

# Daily Routine

- Sit in your appropriate seat quietly
- Have all necessary materials out
- All back packs on the floor
- All cell phones on silent and away in backpacks
- All iPods off and headphones out of your ears
- Hats off
- No food or drink except for water

# Bellwork

- What are seismic waves? Describe the three types of seismic waves.
- What are the three types of faults?

# Earth Science Announcements

- Volcano Project: Due Today
- Midterm 10/9 or 10/10

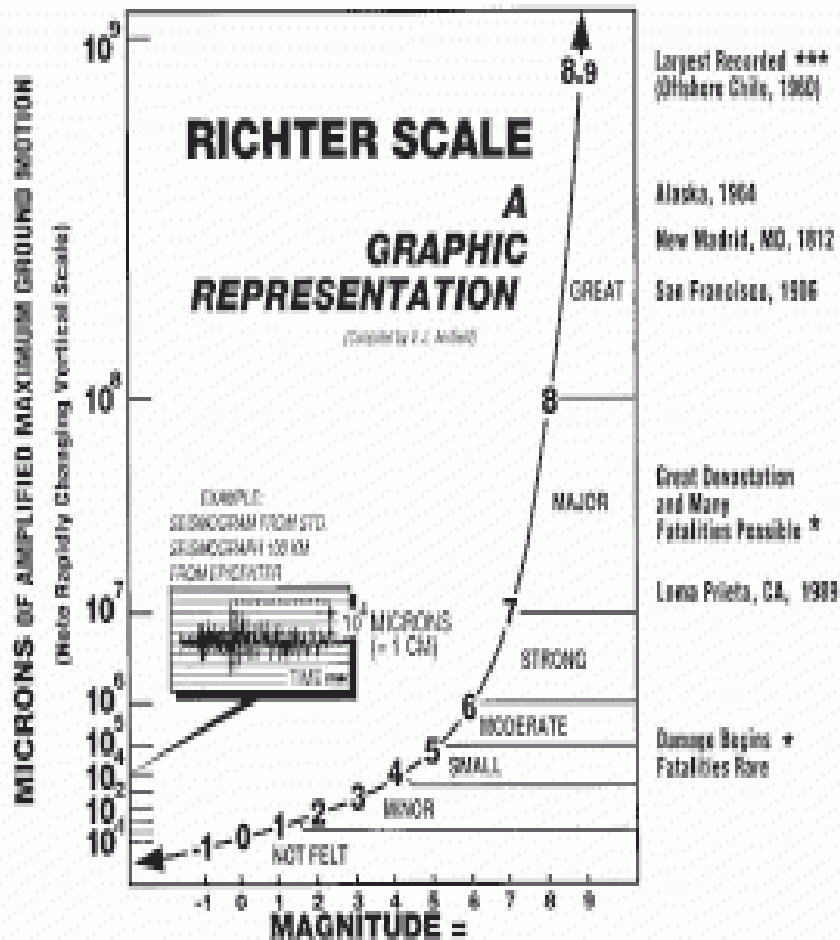
# How to find the epicenter

How does earthquakes affect our  
lives?

# Richter Moment of Magnitude Scale

- **Developed by Charles Richter in 1935**
- **Mathematical calculation for the intensity of an earthquake**
- **Calculated using the amplitude of the waves on a seismogram**
- **Measures surface waves energy from the epicenter**
- **Increases by a factor of 10 (log)**
- **Represented by whole numbers and decimals**

# Richter Moment of Magnitude Scale

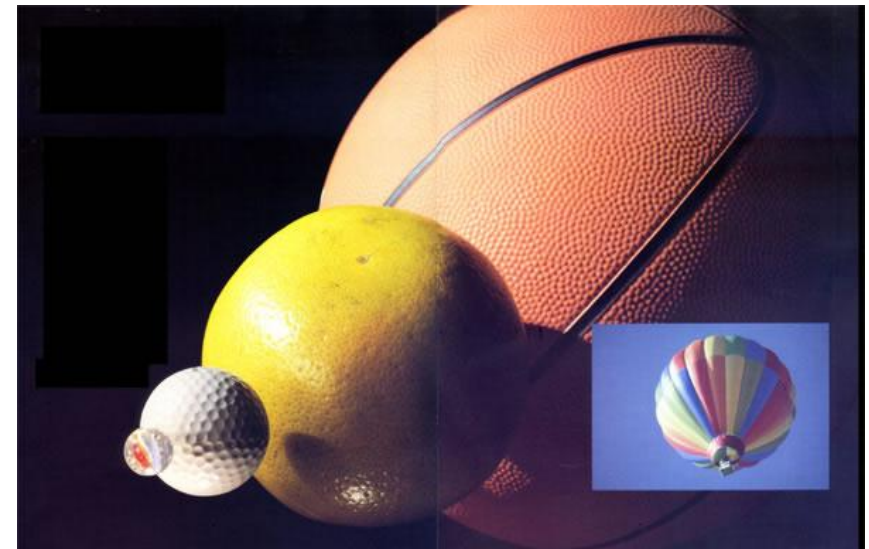


LOGARITHM (BASE 10) OF MAXIMUM AMPLITUDE MEASURED IN MICRONS \*\*

\* EFFECTS MAY VARY GREATLY DUE TO CONSTRUCTION PRACTICES, POPULATION DENSITY, SOIL DEPTH, ROCK DEPTH, ETC.

