

# OKLAHOMA ROCKS!

## Earthquakes: Seismic Waves

Earthquakes produce seismic waves similar to sound waves that travel very fast through the Earth. These seismic waves radiate out from the earthquake in all directions. Scientists record seismic waves on sensitive instruments called seismometers. These instruments measure the ground motion caused by the passage of seismic waves. These waves are then used to locate the origin and cause of an earthquake. Seismic waves serve a purpose similar to that of X-rays that doctors use to look into the human body, except that these waves help seismologists study the Earth.

There are three basic types of seismic waves. The P-wave, or primary wave, travels faster than any other seismic wave. S-waves, or secondary waves, travel slower than P-waves. And surface waves travel slower than either other type, and do not travel through the deep interior of the Earth. Surface waves are the waves that cause most of the damage in an earthquake.

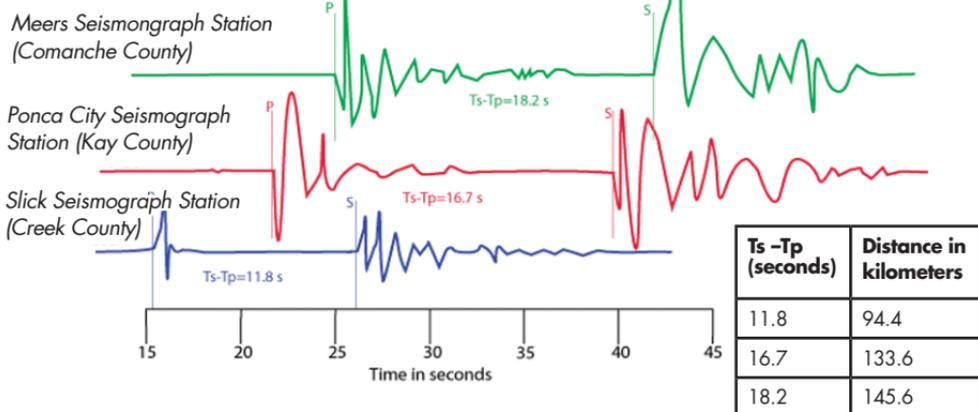


### Activities:

1. The average velocity of a P-wave traveling within the Earth is greater than eight kilometers per second. At 8 km/s, how long will it take a P-wave to reach the other side of the Earth? (The diameter of the Earth is about 12,742 km.) How fast is 8 km/s when converted to miles per hour?
2. Surface waves have a speed of about 4 km/s. How long does it take for a surface wave to circle the globe once? (The circumference of the Earth is 40,075 km.)
3. The graph below shows the seismic waves of an Oklahoma earthquake as recorded by three separate seismograph stations. You can use the provided time differences between the S and P waves ( $T_s - T_p$ ) and the table to find out how far an earthquake is from a seismograph. To do so, take a map of Oklahoma and scale a compass to the map scale. Then draw a circle on the map for the corresponding difference. Once you have done all three, the circles should nearly meet at single point. The earthquake occurred somewhere near the intersection of the circles. If they don't match perfectly, that is called a location of uncertainty.

For example, the difference between the S and P waves measured at the Meers Seismograph Station was 18.2 seconds, which according to the table indicates a distance of 145.6 kilometers. Thus, a circle should be drawn with Meers at its center and a radius scaled to reflect 145.6 km.

### Seismic Waves



Newspapers for this educational program provided by:

