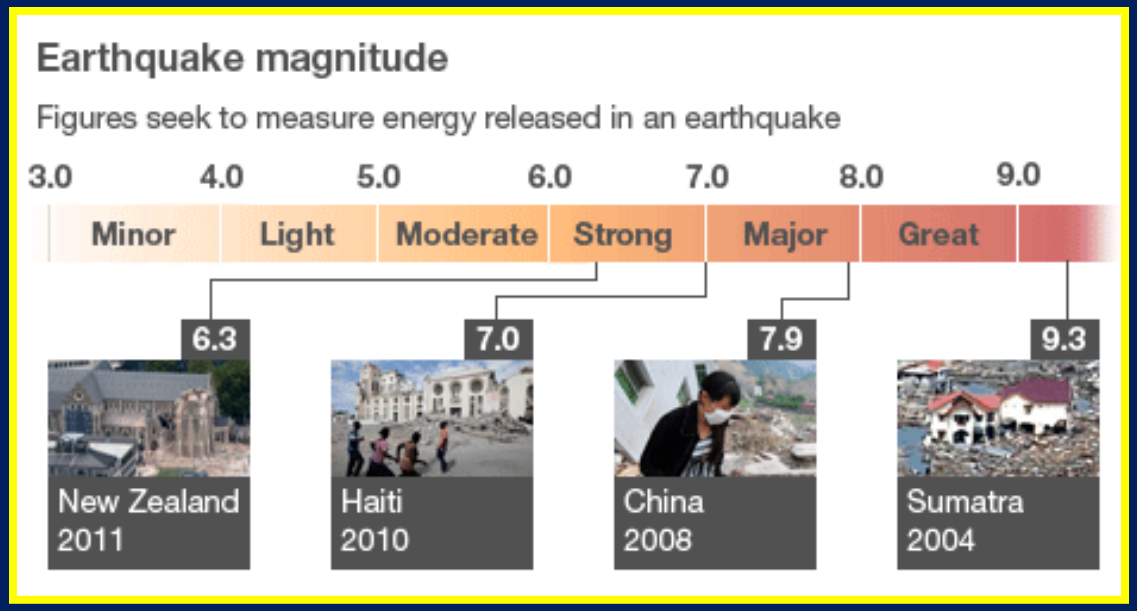
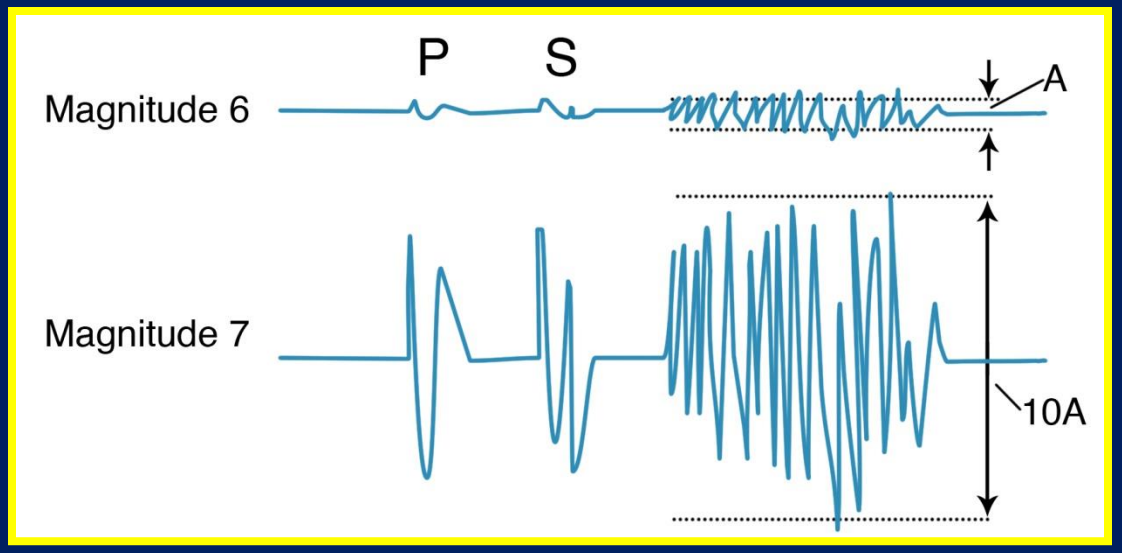
Determining the Strength of an Earthquake

Magnitude

The magnitude of an Earthquake refers to the amount of energy an earthquake releases.

