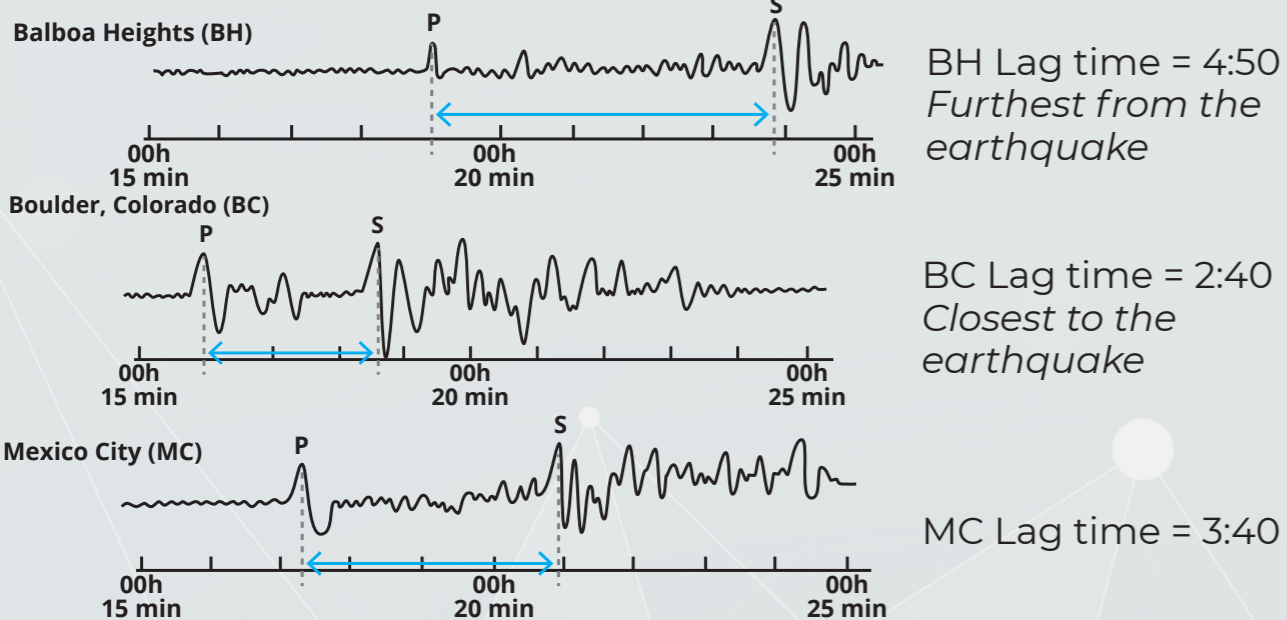


Following an earthquake, three different types of seismic waves are created. They are called primary waves (**P waves**), secondary waves (**S waves**) and **surface waves**.

