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2. Every 50 years
3. Every 100 years
4. Every 200 years

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2. The surface of the Earth is broken into large, rigid, movable \_\_\_\_\_ that move over a layer of partly molten rock.
3. The \_\_\_\_\_ is the unifying theory of geology.
4. In the \_\_\_\_\_, scientists found that as distance increases from the centre of the ridge, the rocks are older.
5. \_\_\_\_\_ occurs when plates of different density converge.

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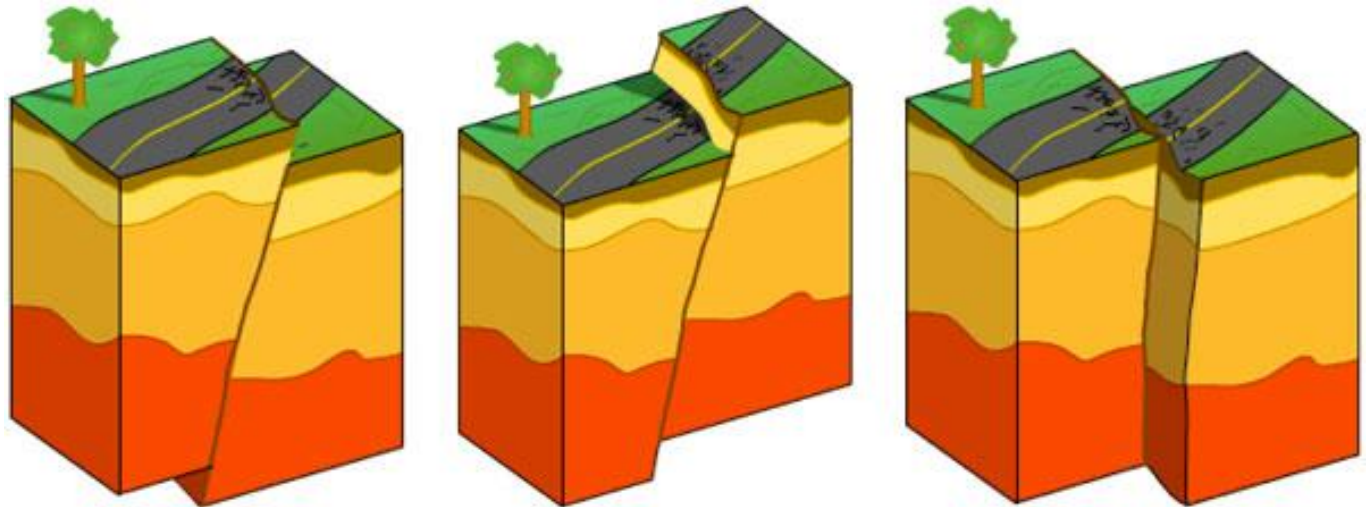
# EARTHQUAKES

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# Earthquakes

- It takes a tremendous amount of energy to move tectonic plates.
- Pressure is built up between tectonic plates as convection currents move beneath them.
- When the plates can no longer resist the stress, there is an earthquake – a massive release of energy that shakes the crust.



# Earthquakes

- Although earthquakes can occur anywhere on Earth, 95% occur at tectonic plate boundaries
- About 80% of earthquakes occur in a ring bordering the Pacific Ocean.