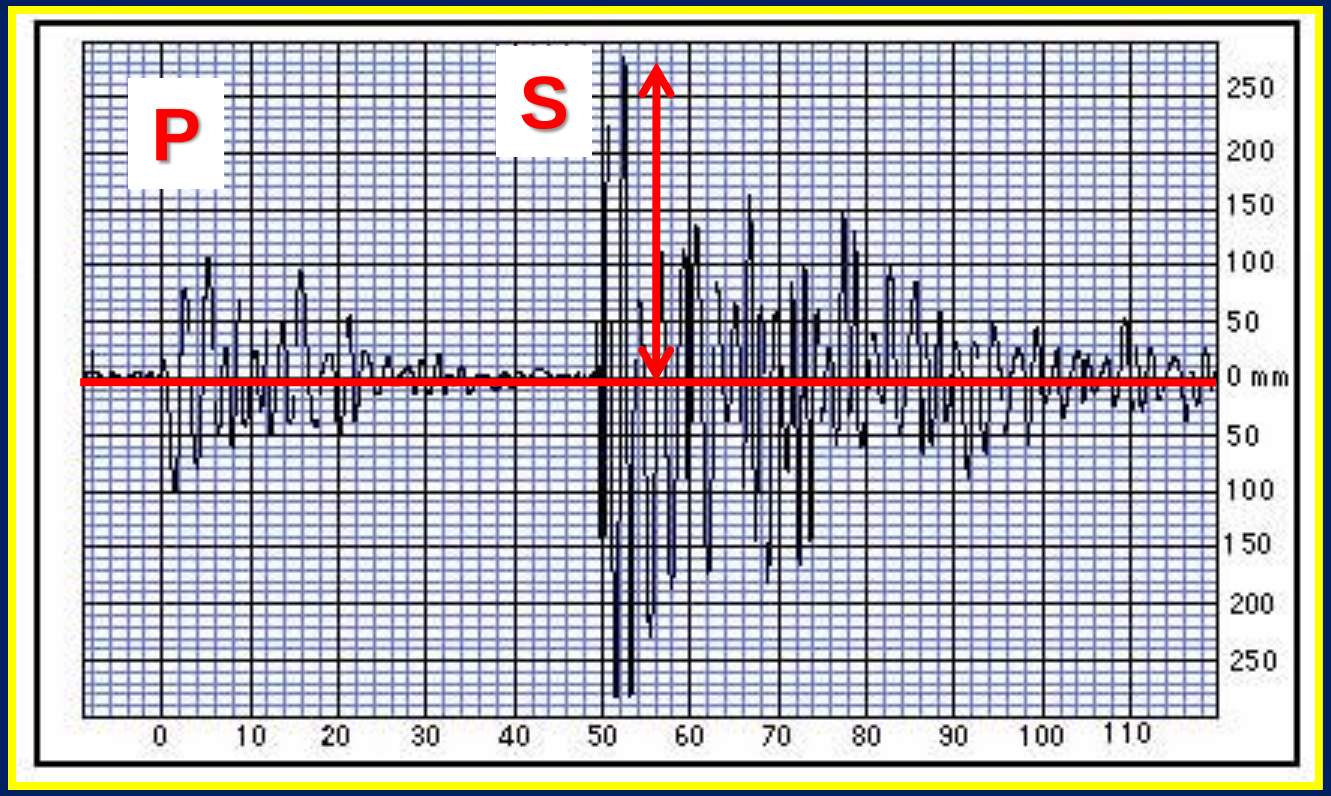




Magnitude is based on the size of the largest seismic wave generated and the distance to the epicenter.

Measuring Magnitude

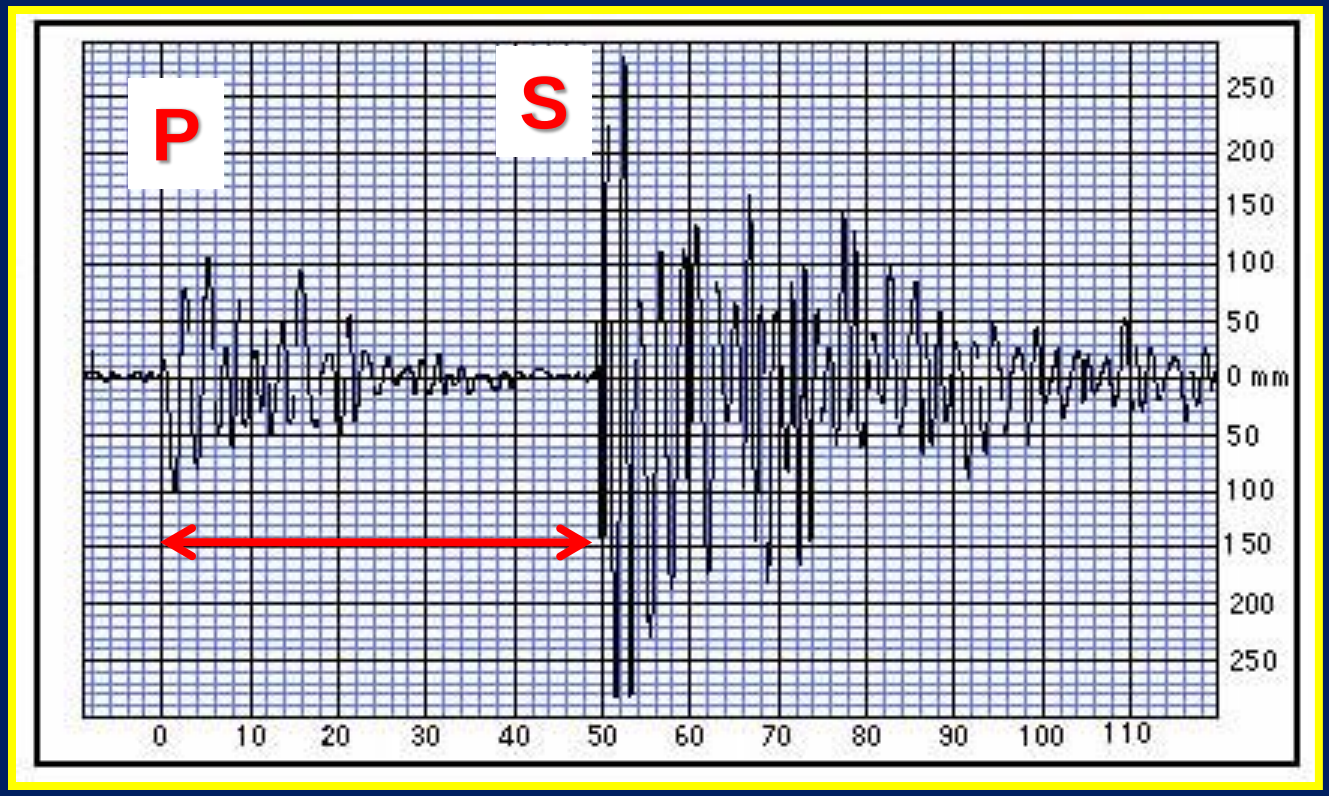
To determine the magnitude of an earthquake, begin by measuring the height or amplitude of the largest wave



