DIRECTIONS!

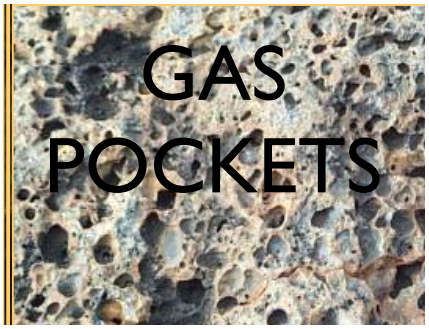
- You will have 9 minutes with each station to complete as many questions as you can.
- You will TURN IN your OWN INDIVIDUAL sheet at the end.
- Make sure you READ THE DIRECTIONS and FOLLOW EACH STEP EXACTLY AS IT IS WRITTEN

If you get stuck...

- You can...
  - Re-read the directions
  - Check the reference table for clues
  - Go to the next question and come back if you have time at the end

A rock is IGNEOUS if you see...

- randomly located, shiny, interlocking **crystals**
- **gas pockets** where gases escaped as lava cooled (vesicular texture, found in pumice and scoria)
- **glassy** texture (found in obsidian)



A rock is SEDIMENTARY if you see...

- Perfectly flat **layers** of sediment or visible sand (usually sandstone)
- Pebbles (conglomerate)
- Shells (limestone or coquina)
- Fossils (usually in shale)

A rock is METAMORPHIC if you see....

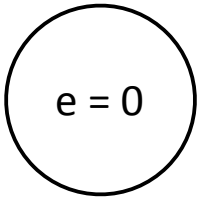
- Alternating light and dark colors, or **banding** (found in gneiss)
- Alignment of mineral crystals, or **foliation,** which could like like...
  - Glitter (mica crystals found in schist), or..
  - Smooth, dark, and looks like a chalkboard

How do I identify a mineral?

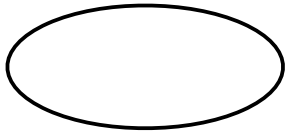
- **Luster**: metallic or non-metallic
- **Hardness:** resistance to being scratched; test with glass
  - SOFT: does NOT scratch a glass plate
  - HARD: DOES scratch a glass place
- **Cleavage or fracture:** how the mineral breaks
  - **Cleavage:** Has at least one flat surface
  - **Fracture:** Breaks along crooked or curved edges
- **Streak:** color of the powder left behind after mineral is rubbed on a streak plate

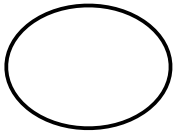
What is the path objects take as the revolve around the sun?

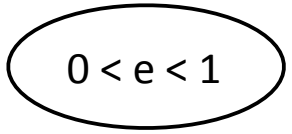
- Planets, asteroids, and comets **don't** travel in a **perfect circle** around the sun... it's a little squashed
- This "squashed circle" is called an **ellipse**
- We measure how "squashed" an ellipse is with a number called **eccentricity**
  - **If the eccentricity is 0, the path is a perfect circle**
  - **If the eccentricity is 1, the path is a straight line**
  - **The higher the eccentricity is, the more "elliptical" we say the orbit is**



e = 1

higher eccentricity 

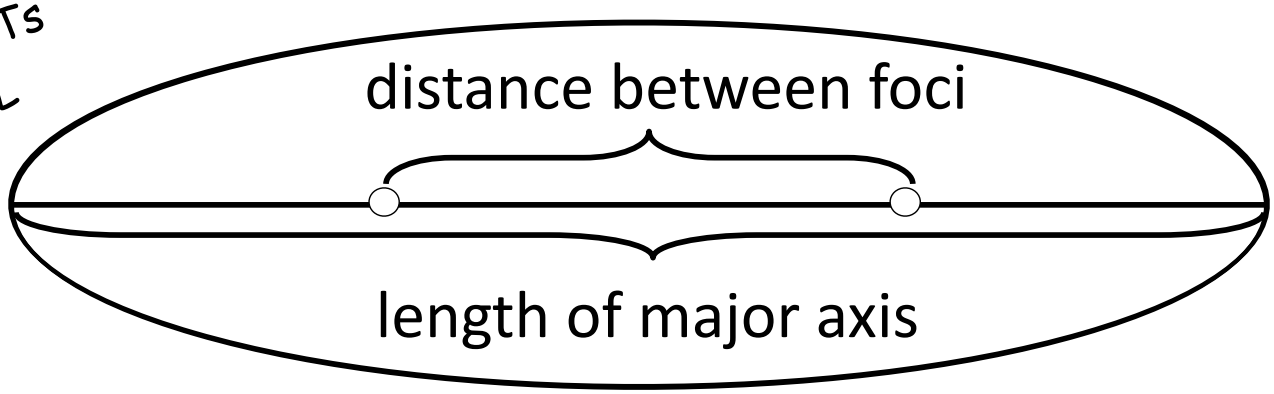
lower eccentricity 



How do we find the eccentricity?

