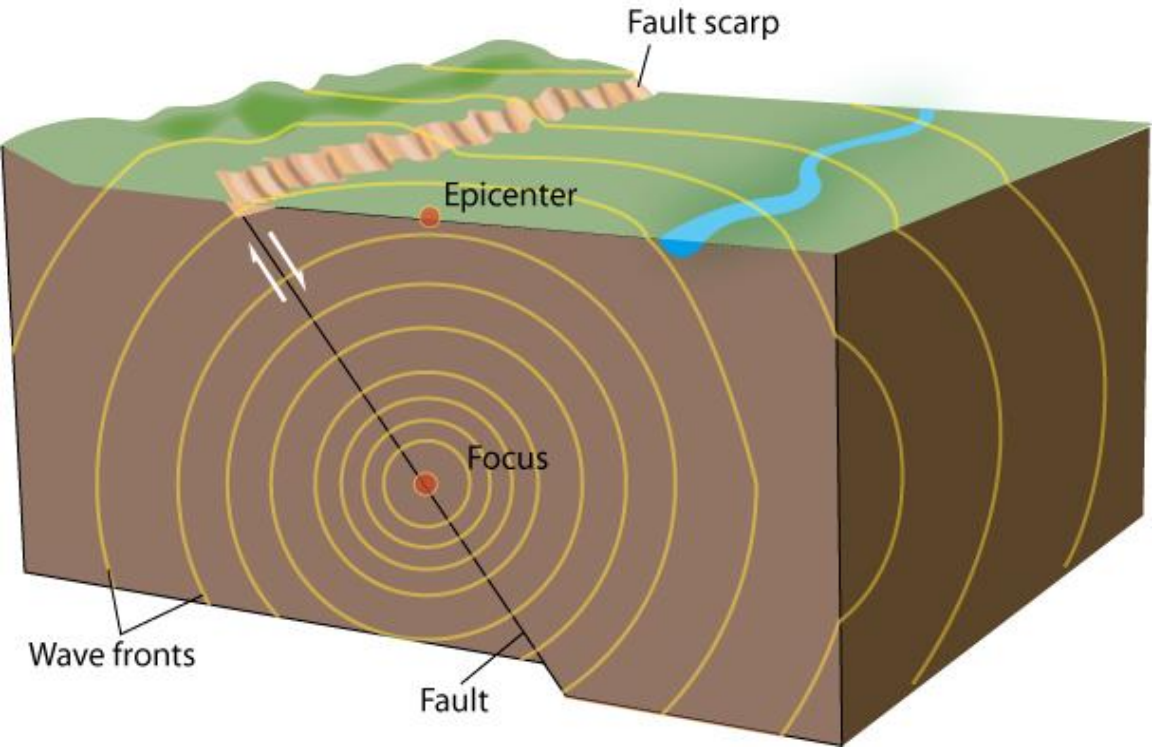
Seismic Waves

Unit 2 - Ch 8

Earthquakes

- Most earthquakes occur…
  - In areas where it has occurred in the ***past***
  - ***Without*** warning
  - Along plate ***boundaries*** & ***fault*** lines (zones)

Seismic Waves



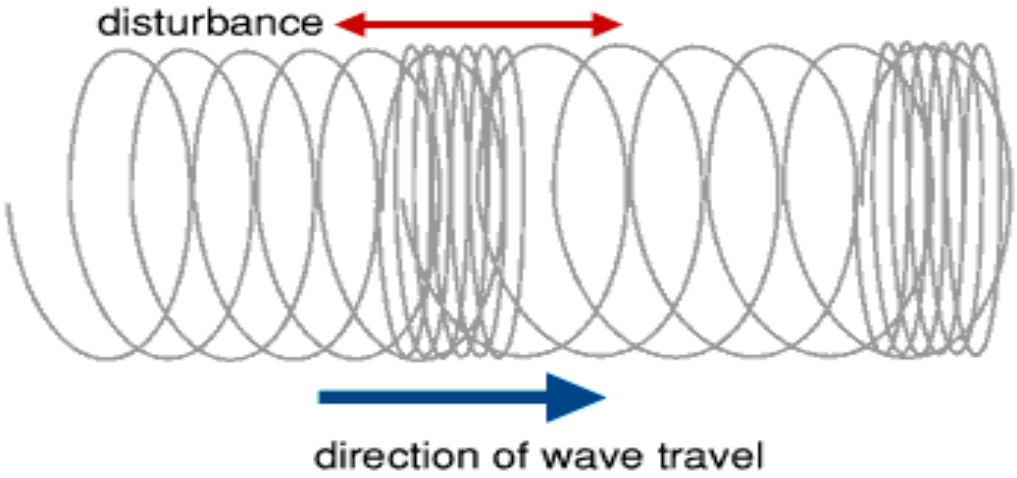
- During an EQ, **energy** is released ***from the focus*** in **all directions** in the form of ***seismic waves***

P-Waves

- **Push-Pull** ***(Primary Body Waves)*****:**
  - ***Compress*** and ***expand*** rocks in **same** direction of wave travel
    - *a.k.a* ***"Compressional"*** seismic waves
- **Fastest** traveling wave & **1st** to arrive
- Can travel through ***solid*** & ***liquid*** Earth material **(Inner & Outer Cores)**

P-Wave Motion

"P" **- Push-Pull (*Compressional*) Waves**

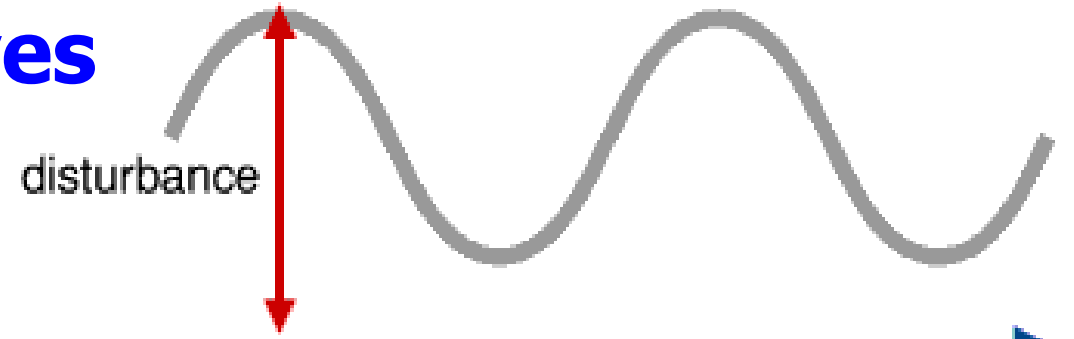


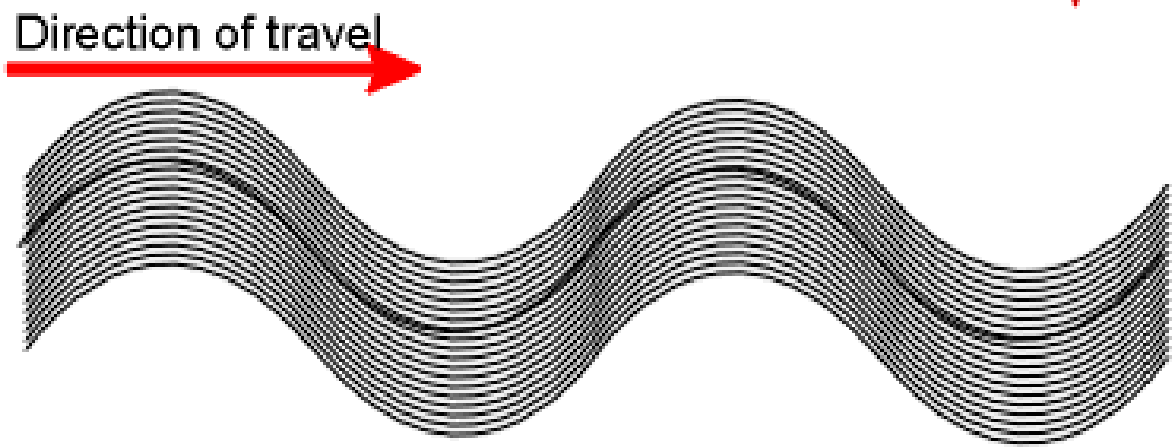
S-Waves

- **Shake-Shear** ***(Secondary Body Waves)*****:**
  - Rocks move ***sideways (perpendicular)*** in relation to wave travel
    - a.k.a ***"transverse"*** seismic waves
- Travels **slower** than P-Waves & **2nd** to arrive
- Can travel through ***solid*** Earth **ONLY**
  - ***CANNOT*** travel through ***liquid*** Earth material