Amplitude = 280 mm

Measuring Magnitude

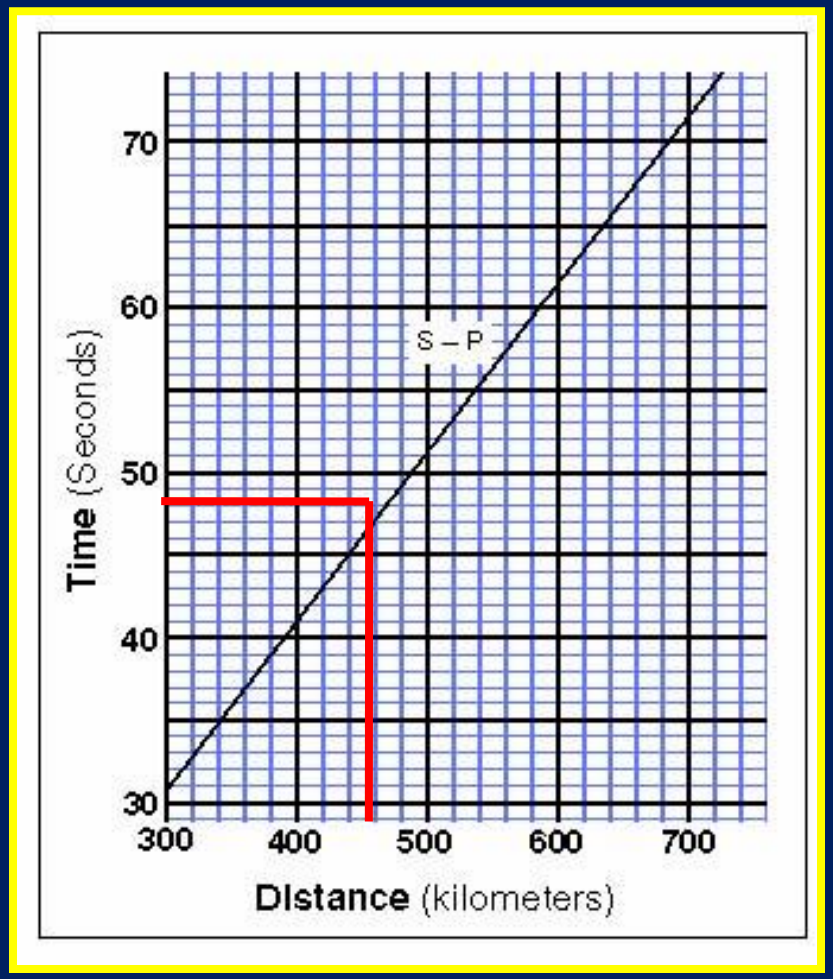
Next, determine the time interval between the primary and secondary waves.



Time = 48 seconds

Measuring Magnitude

Then use Time-Distance Graph to find the distance to the epicenter of the earthquake.