- "**Foci**" are the two centers of an ellipse
- The **major axis** is the longest line you can draw through the ellipse
- **Eccentricity** = $\frac{\text{distance between foci}}{\text{length of major axis}}$

pg. 1 ESRTs
$e = d/L$

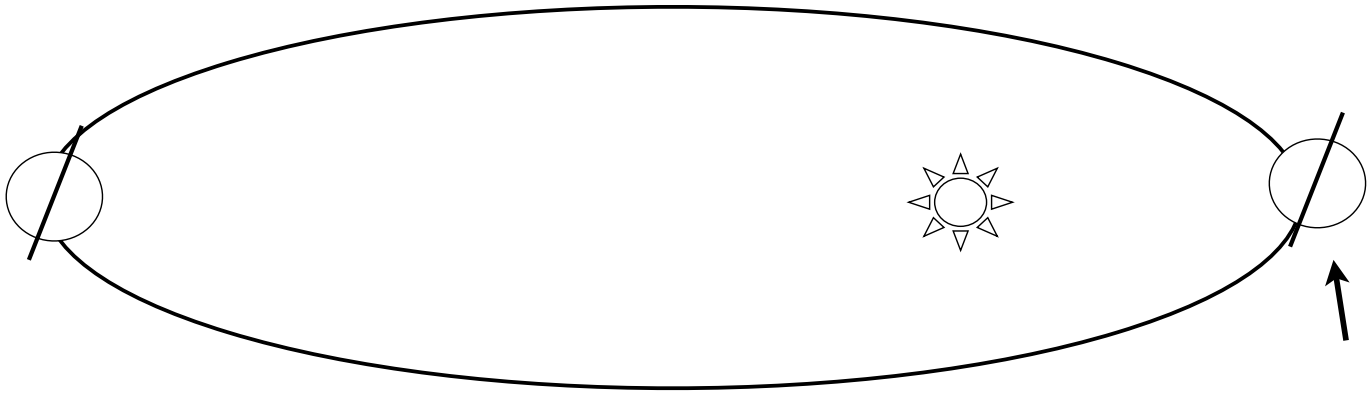


- Measure distances to the nearest tenth of a centimeter (one digit after the decimal, 0.0)
  If it's exact, like 1 cm, write "1.0 cm"
- Round your eccentricity to the nearest thousandth of a centimeter (three digits after the decimal, 0.000)

How does the ellipse affect revolution?

- The sun is at one of the foci (the two centers of an ellipse), so the distance between a planet and the sun changes
- When a planet is **far** from the sun:
  - Gravitational attraction **decreases**
  - Orbital velocity **decreases**
- When a planet is **close** to the sun:
  - Gravitational attraction **increases**
  - Orbital velocity **increases**

Planet is moving **slowest** on this side



Planet is moving **fastest** on this side

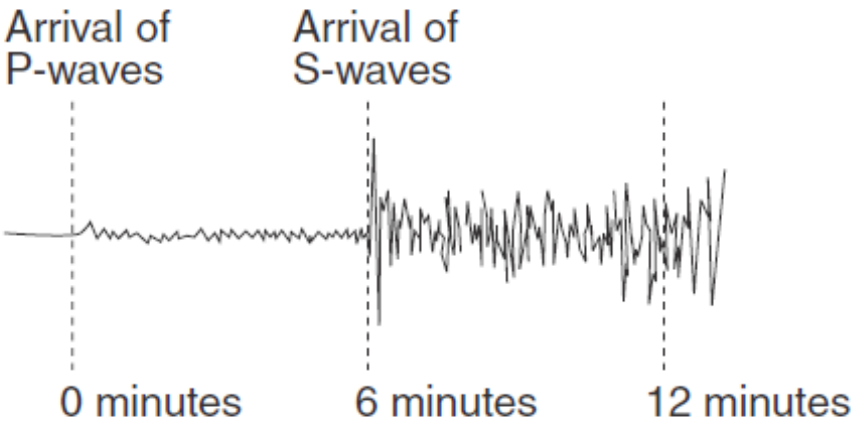
Earthquakes and Epicenters

- **Epicenter:** location on earth's surface directly above the focus (where the earthquake originates)
- Need data from at least **3 seismic stations** to locate the epicenter of an earthquake
- The **bigger** the **gap** is between the P-wave and the S-wave arrival times, the **farther** away the epicenter is