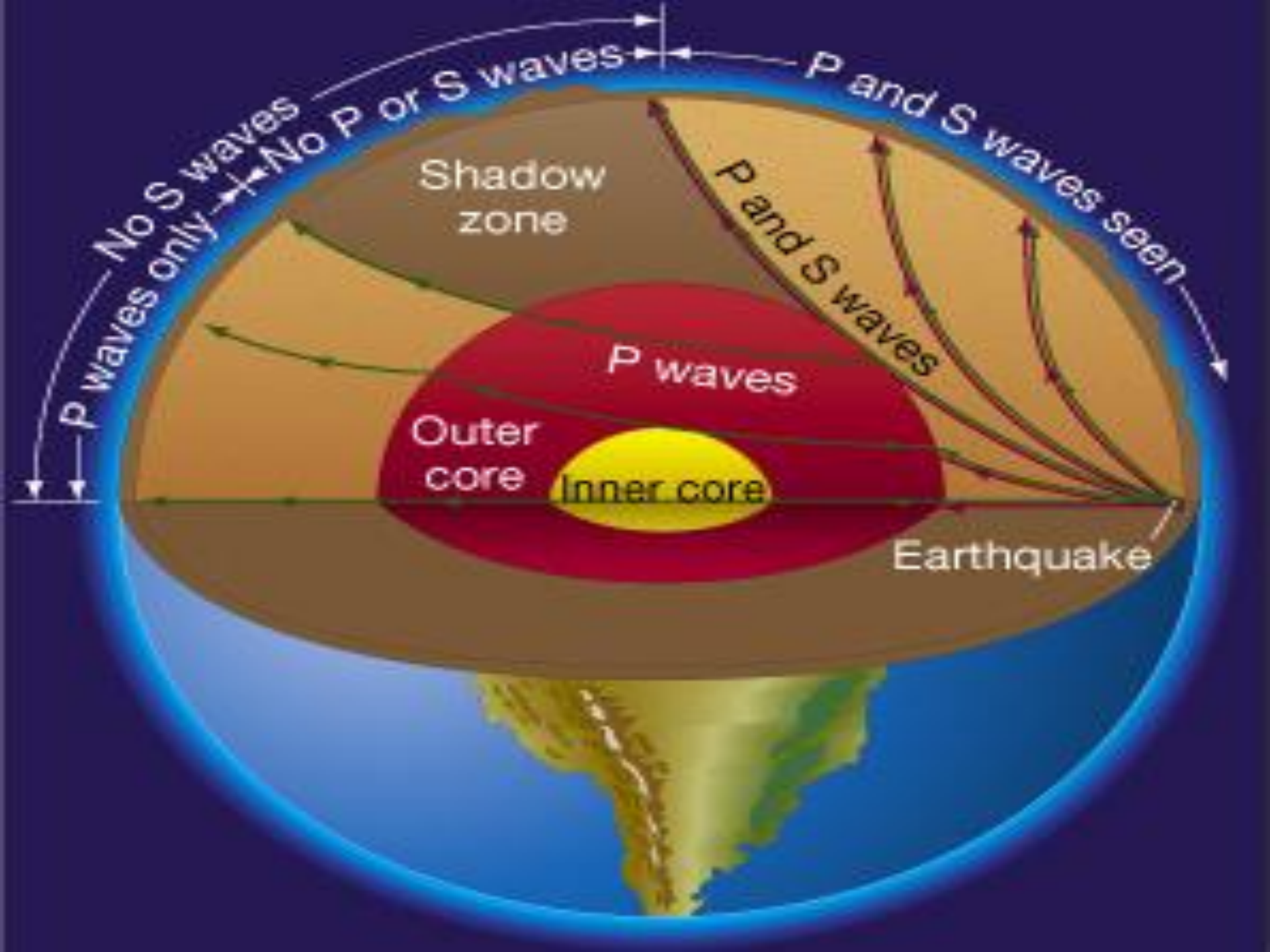
S-Wave Motion

"S" **– Shake/Shear**
(transverse) **Waves**



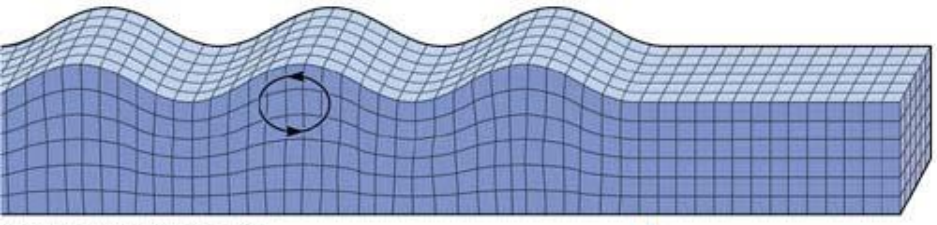


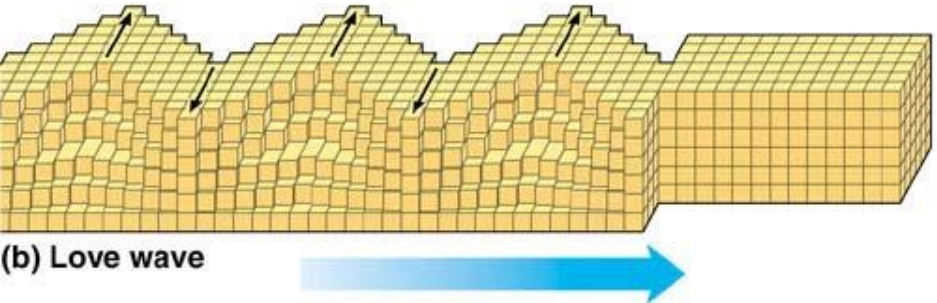
Shake (shear) wave

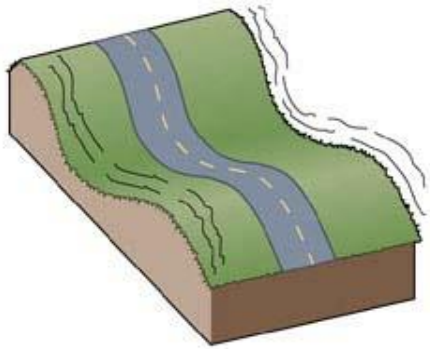

No S waves
P waves only
No P or S waves
P and S waves seen
Shadow zone
P and S waves
P waves
Outer core
Inner core
Earthquake

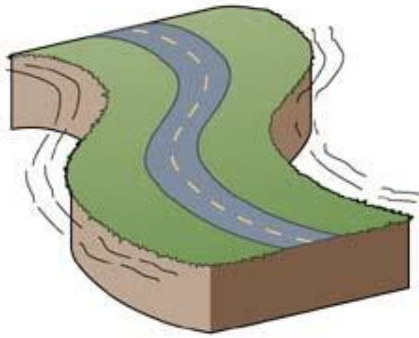
Surface Waves

- Moves *up*/*down* ***(rolling)*** & ***side-to-side***
- **Last** to arrive **AND** ***most destructive***



