

1. **DESCRIPTION:** Teams will demonstrate understanding in the construction and use of topographic maps, geologic maps, and cross sections, and their use in forming interpretations regarding subsurface structures and geohazard risks **especially with respect to subduction zones.**

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**

- a. Each team may bring one three-ring binder of any size containing information in any form and from any source attached using the available rings.
- b. **If the event features a rotation through a series of laboratory stations in which the participants interact with samples, specimens, or displays, no material may be removed from the binder while at or in-between laboratory stations.**
- c. Each team should bring a geologic compass, protractor, ruler, colored pencils, and an equal-area projection stereonet with tracing paper and pin.
- d. **In addition, each team is permitted one stand-alone non-programmable, non-graphing calculator.**

3. **THE COMPETITION:**

The event may be composed of a test, stations, or a combination of both that will require the use of knowledge and relevant skills including observing, classifying, measuring, inferring, predicting, and using relationships from the following topics:

- a. Topographic and geologic maps
- b. Plate tectonics, rock formation, Earth structure, Earth history, lithologies, and geological principles
- c. Major structural elements, fold geometries, fault types, erosional patterns, intrusion types, subsurface geometries, and depositional and deformation sequences
- d. Cross-sections of topographic profiles, projections of mapped features, and stereonet projections
- e. Bed thicknesses, orientations of planes from points, and map projection types
- f. Geohazards types and methods to assess, monitor, and mitigate the associated risks
- g. **Major structural elements and processes associated with subduction zones, spanning before the oceanic trench to volcanic arc**

4. **SAMPLE QUESTIONS/TASKS:**

- a. Use a topographic map to construct a topographic profile.
- b. Use stratigraphic column, geologic map, topographic profile, strike and dip, and bed thickness measurement to construct a cross-section of sub-surface structures.
- c. Determine the order of events based on geological principles.
- d. Assess geohazard risks based on interpretation of geologic and topographic maps, knowledge of lithologies, tectonic setting, and seismic history.
- e. Use a geologic compass to take measurements of strike and dip as well as plunge and trend of planes and lines.
- f. **Use structural elements, geologic and topographic maps, surface and sub-surface lithologies and seismic records to reconstruct the evolution of a given plate boundary.**

5. **SCORING:**

- a. The high score wins. All questions will have been assigned a predetermined number of points.
- b. Pre-identified questions will be used as tiebreakers.

**Recommended Resources:** The Science Olympiad Store ([store.soinc.org](http://store.soinc.org)) carries the GeoLogic Mapping CD and the Bio/Earth Science CD; other resources are on the event page at [soinc.org](http://soinc.org).