How do I find the epicenter?

lag time from seismogram: 6 min

26 The seismogram below shows *P*-wave and *S*-wave arrival times at a seismic station following an earthquake.



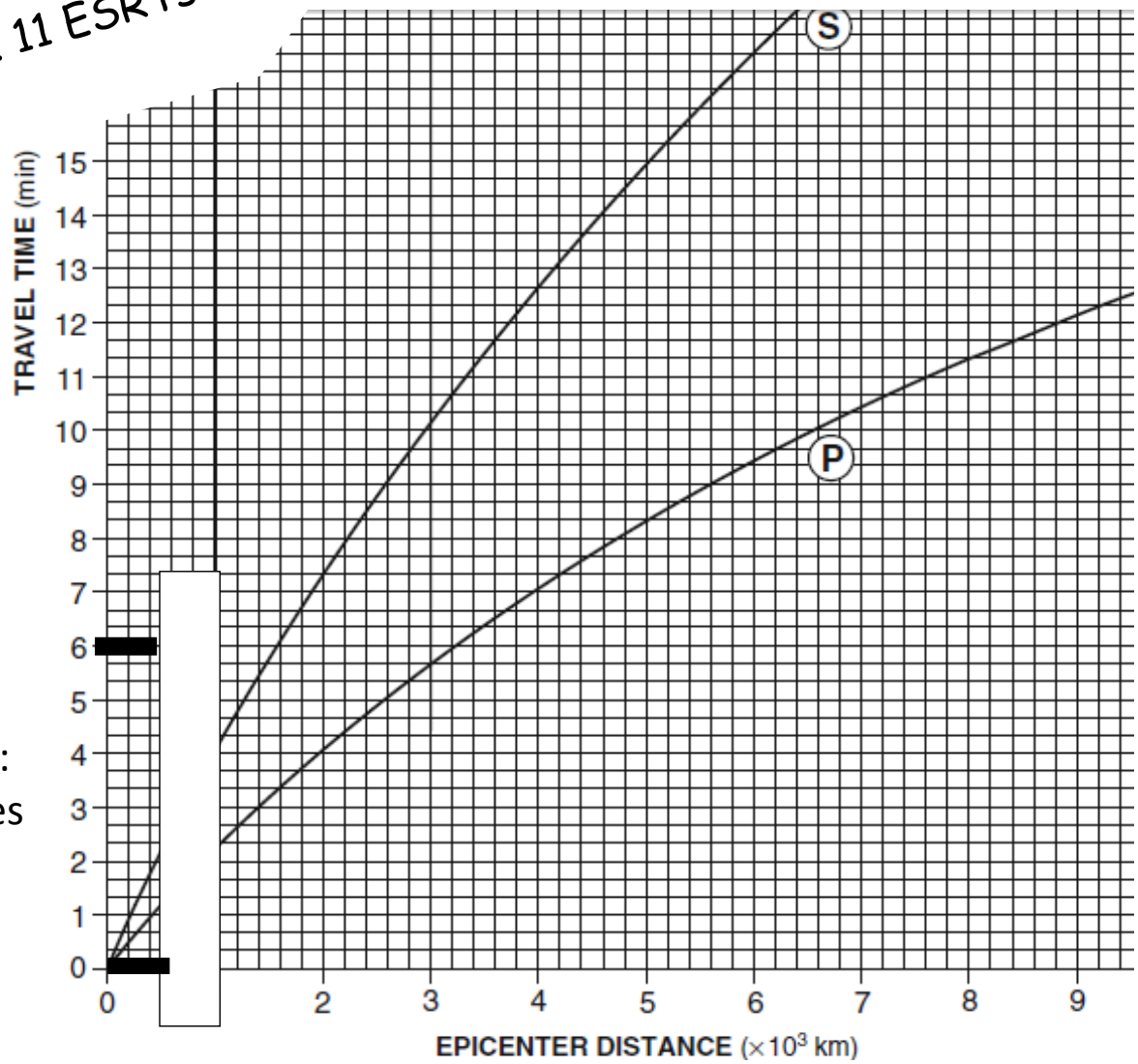
The distance from this seismic station to the epicenter of the earthquake is approximately

