

Epicentre and Magnitude

The location of the *epicentre* of an earthquake is the ground-level point at which the seismic waves start. This is at some distance from a seismograph station. If a circle is centred on the seismograph, the epicentre is on its circumference at some radius. Readings from three stations are then needed to “triangulate” the location of the epicenter where the three circles cross. The S - P time interval can then be used to determine the distance the waves have traveled from the origin to that station.

In the online **Epicentre and Magnitude Activity**, seismograms at known distances are used to measure at what time the S- or P-wave has reached the seismograph and the time lag between the two waves at that point, but in the **Walk/Run activity**, the *Time Lag versus Distance* graph is made directly (again, the distances are known). Once the epicentre distances are determined from the *Time Lag versus Distance* graph, circles, centered on the seismograph stations can be drawn with those radii and the point at which they cross is the epicentre.

Discussion

- What assumptions are being made about the P and S wave velocity in the region?
- What factor(s) would contribute to your circles not intersecting at one point?
- What are the limitations of this way of determining earthquake magnitude?

(this activity is adapted from <https://stao.ca/cms/alldocuments/resources/secondary-resources/curriculum/1102-ses4u-2002-curriculum-earth-and-space-investigations/file>)