

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 **past depositional environments**.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

2. **EVENT PARAMETERS:**

- a. Each team may bring **one 2" or smaller** three-ring binder, as measured by the interior diameter of the rings, containing information in any form and from any source. Sheet protectors, lamination, tabs and labels are permitted. If the event features a rotation through a series of laboratory stations where the participants interact with samples, specimens, or displays; no material may be removed from the binder throughout the event.
- b. Each **participant may** bring **one** protractor, **one** ruler, **one set of** colored pencils, and a stand-alone non-programmable, non-graphing calculator.
- c. **State and National participants may also have one geologic compass per team.**

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's structure, Earth's 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 topographic profiles, projections of mapped features, **and drill cores (physical or representations of)**
- e. Bed thicknesses, orientations of planes from points, and map projection types
- f. **Key features used for differentiating between and within types of continental, marine, and transitional depositional environments (alluvial, tidal, deep marine, etc.)**
- g. **Changes in depositional environments over time and space (transgressions, regressions, uplift, etc.)**

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. **Interpret the changes over time of paleodepositional environments for a particular location based on lithologies, fossil assemblage, and sedimentary structures in the underlying bedrock.**
- e. **Reconstruct the depositional systems across a geographic region, based on lithologies, fossil assemblage, and sedimentary structures in a mapped area.**

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) carries the GeoLogic Mapping CD and the Bio/Earth Science CD; other resources are on the event page at soinc.org.