(1) 1,600 km
(2) 3,200 km
(3) 4,400 km
(4) 5,600 km

STEP 1: Subtract the S-wave arrival time from the P-wave arrival time given on the **seismogram**

P- and S-wave Travel Time Chart

pg. 11 ESRTs

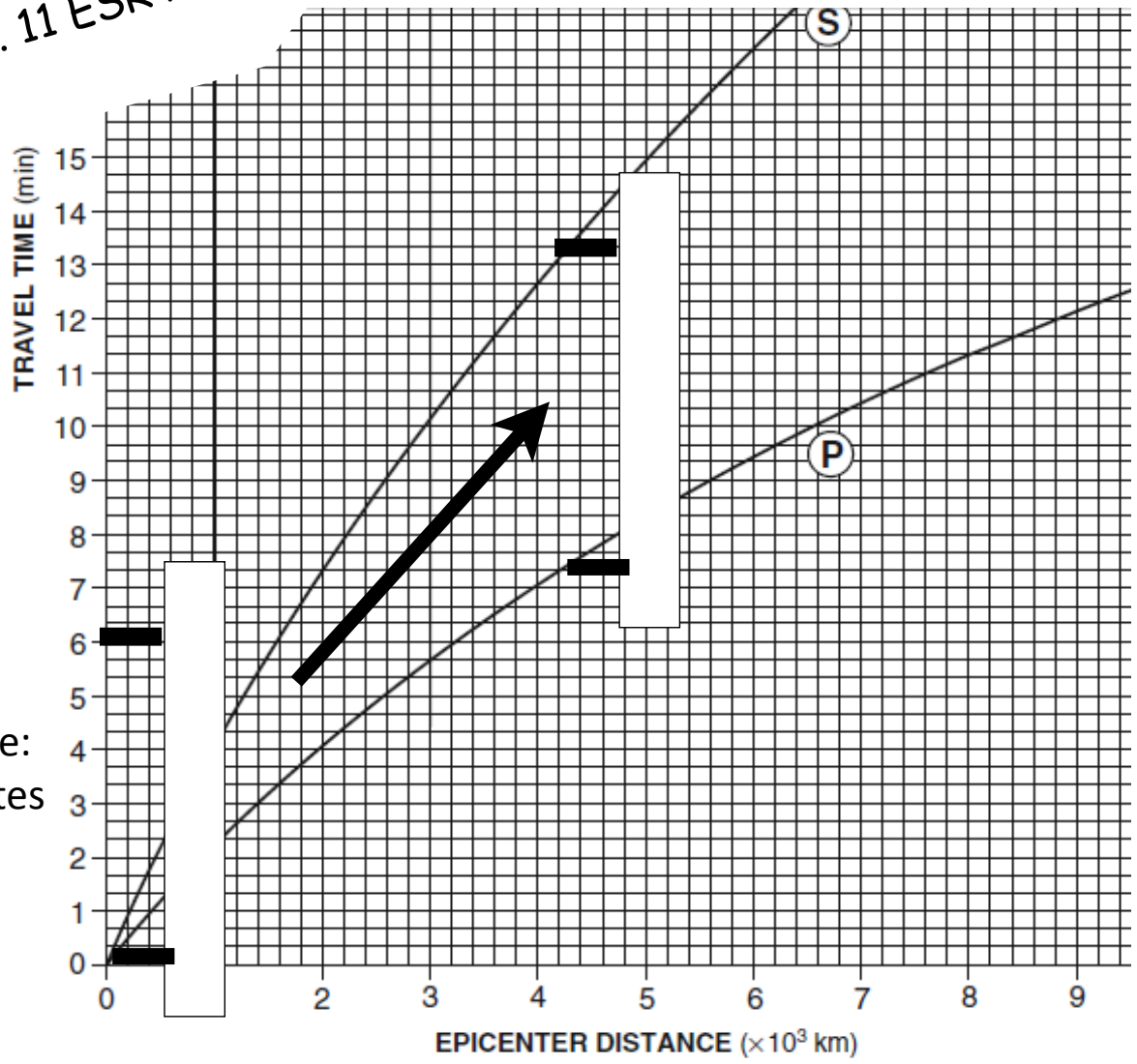


Lag time:
6 minutes

STEP 2:
Mark 0 and the lag time on a piece of scrap paper, using the ESRT chart