Time

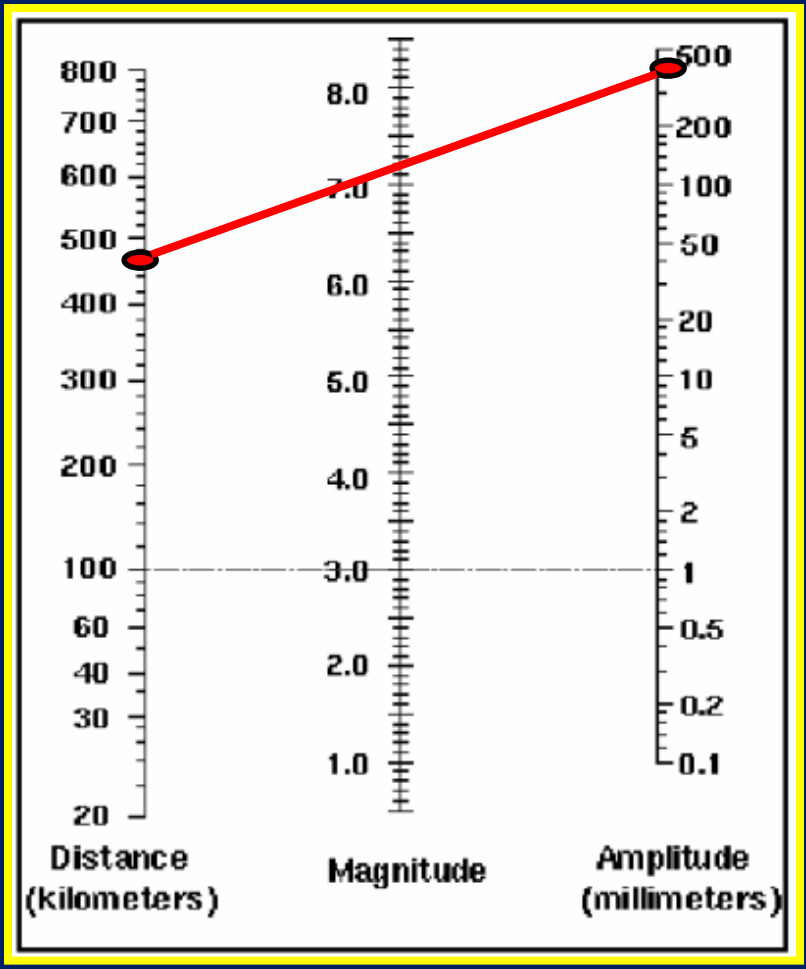
48 seconds

Distance

460 km

Measuring Magnitude

Finally, use the Richter Nomogram Graph to find the Magnitude.



