DYNAMIC PLANET

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Students will use process skills to complete tasks related to Earth's fresh waters.
   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. 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 team may bring two stand-alone calculators of any type.
3. **THE COMPETITION:**
   a. Participants will be presented with questions which may include one or more tasks at a workstation or a timed station-to-station format.
   b. The participants will be expected to use process skills (e.g., communicating, classifying, inferring, measuring, observing, predicting, & using number relationships) to answer questions on the following topics:
      i. Interpretation of fresh water features shown on USGS topographic maps
      ii. Stream drainage systems: stream order, drainage patterns, main channel, tributaries and watersheds
      iii. Channel types: braided, meandering, straight and calculations of sinuosity
      iv. Sediment: weathering, erosion, clast forms & sizes, transportation, capacity & competence, deposition
      v. River valley forms and processes: geology, gradient, base level, floodplain features, dynamic equilibrium, nick points, waterfalls, stream capture, deltas and fans
      vi. Perennial and intermittent stream flow, stream gauging and monitoring, stream flow calculations, discharge, load, floods, recurrence intervals
      vii. Groundwater: zone of aeration, zone of saturation, water table, porosity, permeability, aquifers, confining beds, hydraulic gradient, water table contour lines, flow lines, capillarity, recharge and discharge, saltwater intrusion, and interactions between surface and groundwater
      viii. Karst features: sinkholes, solution valleys, springs, disappearing streams, caves
      ix. Lake formation & types: faulting, rifting, volcanic action, glaciation, damming of rivers, changes over time
      x. Lake features: inflow & outflow, physical & chemical properties, stratification, shorelines, waves
      xi. Wetlands: interactions between surface and groundwater in the evolution of bogs and marshes
      xii. Destruction/Effects of land use changes, dams and levees: sedimentation, down-cutting, diversion of water, flooding, ecological changes
      xiii. Hydrologic cycle and water budgets: precipitation, runoff, evaporation
      xiv. Pollution: types, sources, transport
      xv. Critical zone hydrology: infiltration, evapotranspiration, soil moisture, permafrost, pingos
      xvi. Division C Only:
         (1) Chezy and Manning equations
         (2) Darcy's Law
4. **REPRESENTATIVE ACTIVITIES:**
   a. Analyze and interpret features and actions of a stream or river appearing on a topographic map including watershed boundaries, elevation, gradient, direction of flow, drainage pattern, valley shapes, erosional landscapes, and depositional features.
   b. Construct a water table contour map and indicate the direction of groundwater movement.
   c. Analyze data on the thermal structure of a lake and determine how the stratification changes seasonally.
   d. Given a geologic map, cross section, or lithologic sequence, determine pattern of water flow and storage, optimal reservoir sitting.
5. **SCORING:**
   a. All questions will have been assigned a predetermined number of points.
   b. The highest score wins.
   c. Selected questions will be used to break ties.

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries a variety of resources to purchase for this event; other resources are on the Event Pages at soinc.org

This event is sponsored by the National Oceanic and Atmospheric Administration (NOAA) and the North American Association for Environmental Education (NAAEE)