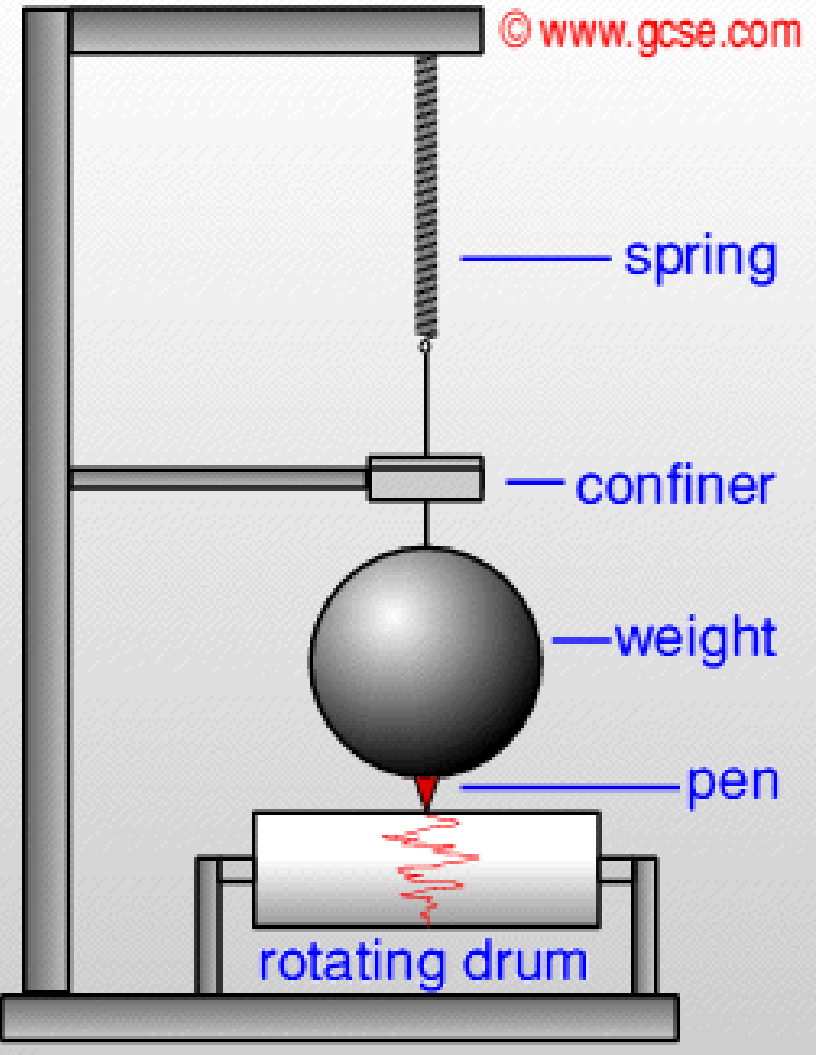






(c)