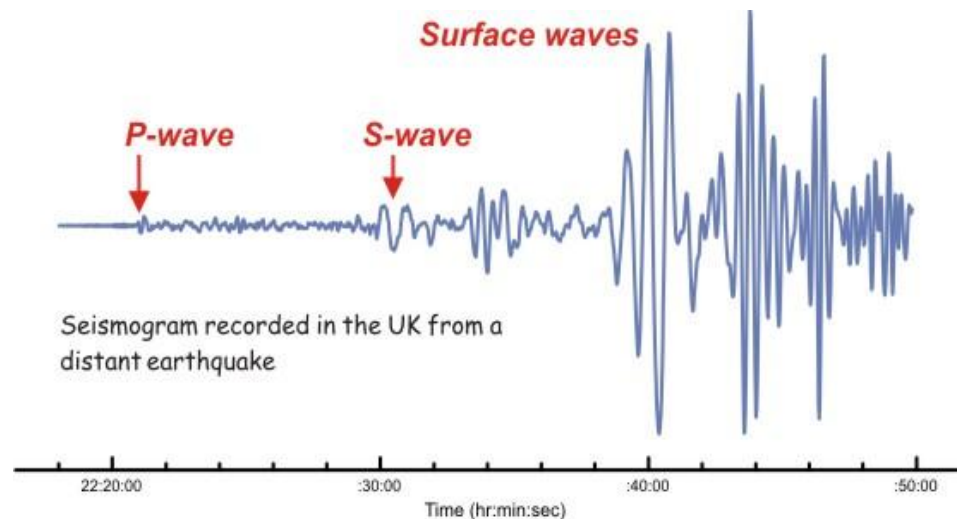
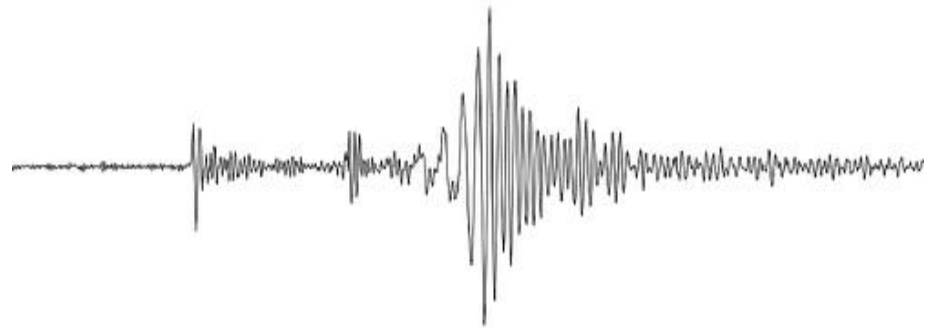
\*\* MICRON = A THOUSITH OF A METER

\*\*\* EQUIVALENT TO A MOMENT MAGNITUDE OF 9.1



# What is the usefulness of a seismogram?

- Determine amplitude of waves from an earthquake
- Calculate magnitude of an earthquake
- Calculate where the epicenter of an earthquake is



# Distance To Earthquake Epicenter

- Scientists use the seismograph to locate the epicenter of an earthquake
- P-wave is faster and arrives first at the station
- Every Seismograph records a time delay between the P and S wave
- This time delay and S and waves are used to find the distance to the earthquake epicenter

