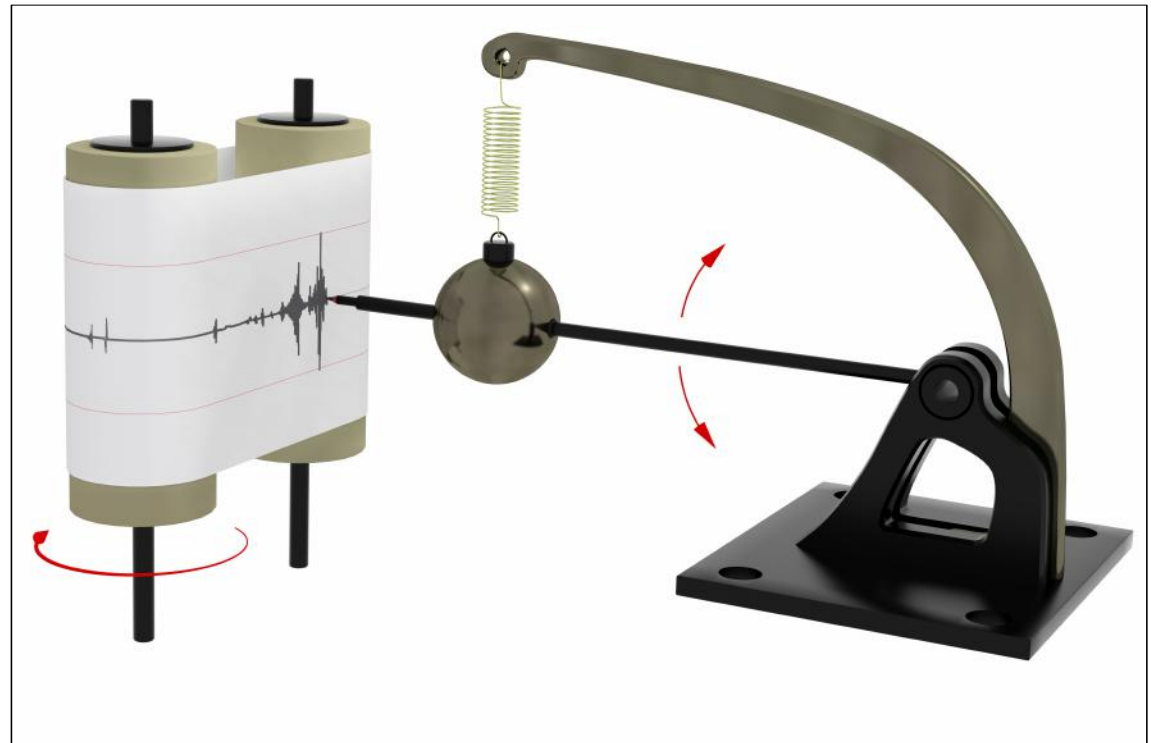




## Seismographs

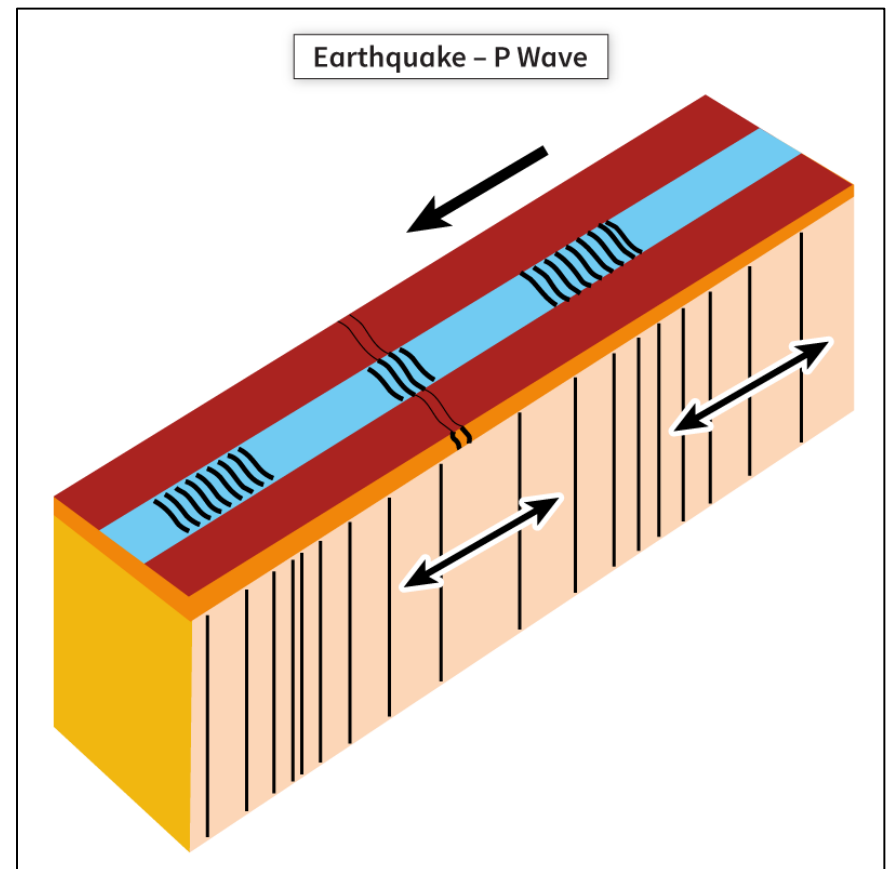
An earthquake releases vibrations that travel through the ground in waves of seismic energy. These waves are called earthquake waves or body waves. There are two types of earthquake waves that travel inside Earth's crust: P (primary) waves and S (secondary) waves. Seismographs, which are used to gauge