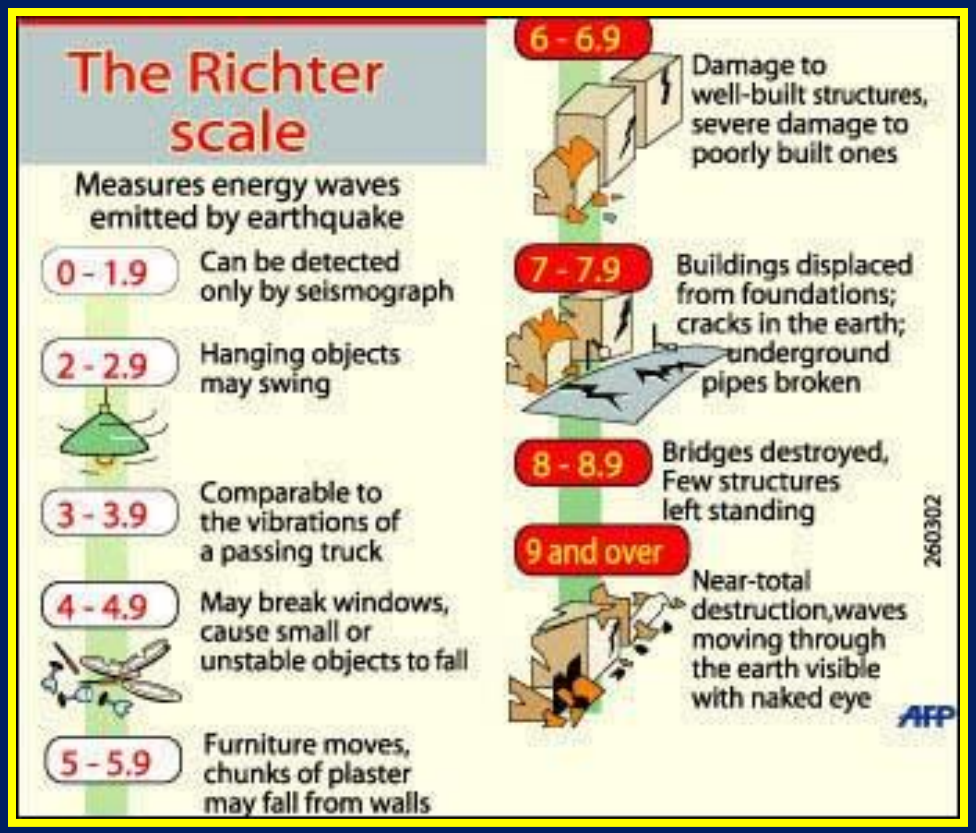
Distance
460 km

Amplitude
280 mm

Magnitude
7.2

Richter Scale

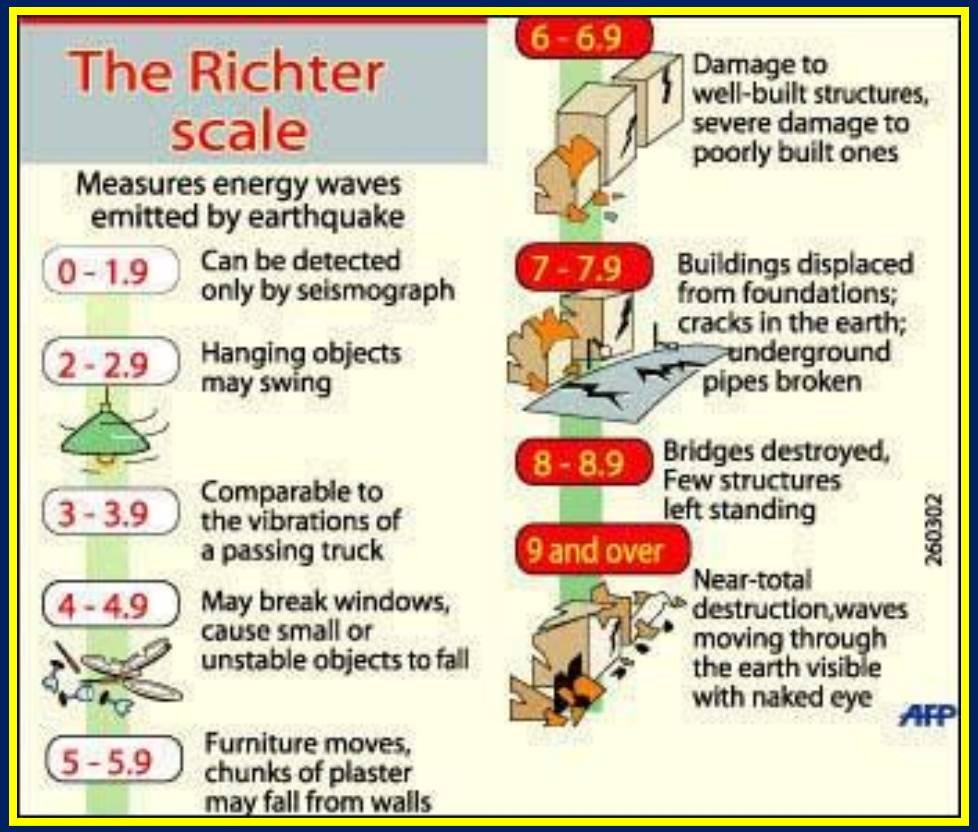
Magnitudes of earthquakes are rated on the Richter Scale with each magnitude representing an increase in amplitude or wave size by a factor of 10.



Waves with a magnitude of 8 are ten times larger than those with a magnitude of 7 and one hundred times larger than those with a magnitude of 6.