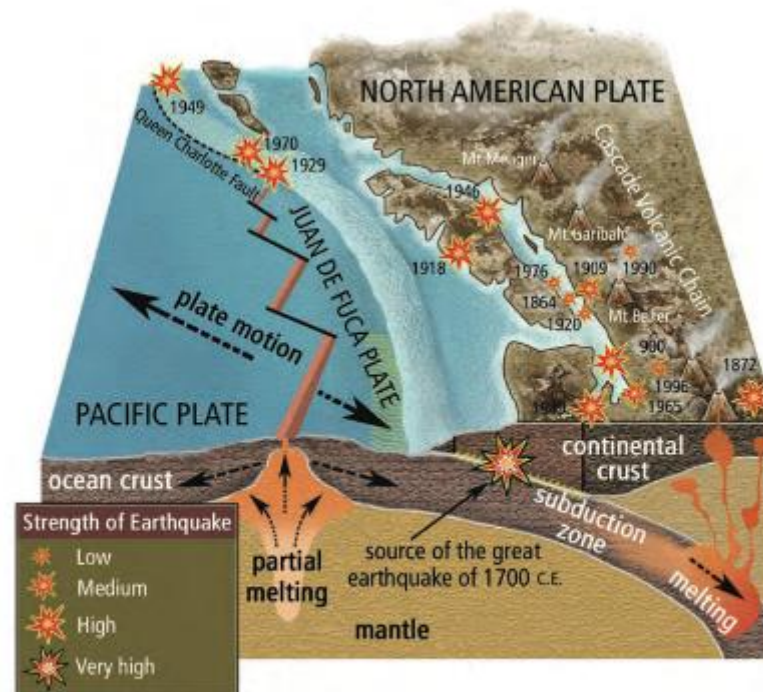
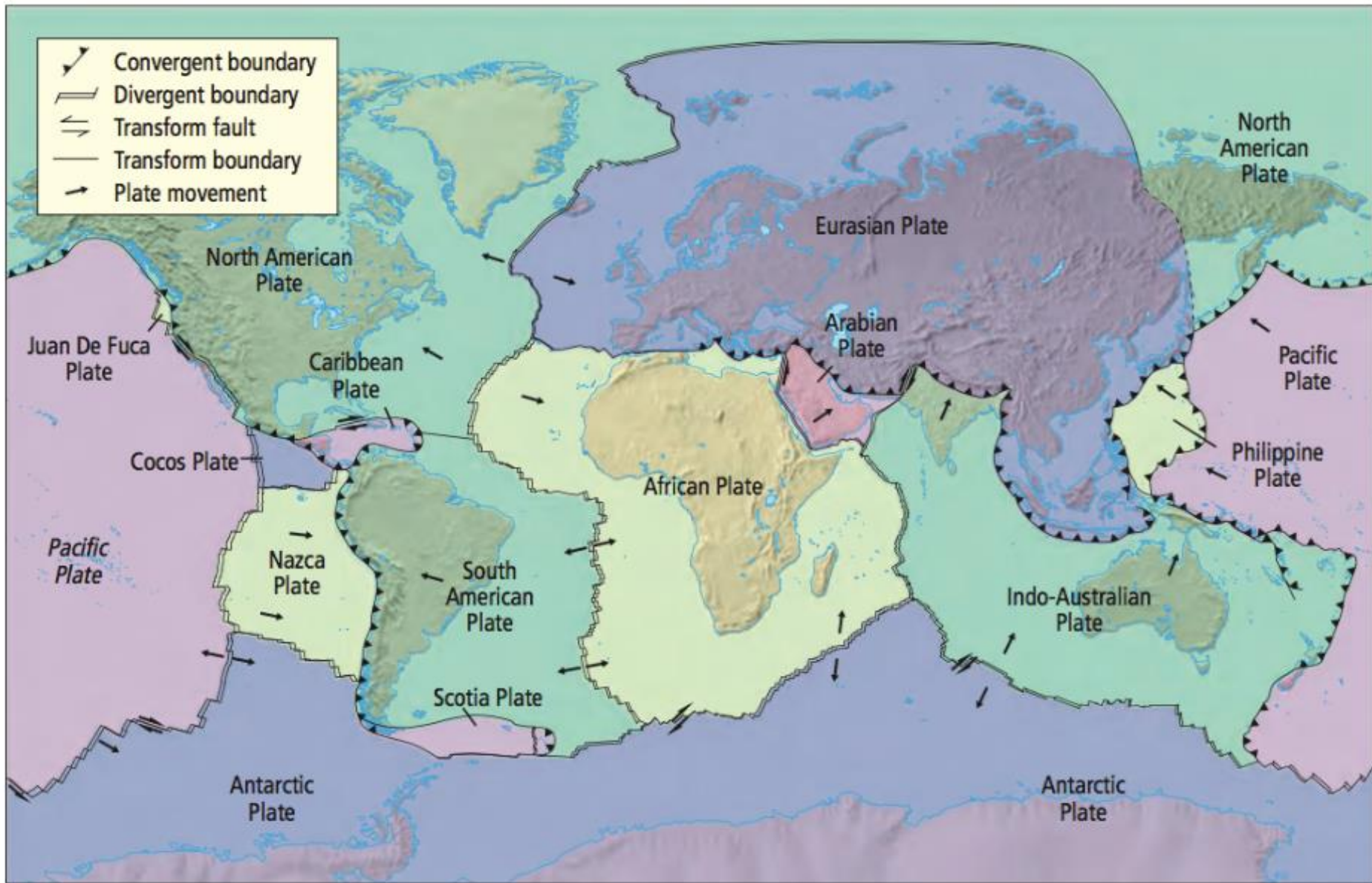