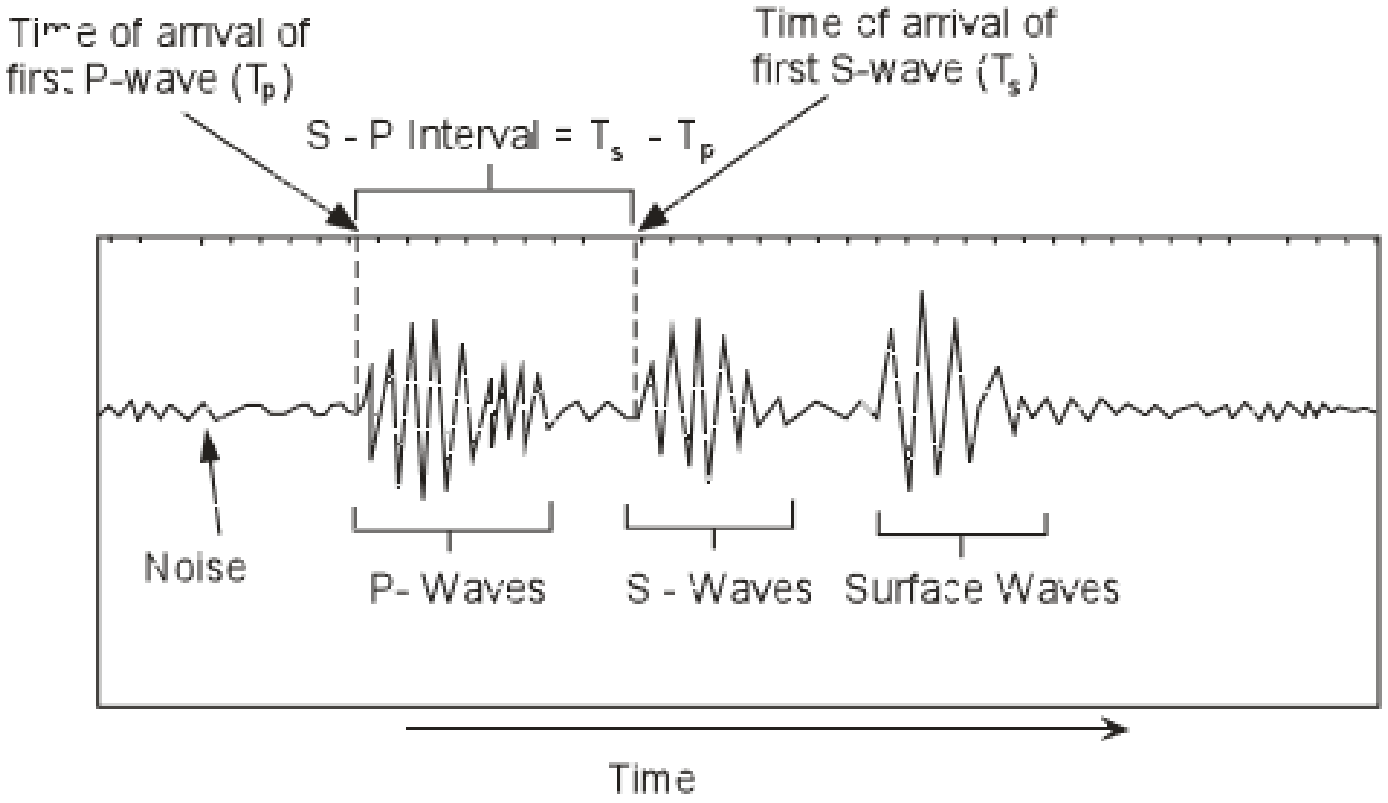
Seismometers

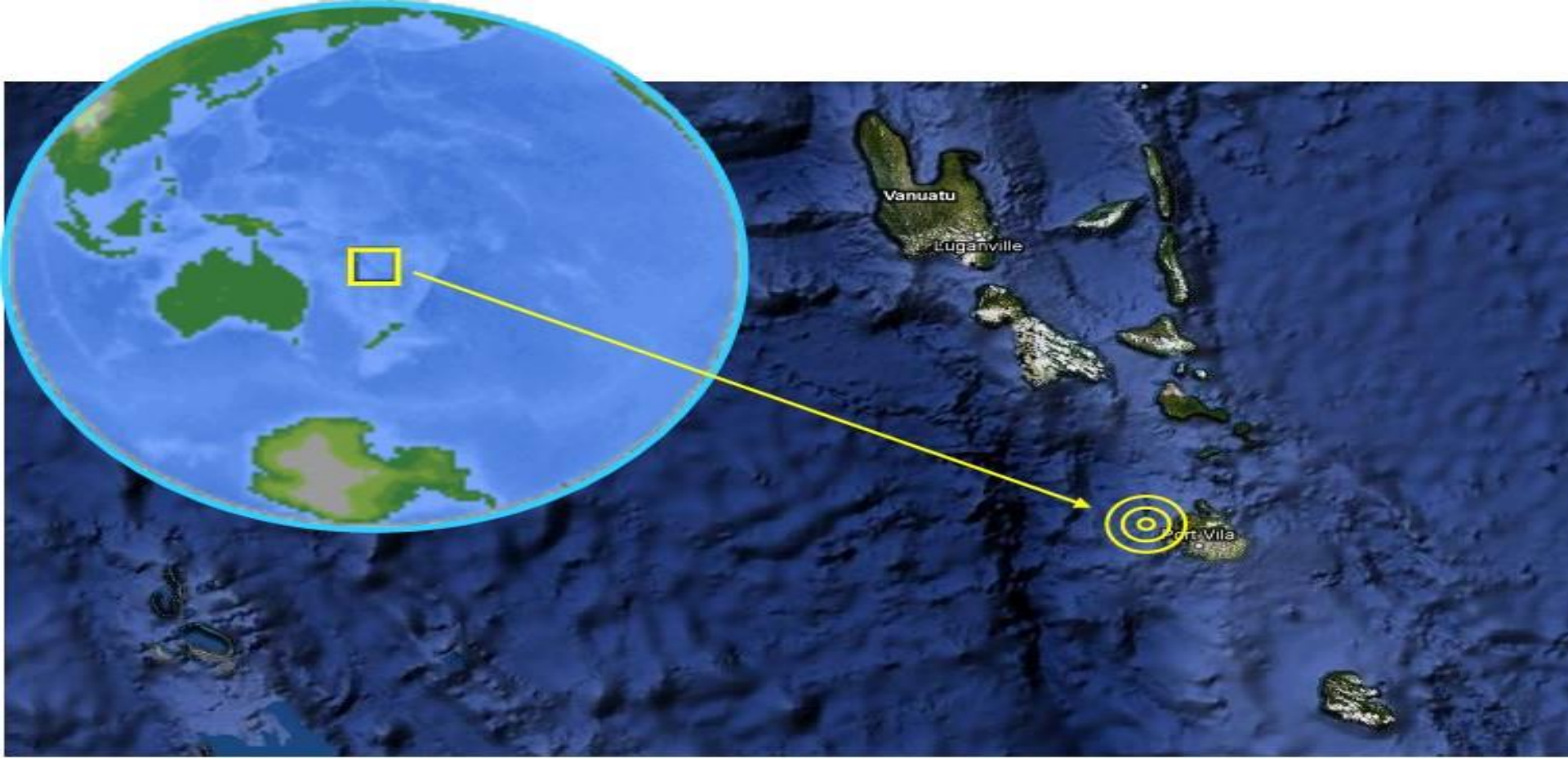


- Records ***vibrations*** beneath surface
  - Produces ***seismographs***