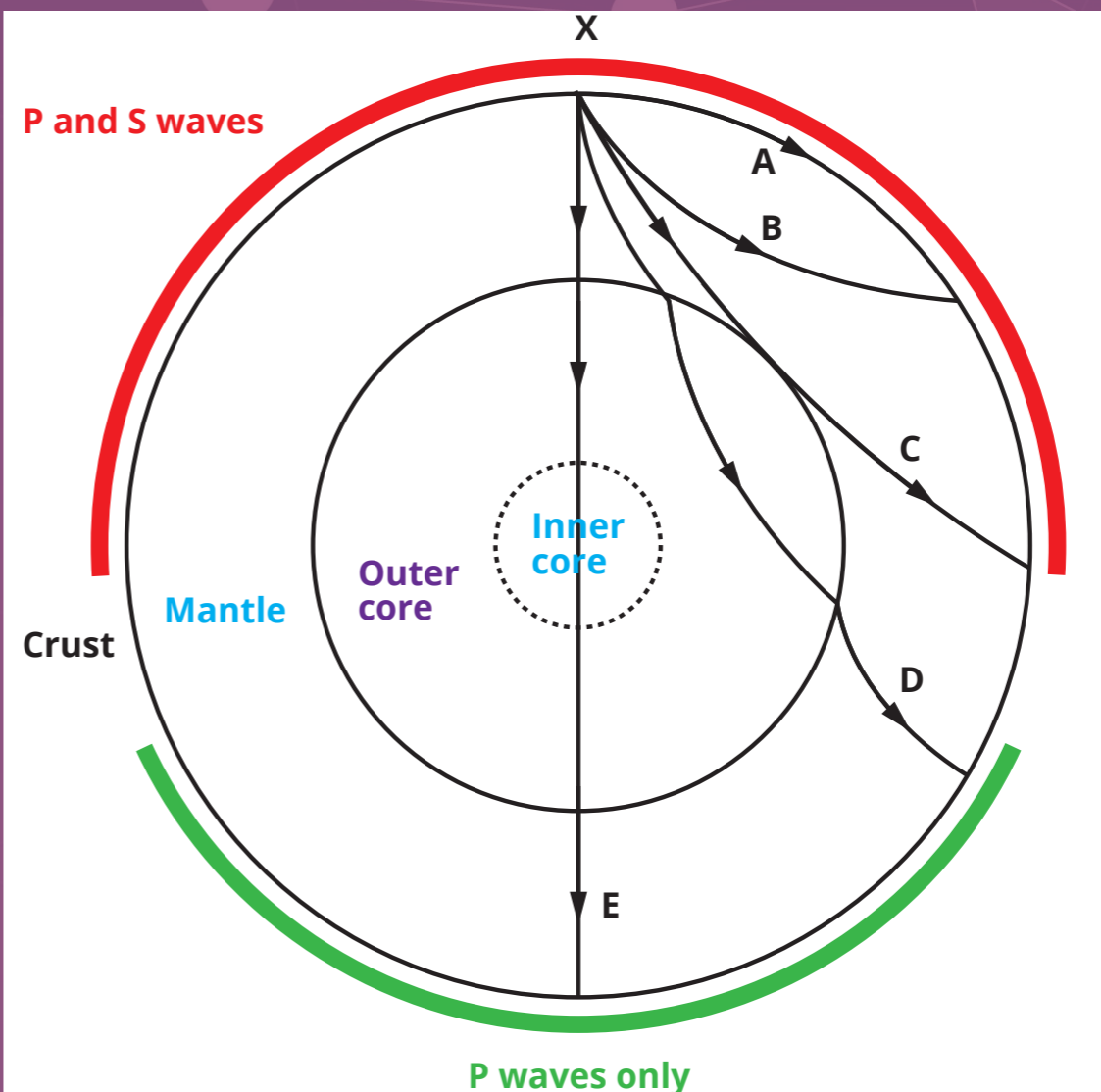
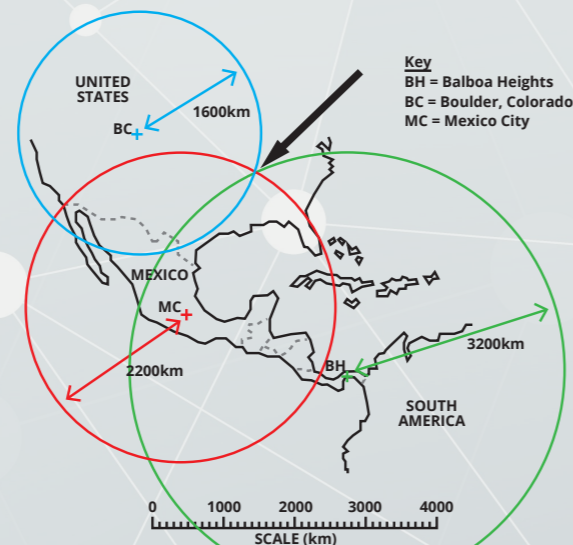
Wave	P waves	S waves	Surface waves
Type	Longitudinal	Transverse	Longitudinal
Speed	Fastest (arrives first)	Slower (arrives second)	Slowest (arrives last)
What can they travel through?	Solid and liquid rock	Solid rock only	Along the Earth's surface only

Lag time

P waves are **faster** than S waves and following an earthquake will arrive first. The **delay** between P waves and S waves arriving is known as the **lag time** and can be used to **calculate the distance** to the earthquake from that point.



Using **data** from the question or a **graph**, you can convert the lag time into a distance. Using data from **three stations**, draw circles with a radius equivalent to that distance to find the point where the circles meet. This is where the earthquake happened (marked by the arrow).



An earthquake at X will create all three types of seismic waves which can be measured across the Earth.

As only P waves reach the opposite side of the Earth from X the outer core must be liquid as S waves cannot travel through it.

Path	Wave	Reason
A	Surface wave	Travels on the surface of the Earth, not into the mantle.
B	P waves and S waves	Travels through the solid mantle , both P and S waves can travel through solid rock.
C	P waves and S waves	Travels through the solid mantle , both P and S waves can travel through solid rock.
D	P waves only	Travels through the liquid outer core , S waves cannot travel through liquid so cannot follow this path.
E	P waves only	Travels through the liquid outer core , S waves cannot travel through liquid so cannot follow this path.