthquake.
- A. True
  - B. False
5. True/False. Body waves are named because they travel through the body of the earth
- A. True
  - B. False
6. Which waves are the first to arrive at a particular location away from the earthquake focus?
- A. All Body waves
  - B. P-waves
  - C. S-waves
  - D. Surface waves
7. Which waves are the second to arrive at a particular location?
- A. All Body waves
  - B. P-waves
  - C. S-waves
  - D. Surface waves

8. Which waves travel the fastest?
- A. All Body waves
  - B. P-waves
  - C. S-waves
  - D. Surface waves
9. What is the minimum number of seismometer records (seismograms) you need to find the location of an earthquake?
- A. 1
  - B. 2
  - C. 3
  - D. 4
  - E. 5



10. In the above image, which of the seismometers is the closest to the earthquake location?
- A. Seismometer A
  - B. Seismometer B
  - C. Seismometer C
11. In the above image, which of the seismometers is the furthest away from the earthquake location?
- A. Seismometer A
  - B. Seismometer B

C. Seismometer C

12. You know the answer to question #11 because \_\_\_\_\_.

- A. The correct answer has the largest difference between arrivals of P-waves and surface waves.
- B. The correct answer has the largest difference between arrivals of P- and S-waves.
- C. The correct answer has the shortest difference between arrivals of P-waves and surface waves.
- D. The correct answer has the shortest difference between arrivals of P- and S-waves.

## Now, think deeper:

On your own:

13. Describe what you understood an earthquake to be prior to today (or prior to taking this course).

14. In what ways has your knowledge of earthquakes changed? What information is new?

15. What questions do you still have about earthquakes?

Working in groups of 2 or 3:

16. Discuss your answers to questions 13-15. Write down similarities and differences amongst your group partners for each of the questions.