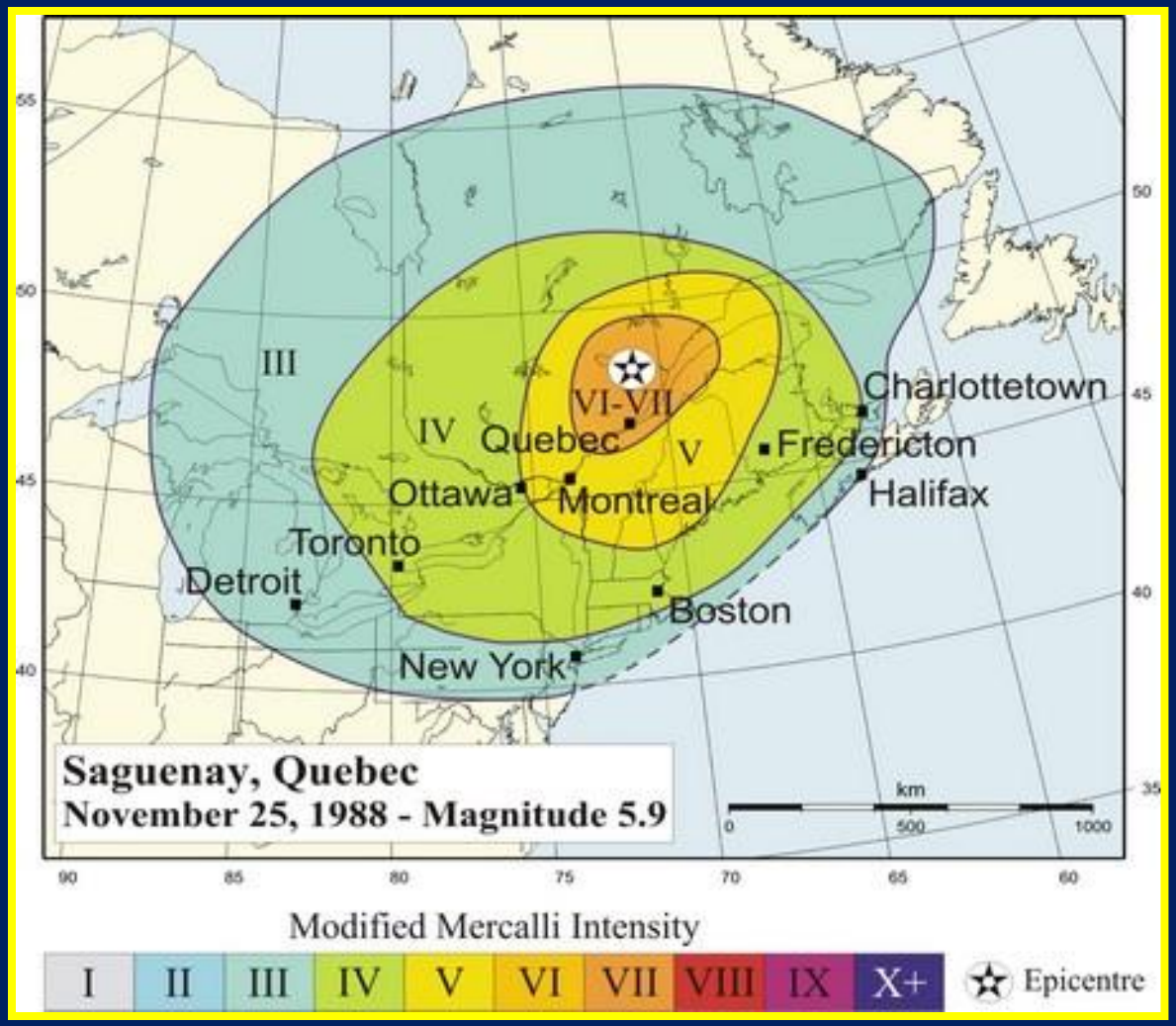
Richter Scale

In relation to the energy released, each increase in magnitude on the Richter Scale represents a 32 fold increase in energy.



Earthquakes with a magnitude of 8 release 32 times more energy than that of magnitude 7 and nearly 1,000 more energy than that with a magnitude of 6.

Earthquake Intensity



Earthquake Intensity

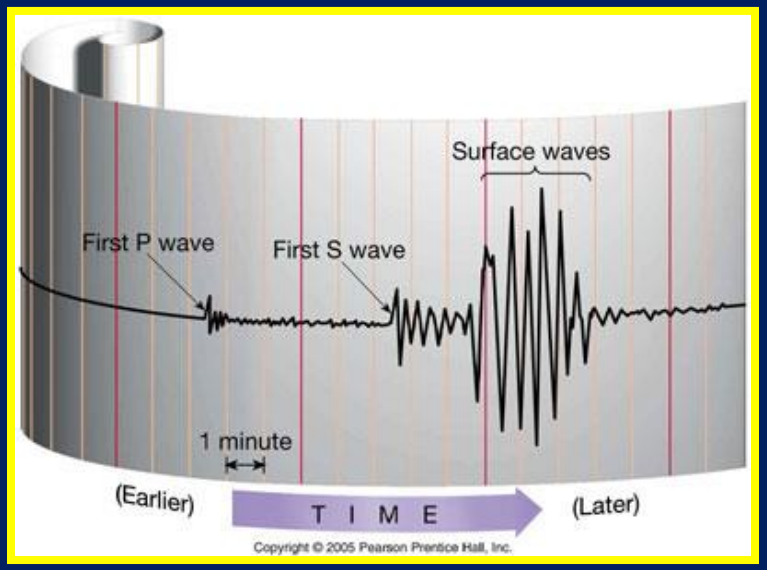
The Modified Mercalli Scale compares earthquakes according to the intensity, or severity, of the waves by assessing the amount of damage done to structures.