Figure 12.21 British Columbia sits near the boundary of the North American and Juan de Fuca Plates, an area where large earthquakes can occur.



# Describing Earthquakes



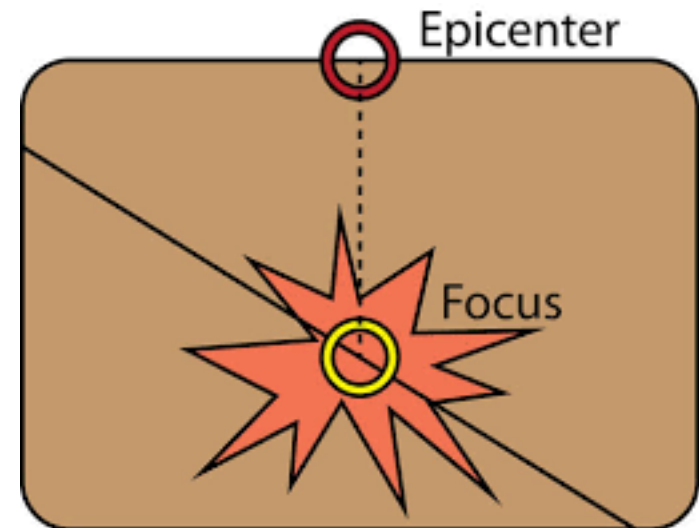
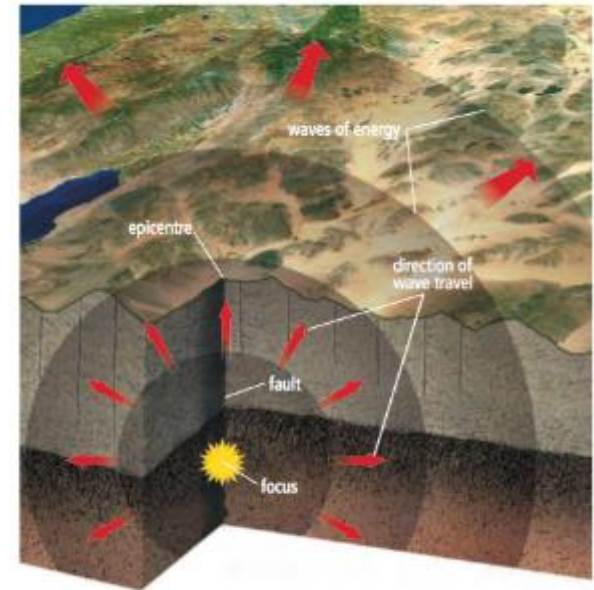
- It is very difficult to accurately predict the timing, size and location of a particular earthquake.
- The plate tectonic theory has greatly helped scientists to understand where and how often earthquakes occur.
- This understanding has led to improved designs for earthquake-resistant buildings and has helped make it safer to live in British Columbia and other places where earthquakes occur.