the strength of earthquakes, measure the P waves and S waves.





## P Waves

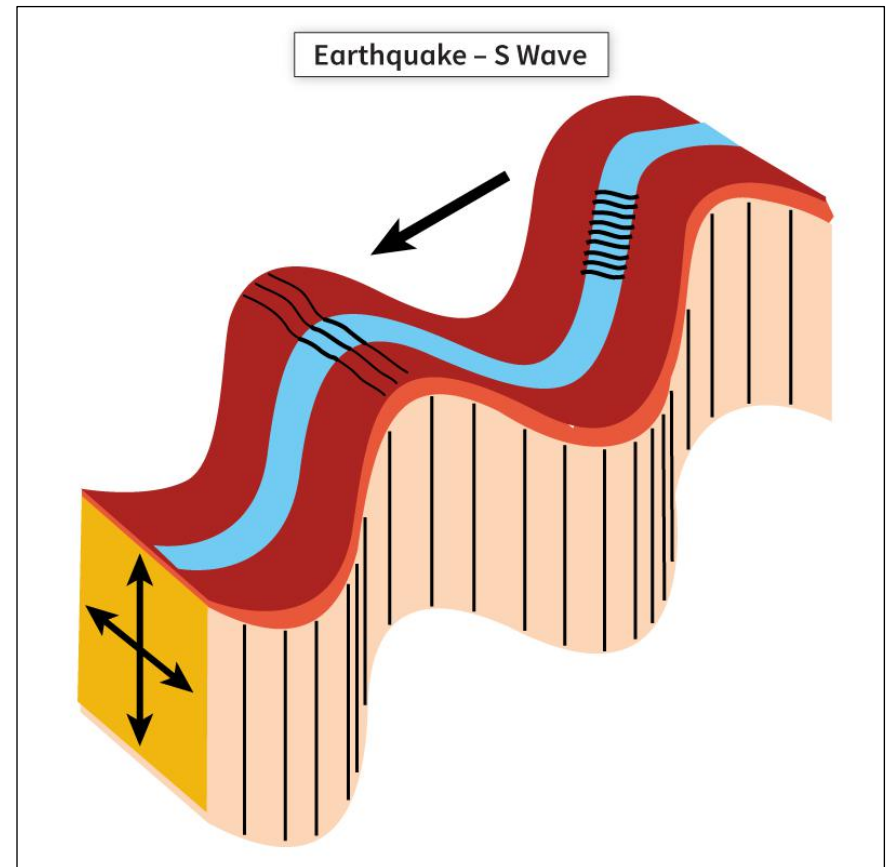
P waves, or compressional waves, compress and expand (shake) the ground in the same direction and in the opposite direction that they are moving. These are the weakest earthquake waves, but they also travel the fastest. This means that seismographs detect them before other waves.