$S-P \text{ Time Delay} =$   
 $\text{Distance to Epicenter}$

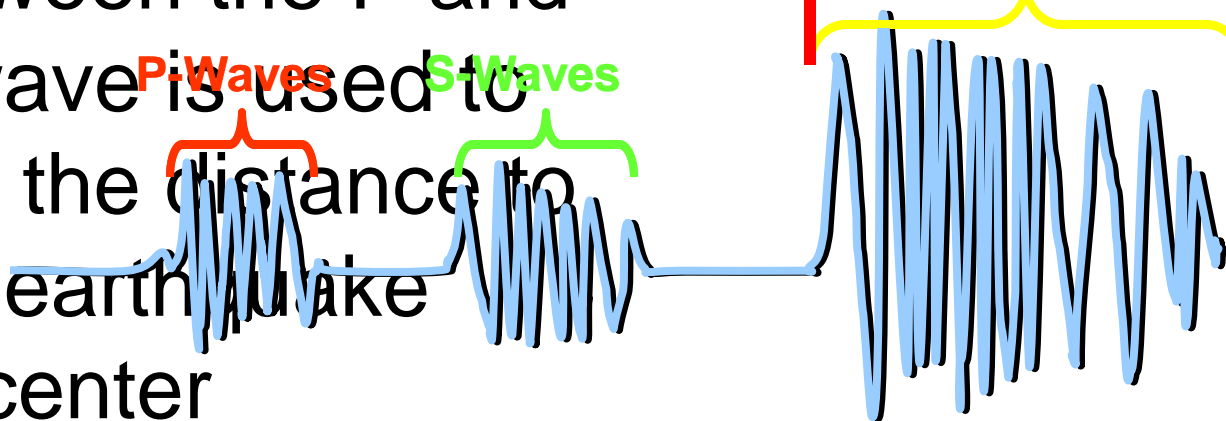
**P-Wave**  
Arrival Time

**S-Wave**  
Arrival Time

**Surface-Waves**

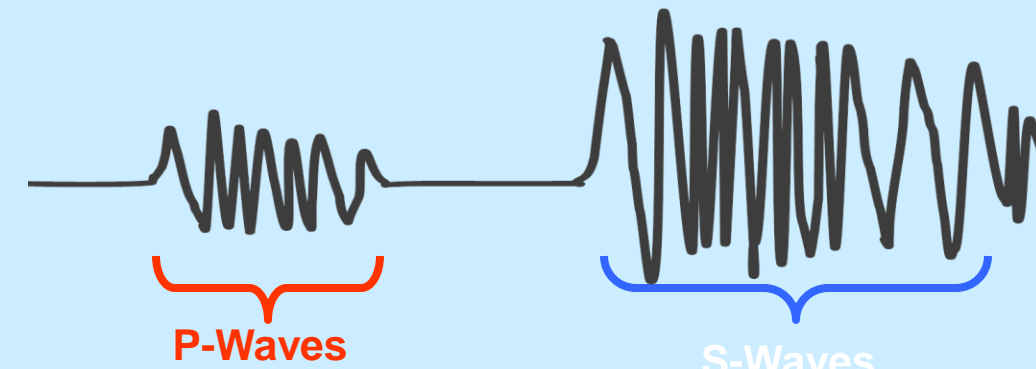
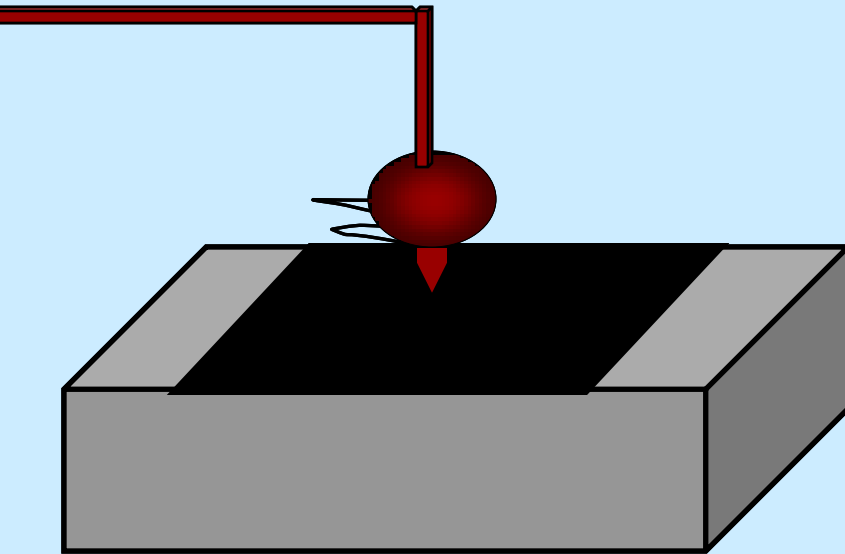
**P-Waves**

