

Operation Mystery Quake

National Seismic Center - Digital Triangulation Lab

Name: _____

Date: _____

Scenario Briefing

You are the lead geologist at the National Seismic Center. At exactly 10:00:00 AM, a massive, unrecorded earthquake struck the central United States. Your communication grid is down, and you only have raw seismograph readings from three remote stations: **Seismica (MO)**, **Tectonville (IL)**, and **Faulton (TX)**.

Your job is to locate the exact epicenter of the earthquake using our digital geographic interface so emergency crews know where to deploy.

Part 1: Seismic Data Analysis

Because Secondary (S) waves travel slower than Primary (P) waves, the time gap between their arrivals (the S-P Lag Time) grows larger the further you are from the earthquake.

Rule of Thumb: For this region's crust, **1 second of S-P Lag Time = 10 km of distance.**

Instructions: Calculate the missing data in the table below before launching the digital map.

Seismic Station	P-Wave Arrival	S-Wave Arrival	S-P Lag (sec)	Distance (km)
Seismica (MO)	10:00:00 AM	10:00:30 AM		
Tectonville (IL)	10:00:10 AM	10:01:00 AM		
Faulton (TX)	10:00:20 AM	10:01:30 AM		

Part 2: Digital Triangulation Protocol

Now that you have calculated how far the earthquake was from each station, you will use the digital map to triangulate the exact location.

1. Open the **Interactive Triangulation Map** provided by your teacher on your device.
2. Look at the control panel on the right side of the screen.
3. Carefully adjust the slider for **Seismica** to match the exact **Distance (km)** you calculated in Part 1. A geographic radius will appear around the station.
4. Repeat this process for **Tectonville** and **Faulton**.

5. If your math is correct, all three circles will intersect perfectly at a single point, revealing the epicenter!

Part 3: Geologist's Final Report

Write a brief, professional summary (3-4 sentences) explaining your findings to the emergency response team. You **must** state the state where the epicenter is located. Additionally, you **must** explain the difference between the **epicenter** on the map and the earthquake's **focus**. Be sure to mention the **lithosphere**.