# Describing Earthquakes

- [Earthquakes](#)

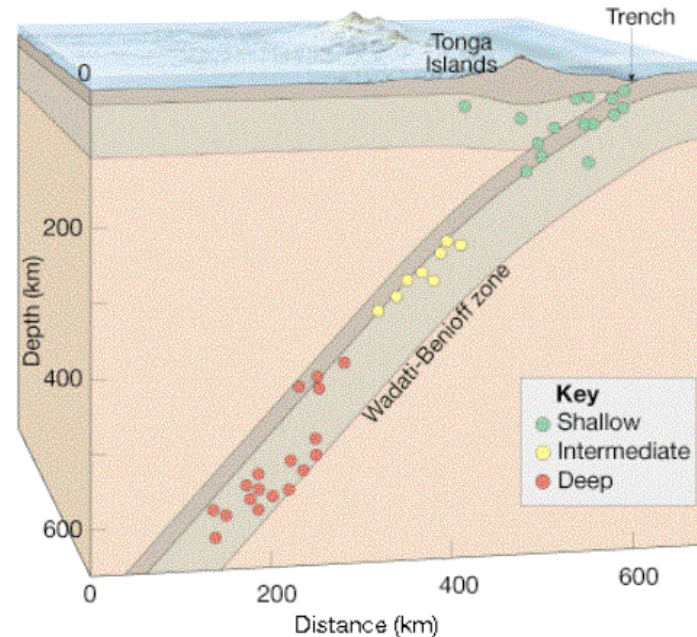
# Describing Earthquakes

- The **focus** (plural foci) is the location inside Earth where an earthquake starts.
- Energy release begins at the focus.
- The **epicentre** is the point on the Earth's surface directly above the focus.



# Describing Earthquakes

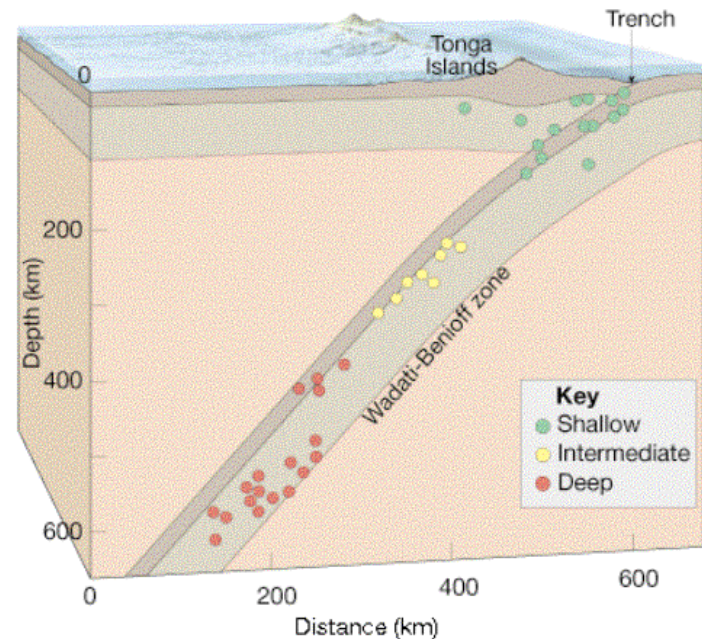
- Earthquakes occur at different depths depending on the plates involved and depth of the focus.
- Deep focus
  - Must travel a long distance
  - Energy can be lost
  - May not cause much damage