P- and S-wave Travel Time Chart

pg. 11 ESRTs

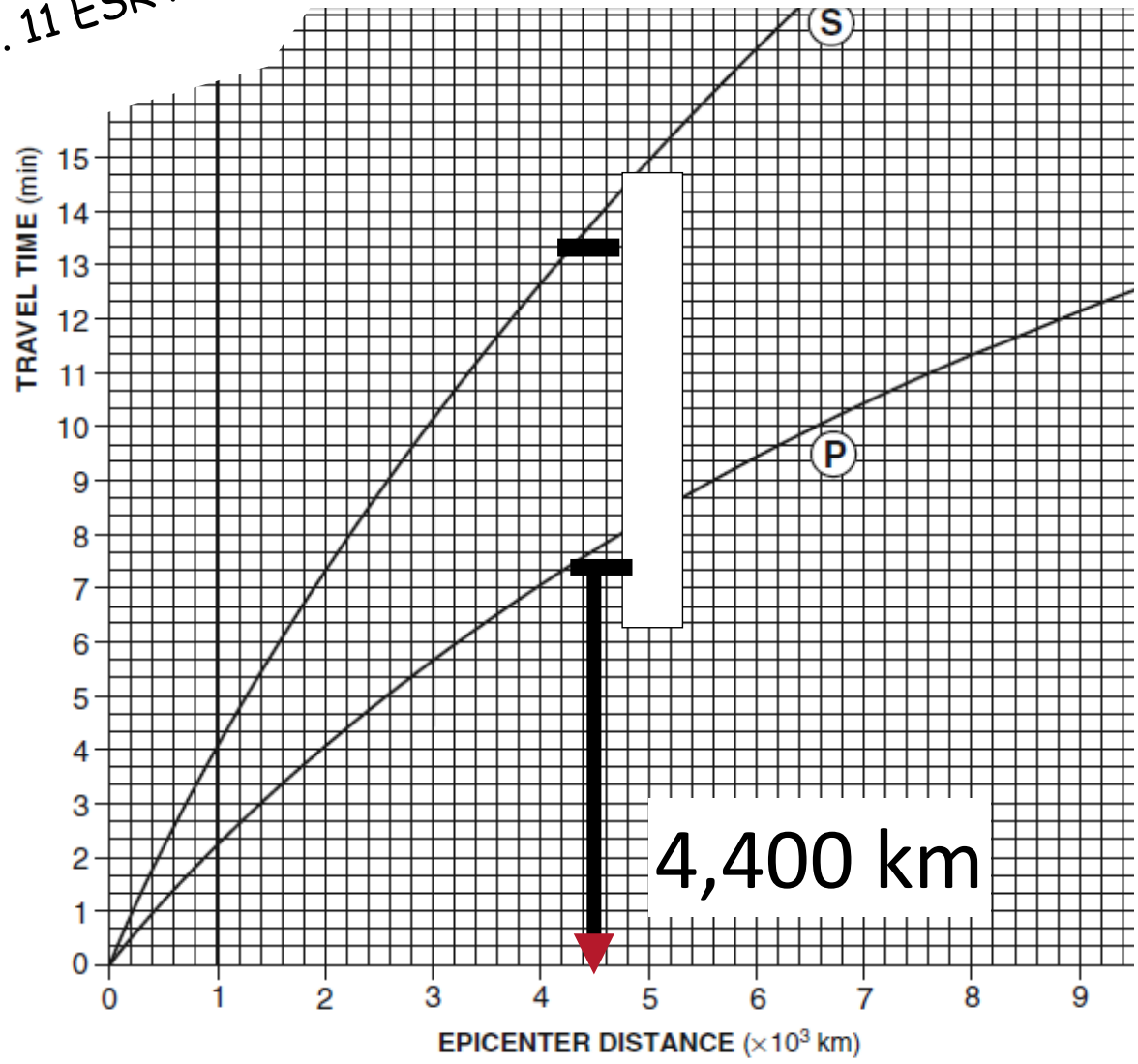


Lag time:
6 minutes

STEP 3:
Slide your paper until you match the gap

P- and S-wave Travel Time Chart

pg. 11 ESRTs



STEP 4:
Read the distance off the X-axis.
Remember: Every box = 200 km