## S Waves

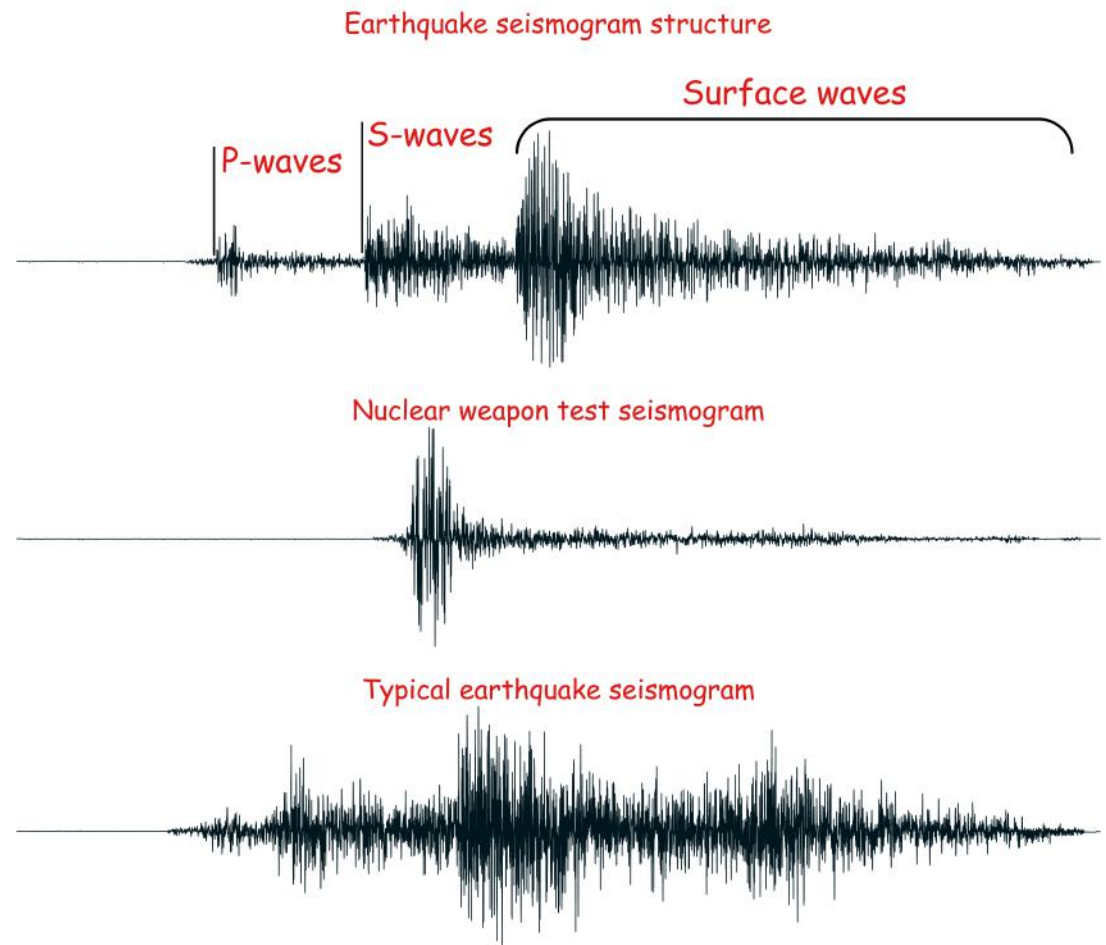
S waves, or shear waves, deform the ground perpendicular to the direction that they are moving. They are the strongest earthquake waves, and they do the most damage. However, they move more slowly than P waves.