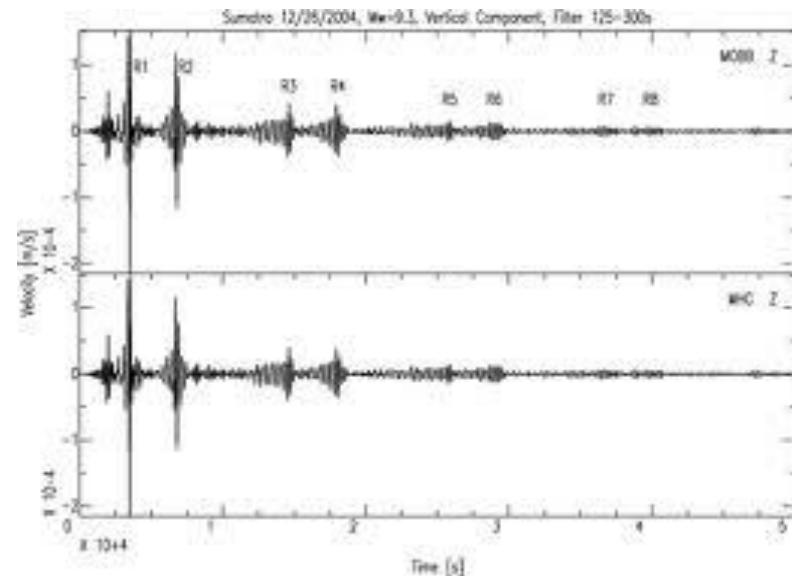
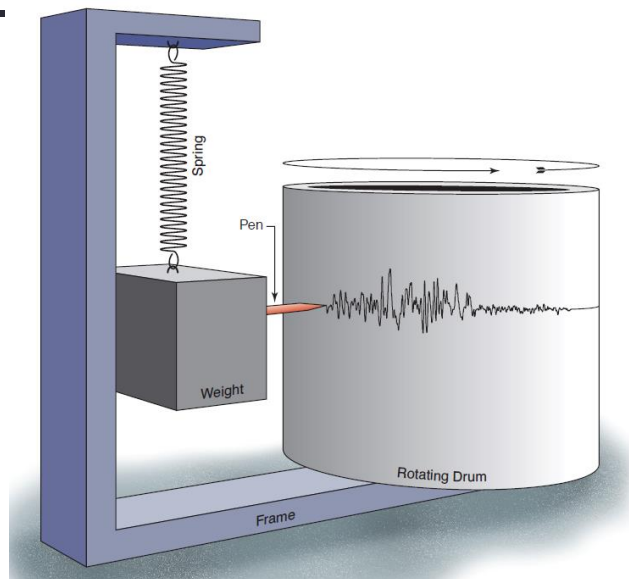
# Describing Earthquakes

- **Shallow focus**
  - Begins close to the surface
  - Energy not lost
  - Usually causes **more** damage
  - Over 90% of earthquakes have foci that are less than 100km deep

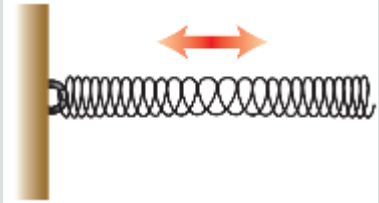


# Types of Earthquake Waves

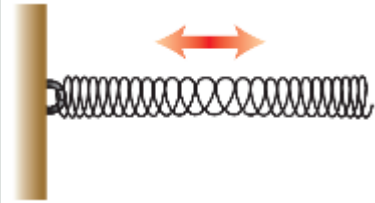
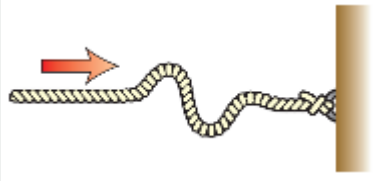
- Geologists cannot explore Earth's interior directly
- Energy released by an earthquake produces vibrations known as seismic waves.
- Seismology is the study of these waves.
- Seismometers are used to measure seismic wave energy.



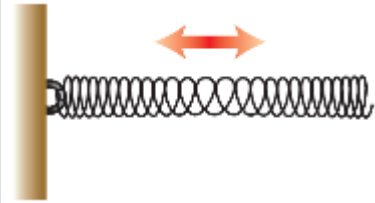
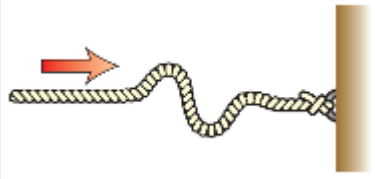

# Types of Earthquake Waves

Seismic Wave	Abbreviation	Description	Motion
Primary wave	P	<ul style="list-style-type: none"><li>• Compression wave</li><li>• First to arrive</li><li>• Travels through solids, liquids and gases</li></ul>	 A diagram illustrating the motion of a primary wave. It shows a vertical brown bar on the left, representing a fixed point. A horizontal spring is attached to the bar and extends to the right. The spring is shown in a state of oscillation, with a red double-headed arrow above it indicating the direction of motion, which is parallel to the wave's direction of travel.