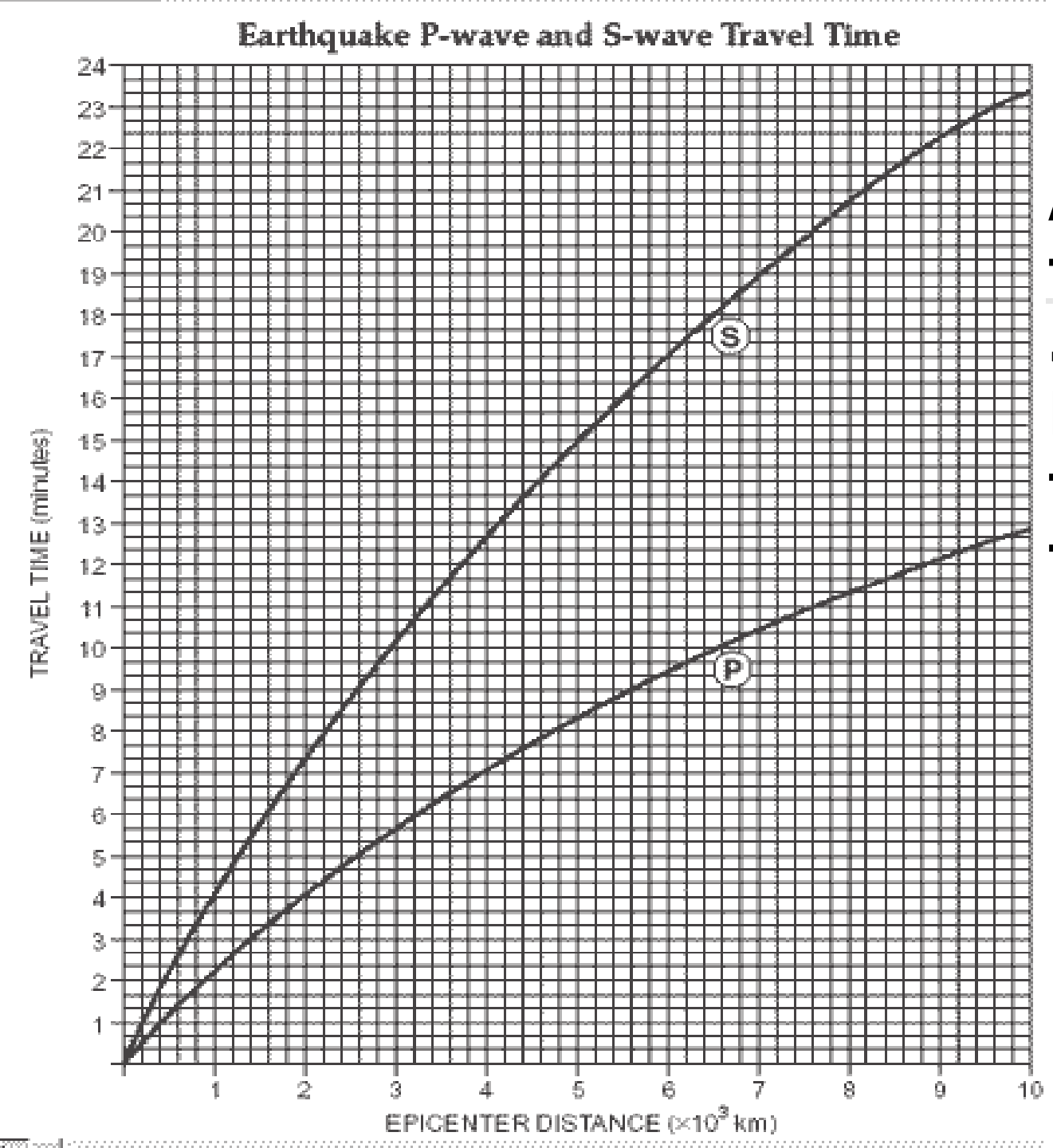
Seismograph

- After an EQ, ***difference*** **in arrival times** of P-S waves at a seismic station is used to calculate ***distance*** **from epicenter**