## Earthquake Early Warning Systems

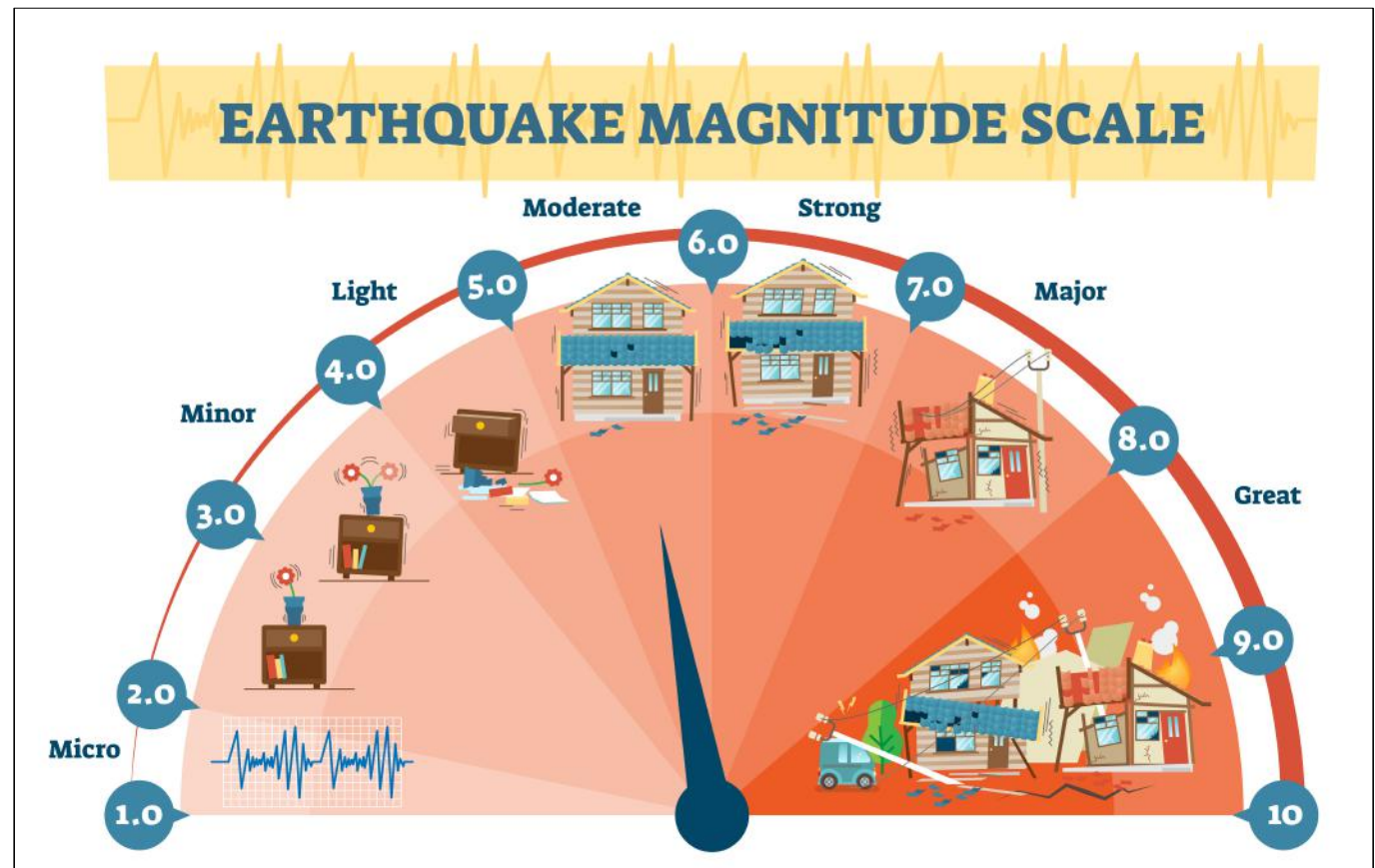
When scientists detect P waves on a seismograph, they can send out an earthquake warning alert, which gives people seconds to minutes to get into a safer place before the stronger S waves (and, later, the surface waves) arrive. People can take this time to stop cars and trains, get out of elevators, and (if outside) to get away from buildings.





## Moment Magnitude Scale

The moment magnitude ( $M_w$ ) scale measures the magnitude (size) of earthquakes, as determined from the information provided by seismographs. The scale ranges from 1 to 10, with 1 being the weakest earthquake and 10 the strongest.



## Image Attributions

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