

TEACHER GUIDE & KEY

Operation Mystery Quake - Digital Triangulation Lab

Part 1: Data Analysis Answer Key

Check students' math here before they input their data into the web application. *Formula: S-Wave Time minus P-Wave Time = Lag Time. Lag Time $\times$ 10 = Distance.*

Seismic Station	P-Wave	S-Wave	S-P Lag (sec)	Distance (km)
Seismica (MO)	10:00:00	10:00:30	30 s	300 km
Tectonville (IL)	10:00:10	10:01:00	50 s	500 km
Faulton (TX)	10:00:20	10:01:30	70 s	700 km

Part 2: Web App Results

When students enter exactly **300**, **500**, and **700** into the interactive map sliders, the circles will automatically draw and snap to a perfect intersection.

Target Epicenter Location: Kansas (Lat: 38.0, Lng: -95.0)

Part 3: Grading Rubric (20 Points Total)

- **Data Table (6 pts):** Correctly calculated lag times and real-world distances (1 pt per box).
- **Digital Triangulation (9 pts):** Students successfully input the correct distances into the app and triggered the success screen (3 pts per correct station setting).
- **Epicenter Identification (2 pts):** Student report correctly identifies Kansas as the epicenter state.
- **Geological Concepts in Report (3 pts):** Student clearly explains the difference between the epicenter and the focus.
 - *Full Credit Response Example:* "The epicenter in Kansas is merely the geographic location on the Earth's surface directly above the earthquake. The focus (or hypocenter) is the actual starting point of the rupture, located deep underground within the tectonic rock of the lithosphere."