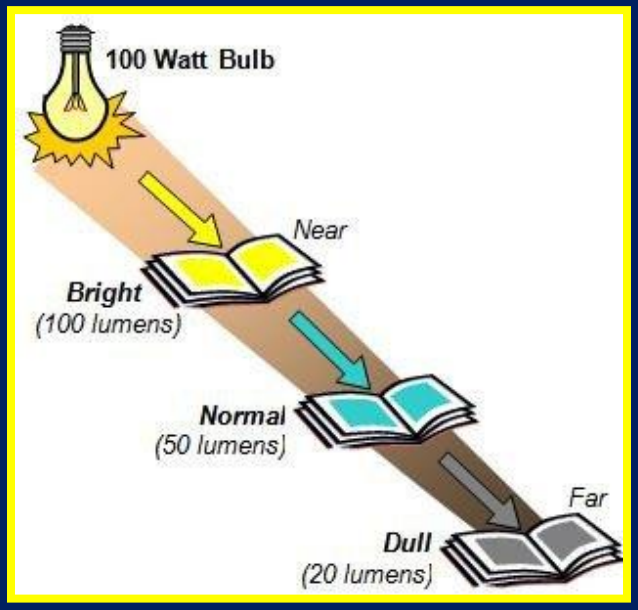
Modified Mercalli Scale

Intensity	Observed Effects
I	Felt by only a few people under very special circumstances
II	Felt by only a few people at rest, especially on the upper floors of buildings
III	Felt noticeably indoors, especially on upper floors of buildings
IV	Felt indoors by many people, outdoors by a few; some awaken
V	Felt by nearly everyone; many awaken; dishes and windows break; plaster cracks
VI	Felt by everyone; many frightened and run outdoors; heavy furniture moves
VII	Everyone runs outdoors; slight to moderate damage in ordinary structures
VIII	Considerable damage in ordinary structures; chimneys and monuments fall
IX	Considerable damage in all structures; ground cracks; underground pipes break
X	Most structures destroyed; rails bend; landslides occur; water splashes over banks
XI	Few structures left standing; bridges destroyed; broad fissures in the ground; underground pipes break
XII	Damage total; waves seen on ground surfaces; objects thrown in air

Earthquake Intensity

The intensity, or severity, of an earthquake depends primarily on surface waves.

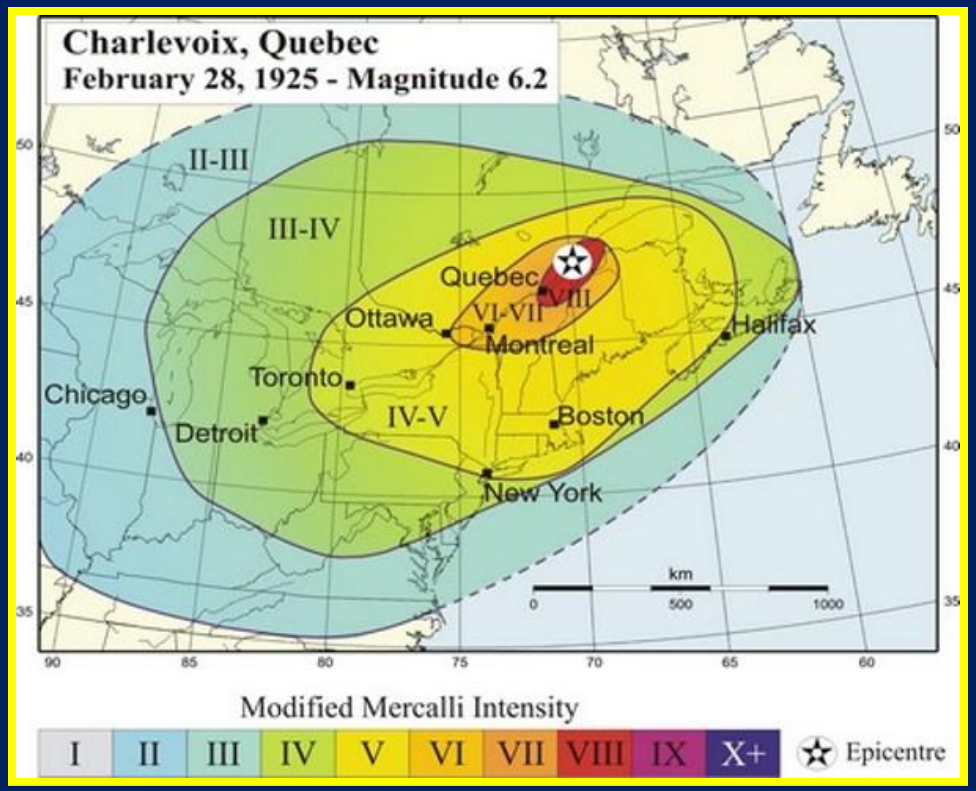




Like the brightness of light from a light bulb, the intensity of surface waves decrease with distance from the epicenter.

Using Intensity Values to Locate Epicenter

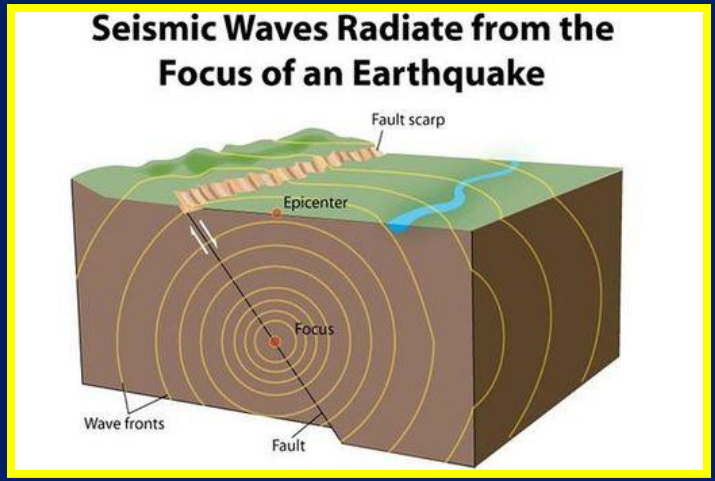
Because earthquake intensity decreases with distance, when the Modified Mercalli scale intensities are placed on a map, they can be used to help locate the epicenter of an earthquake.