# Types of Earthquake Waves

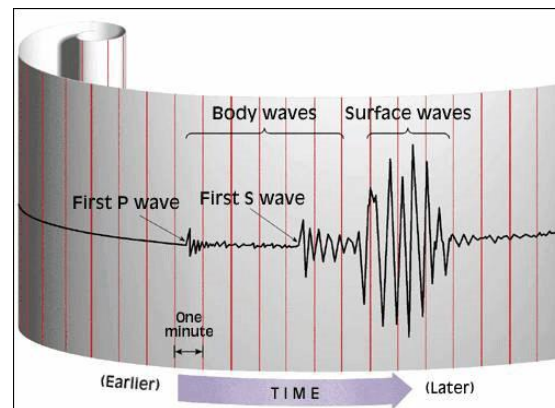
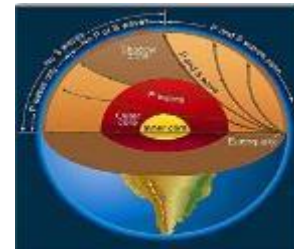
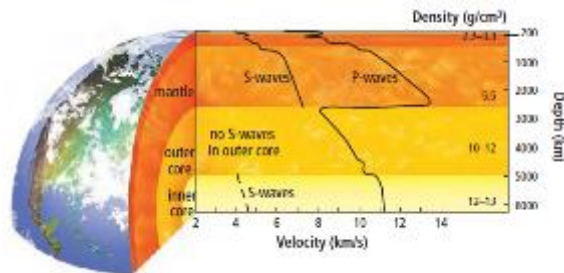
Seismic Wave	Abbreviation	Description	Motion
Primary wave	P	<ul style="list-style-type: none"><li>• Compression wave</li><li>• First to arrive</li><li>• Travels through solids, liquids and gases</li></ul>	 A diagram illustrating a Primary (P) wave. It shows a vertical brown bar on the left representing a fixed point. A horizontal spring is attached to the bar and extends to the right. A red double-headed arrow above the spring indicates the direction of longitudinal oscillation, moving back and forth parallel to the wave's direction.
Secondary wave	S	<ul style="list-style-type: none"><li>• Transverse wave</li><li>• Second to arrive</li><li>• Travels through solids but not liquids</li></ul>	 A diagram illustrating a Secondary (S) wave. It shows a vertical brown bar on the right representing a fixed point. A rope is attached to the bar and extends to the left. A red arrow above the rope points to the left, indicating the direction of wave travel. The rope is shown in a transverse wave pattern, oscillating perpendicular to the direction of travel.

# Types of Earthquake Waves

Seismic Wave	Abbreviation	Description	Motion
Primary wave	P	<ul style="list-style-type: none"><li>• Compression wave</li><li>• First to arrive</li><li>• Travels through all layers of the Earth</li></ul>	
Secondary wave	S	<ul style="list-style-type: none"><li>• Transverse wave</li><li>• Second to arrive</li><li>• Travels through core and mantle only</li></ul>	
Surface wave	L	<ul style="list-style-type: none"><li>• Travels along Earth's surface</li><li>• Last to arrive</li><li>• Motion is a rolling action,</li></ul>	

# Types of Earthquake Waves

- Comparing how P and S waves travel through the Earth can tell us if the Earth is solid or liquid.



# Measuring Earthquakes

- Earthquakes are measured based on the Richter magnitude scale.
- Developed in the 1930's, it is based on a logarithmic scale.
- Each level is 10 times stronger than the previous level.

4 → 5 → 6 → 7 → 8



# Earthquake Assignment

- In partners, label the epicenters of earthquakes on your world map.
- You will label 25 earthquakes with a **magnitude of 4 or higher** on the Richter scale.
- Use the following website  
[www.emsc-csem.org/Earthquake/](http://www.emsc-csem.org/Earthquake/)