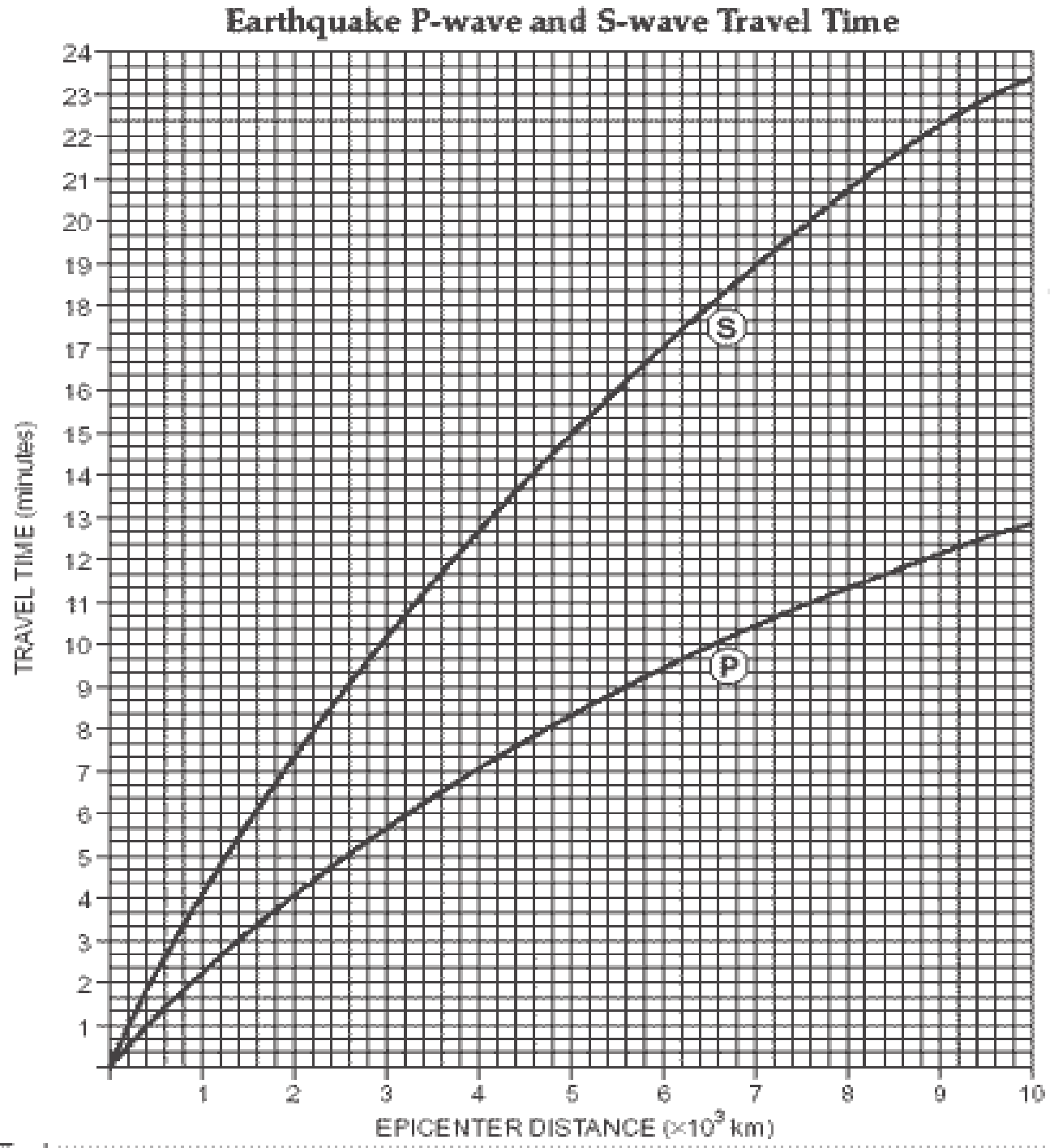


- Need ***three (3)*** seismic stations to determine accurate **location**
  - Use of ***Richter Scale*** to determine **magnitude** ***(0-10)***



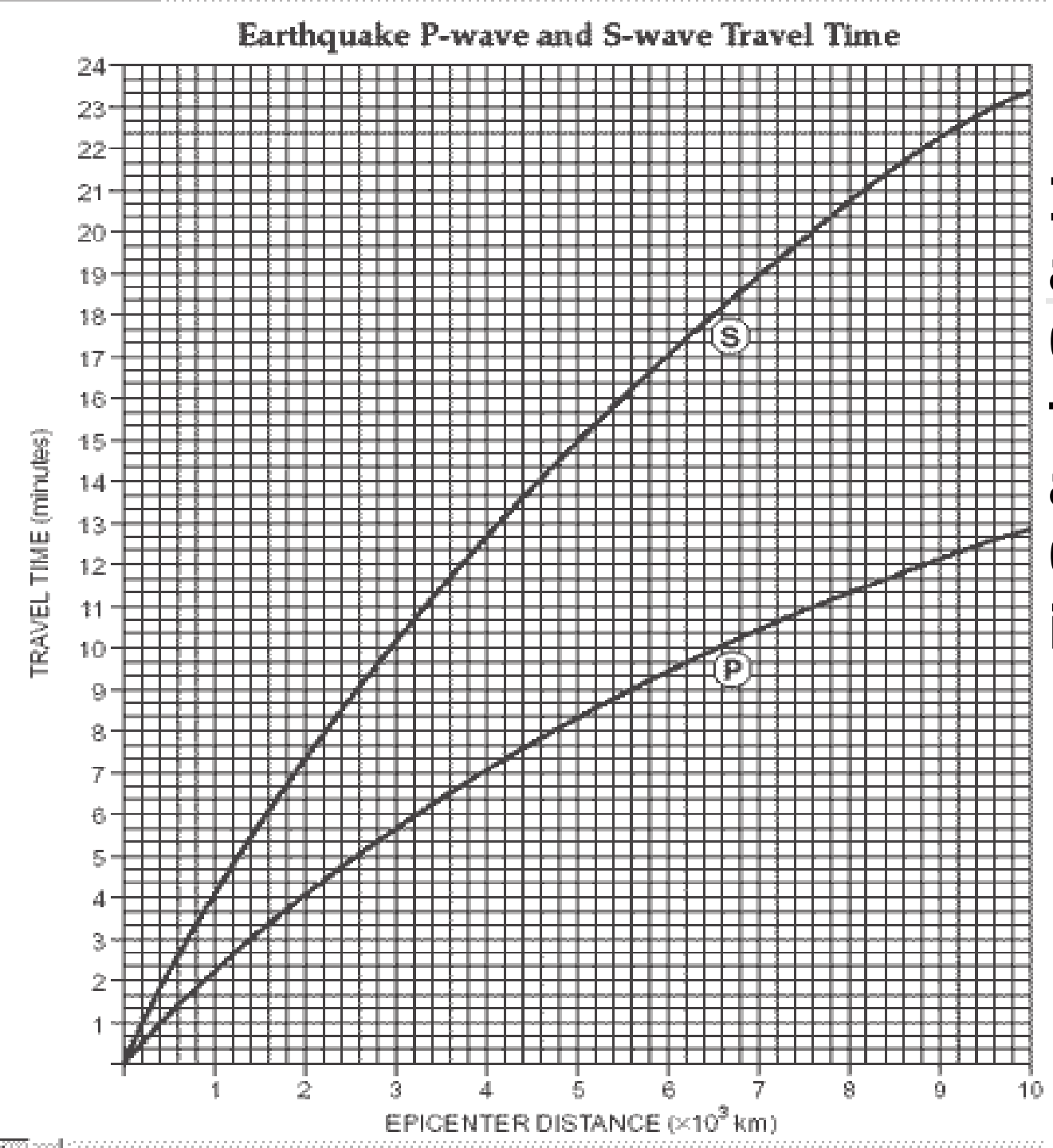
A "P-Wave" travel time is 5 min 20 sec. How *far* does this "P-Wave" travel?