**S-Waves**

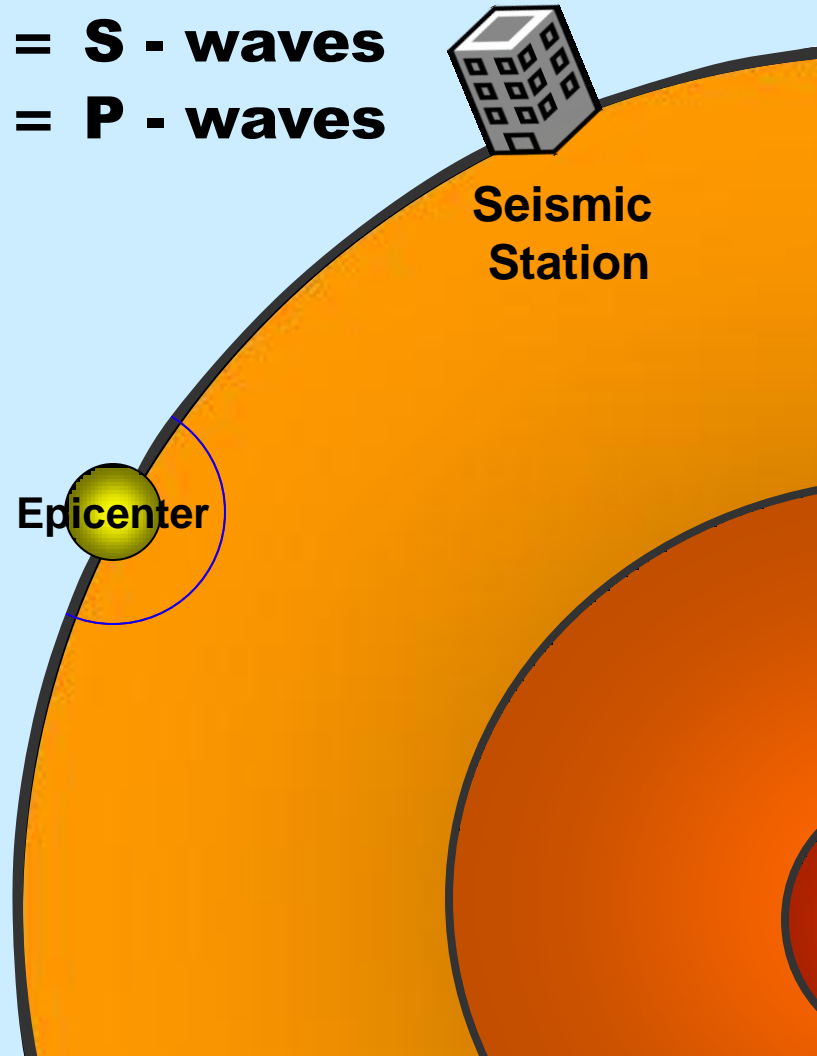


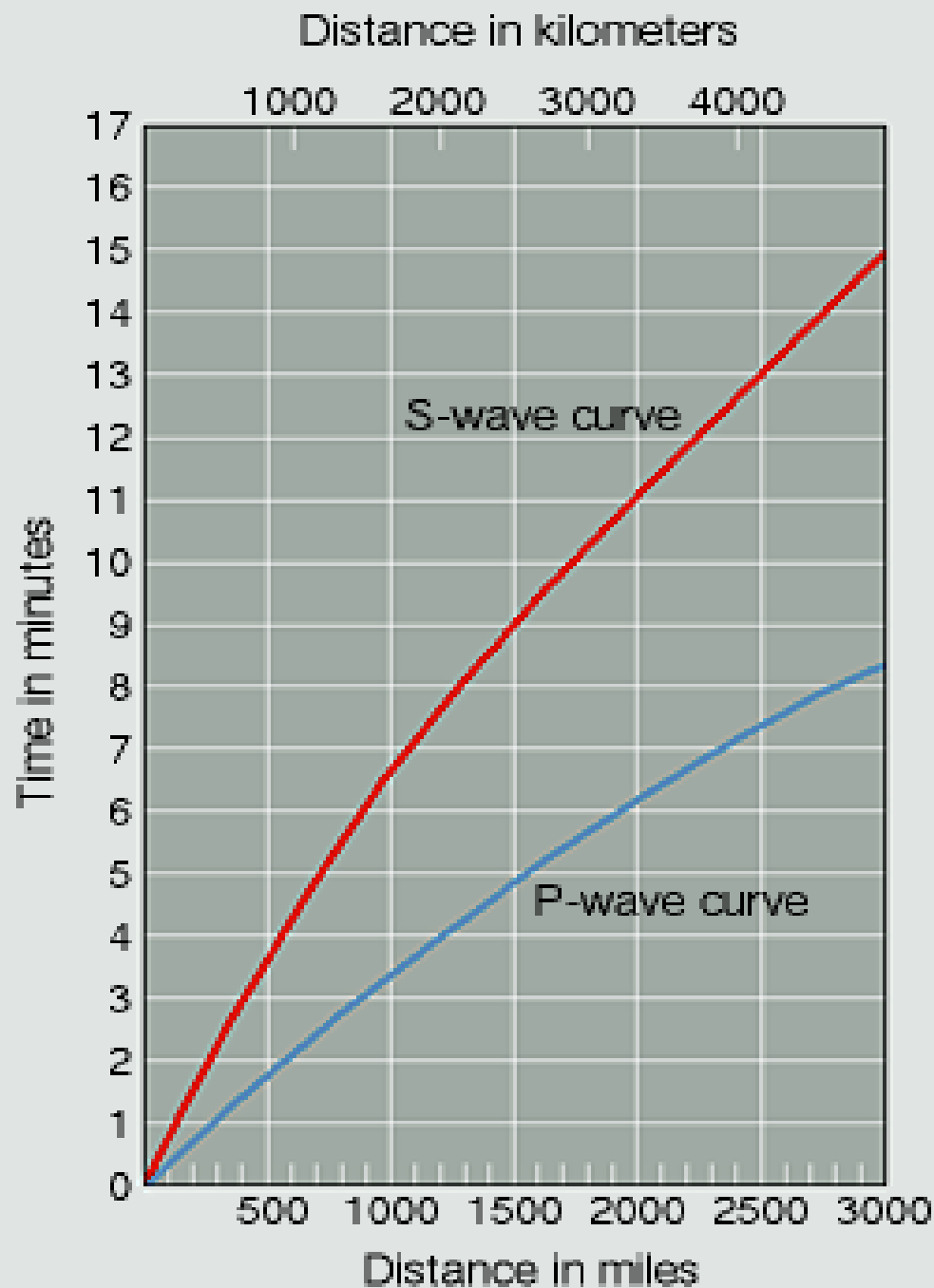


# Distance to Epicenter



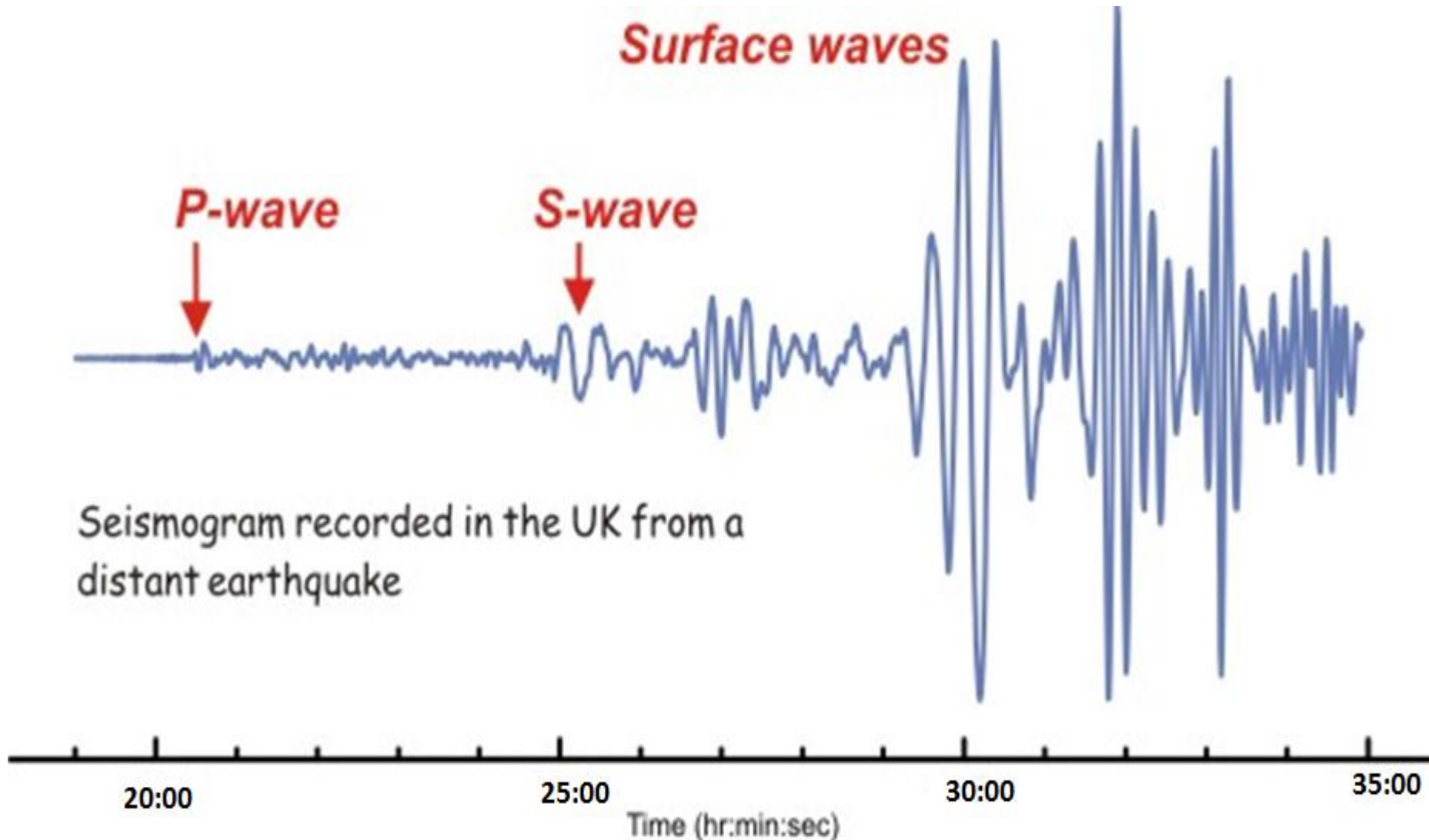
----- = S - waves  
----- = P - waves





$$\frac{\text{S-Wave Time} - \text{P-Wave Time}}{\text{Distance}}$$