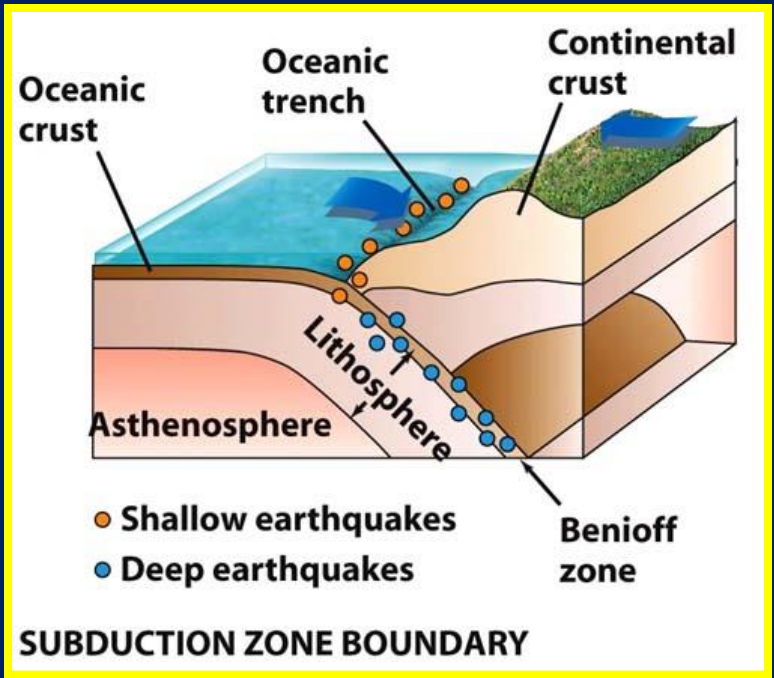


The epicenter usually corresponds with the highest intensity.

Depth of Focus

In the same way that distance from the epicenter affects intensity, the depth of the focus also affects the intensity of an earthquake.

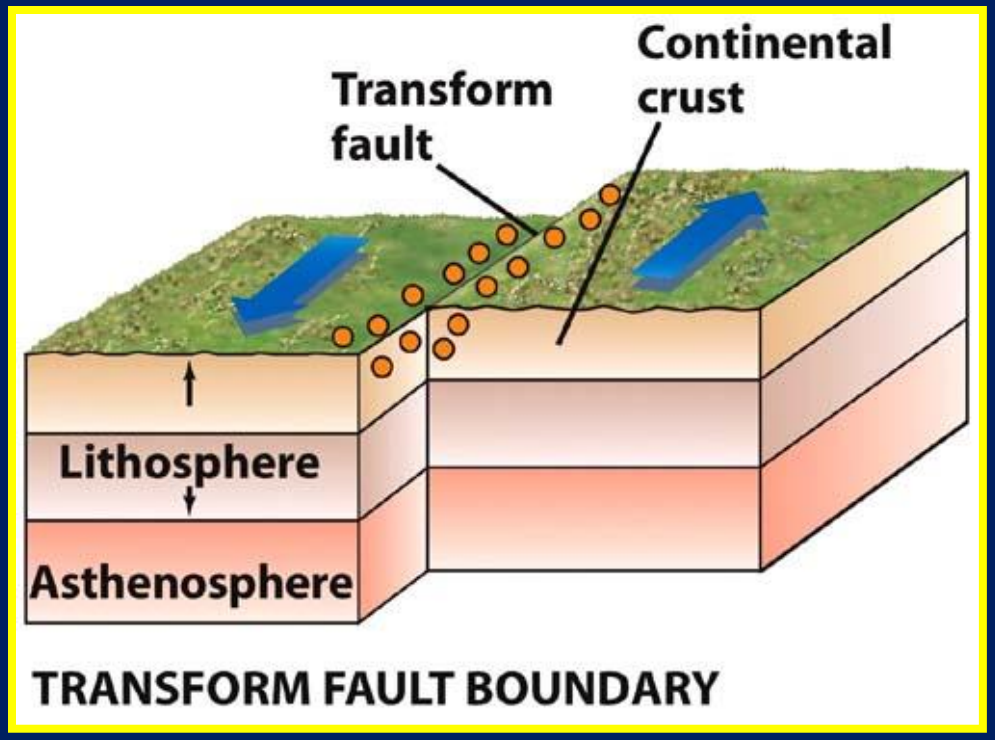




Earthquakes can be shallow, intermediate, or deep, depending upon the depth of the focus.

Depth of Focus

Because earthquakes with a deep focus produce smaller vibrations at the epicenter, a shallow-focus earthquake with a smaller magnitude may produce an earthquake with a higher intensity.



The End