2800km



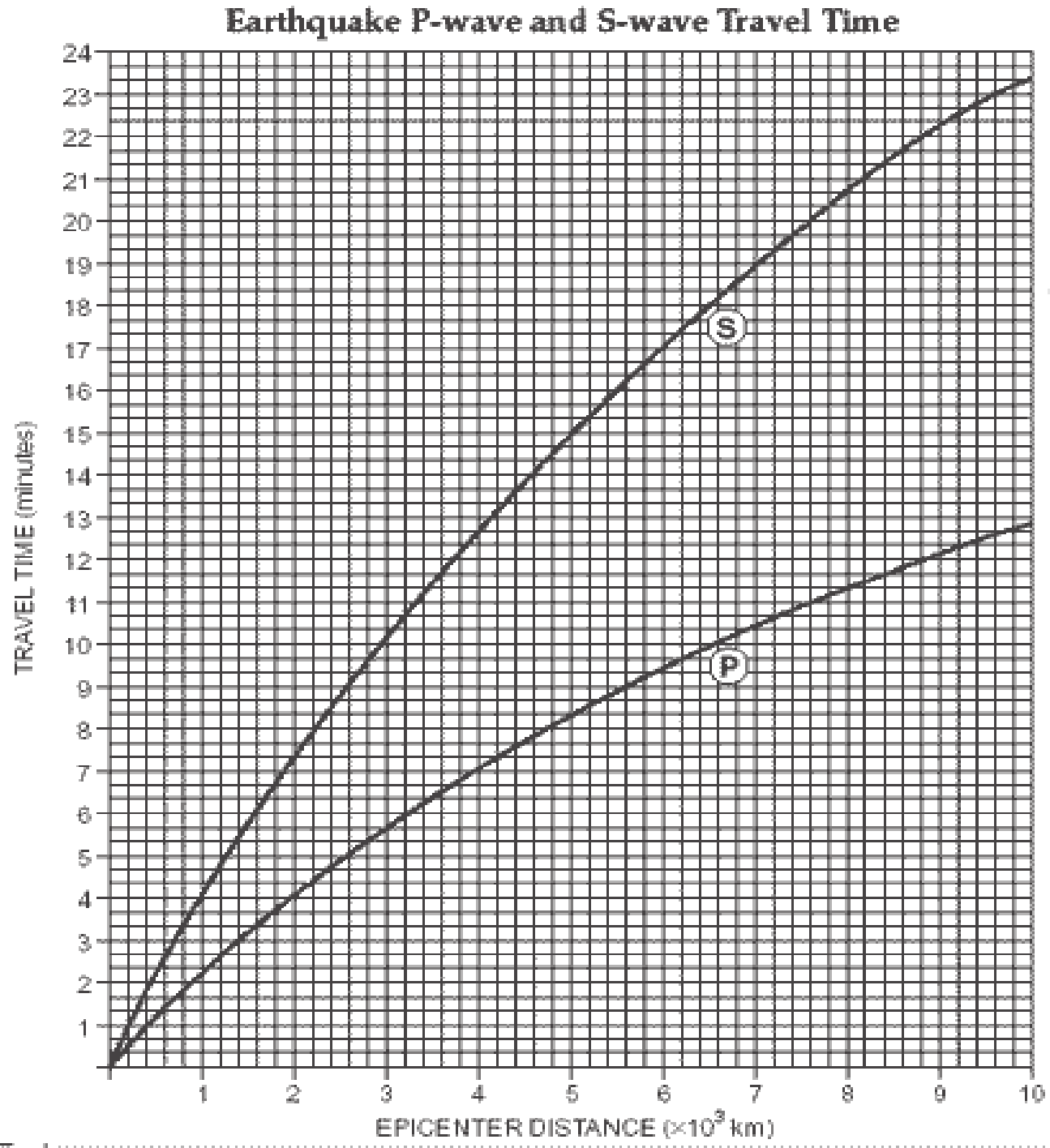
If a "P-Wave" travels 5000km and arrives at 10:20am, what is the *origin time* of EQ?

10:11:40am



If an "S-Wave" arrival time is 05:00:00 and the "P-Wave" arrival time is 04:55:20, what is the *epicenter distance*?

3200km



What is the *epicenter distance* if the first "S-Wave" arrives 7 mins after the first "P-Wave"?

5400km