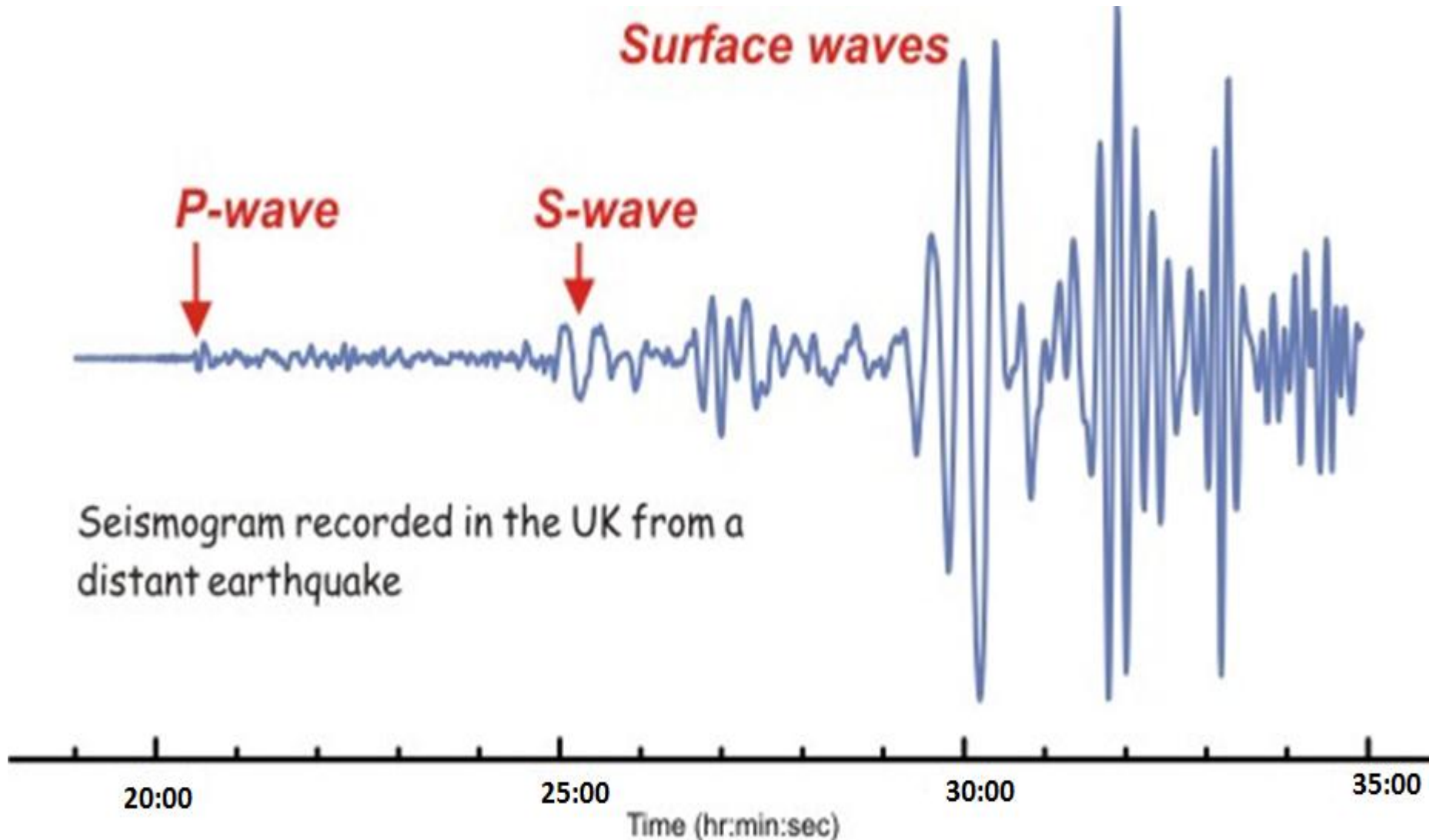
# Let's practice



# Math work

- S Wave comes in at:
- 25:00 minutes

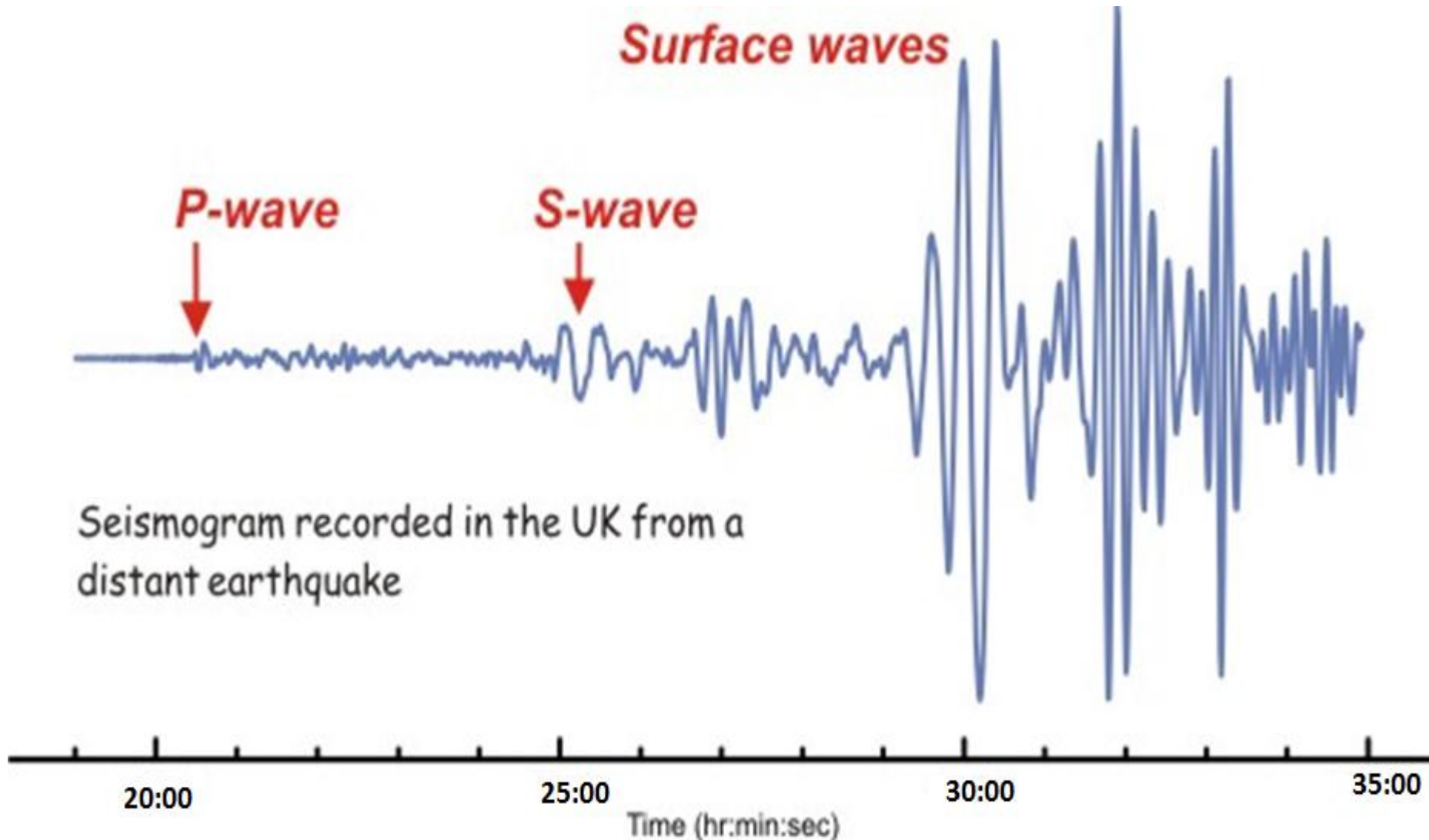
# Let's practice



# Math work

- S Wave comes in at:
- 25:00 minutes
- P wave comes in at:
- 20:00 minutes

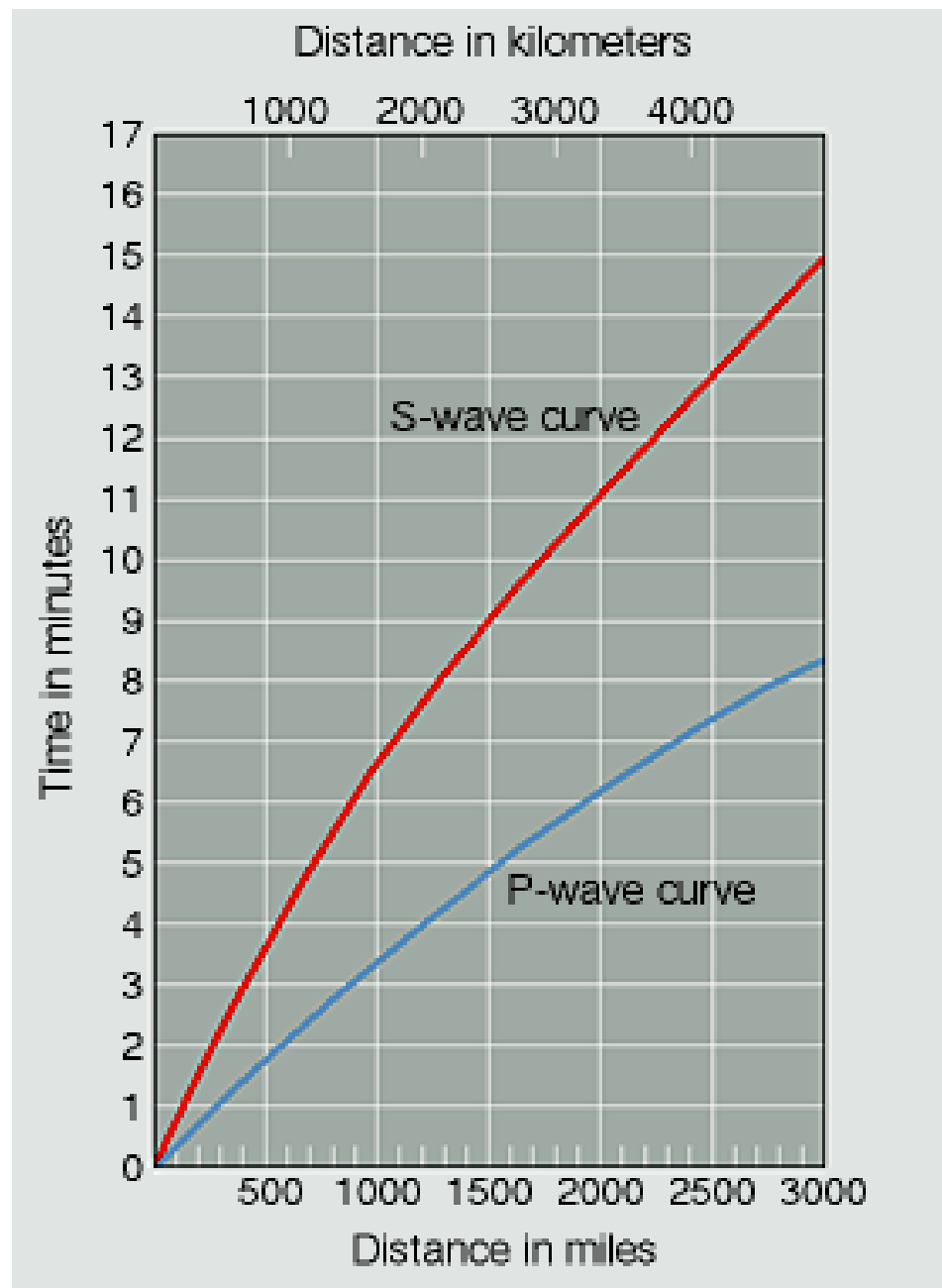
# Let's practice



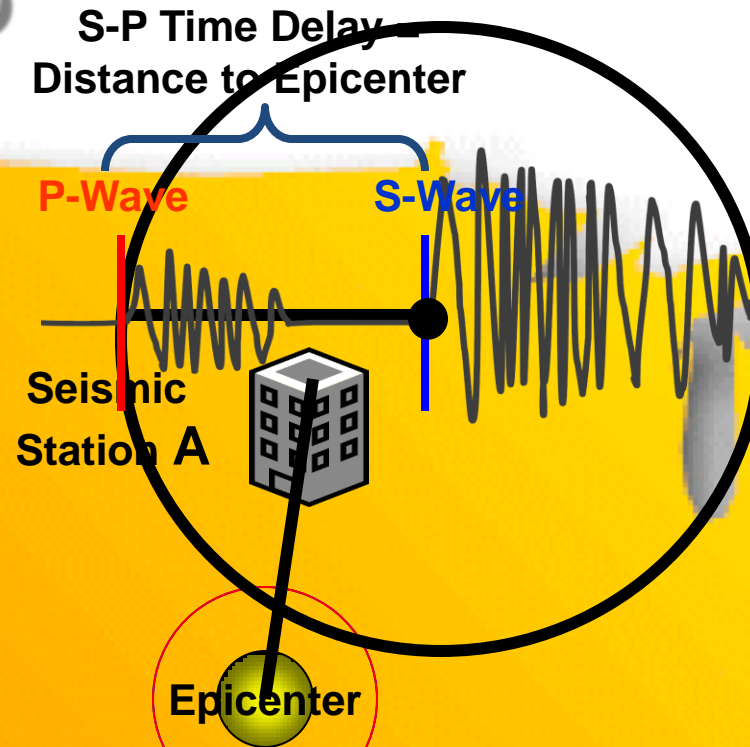
# Math work

- S Wave comes in at:
- 25:00 minutes
- P wave comes in at:
- 20:00 minutes
- Do the math:
- $25 - 20:00 = 5:00$  minutes





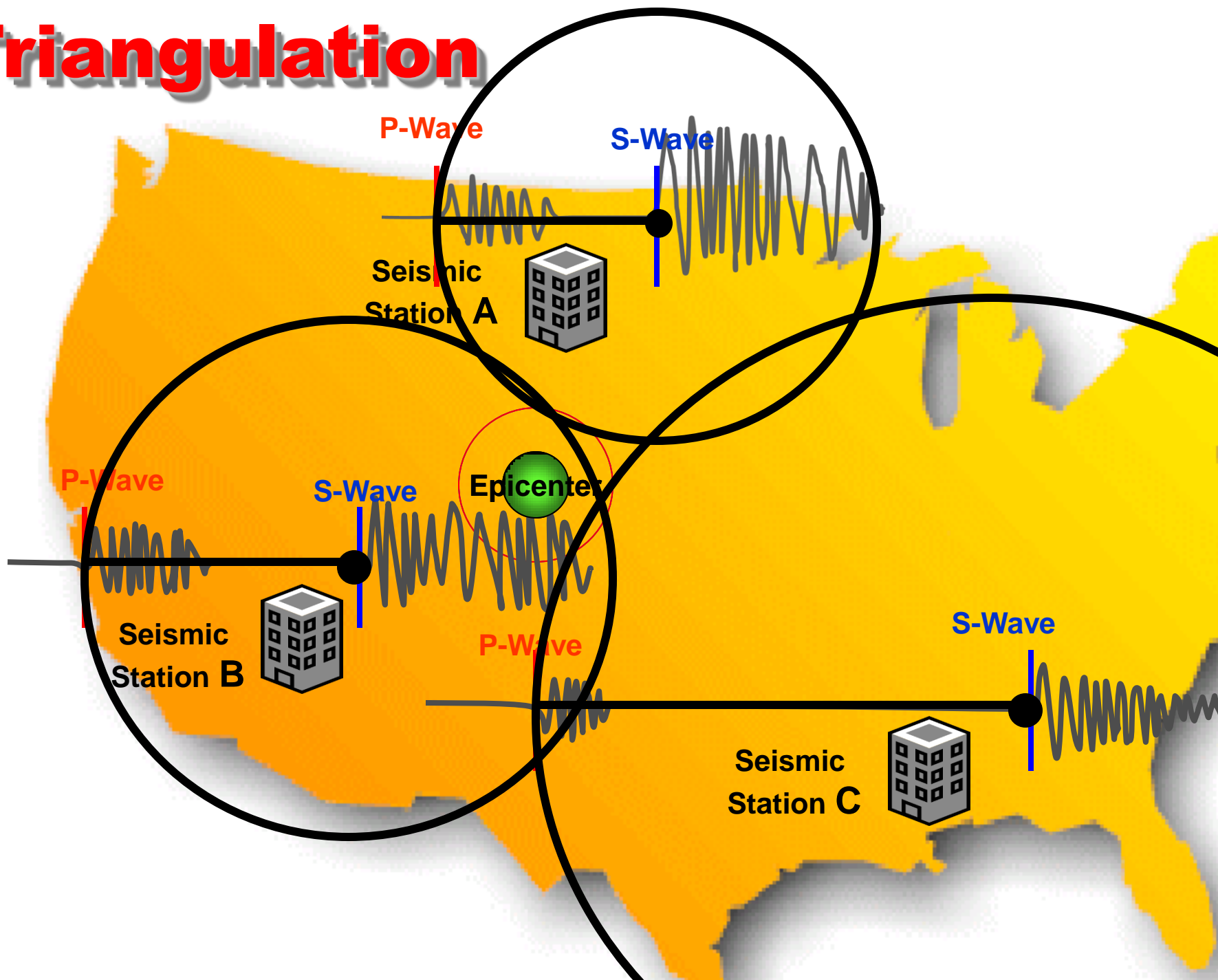
# Distance to Epicenter



The time delay between the **S** and **P** wave gives us the Distance to the epicenter

In other words,  
**S-P Time Delay = Distance to Epicenter**

# Triangulation



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# Bellwork

- What do you use to determine how far the epicenter is located from a seismic station?
- Why can't one seismic station determine where the epicenter of an earthquake is located? How many stations do you need to make a better locate the epicenter?

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