DYNAMIC PLANET DRAFT RULES 17

1. DESCRIPTION: Students will demonstrate an understanding of the large-scale processes affecting the structure of the Earth's crust.
   A TEAM OF UP TO: 2 APPROXIMATE TIME: 50 Minutes
2. EVENT PARAMETERS: Each team may bring four 8.5" x 11" sheets of paper that contain information on both sides on any form and from any source. The sheets may not be contained in sheet protectors or have any annotations affixed but they may be laminated. Each team may bring two non-programmable and non-graphing calculators to use during the event.
3. THE COMPETITION: Participants will be present with one or more tasks presented an an exam and/or timed stations. An emphasis will be placed on the interconnectivity of Earth's processes in relation to global and environmental changes in the past, present and future. Topics will include the following:
   a. History of the theory of plate tectonics, including key scientists.
   b. Identification of Earth's layers – crust lithosphere, mantle asthenosphere.
   c. Driving forces of plate tectonics, types of plates, boundaries and margins.
   d. Types of tectonic basins, process that form them, and the nature of the sedimentary record for each.
   e. Plate movement and impacts of plate movement – Wilson Cycle, terranes, orogenic belts, past supercontinents, convergence, divergence, transform motion and associated faults.
   f. Continental drift's role on opening and closure of ocean gateways and land-bridges, with specific reference to ocean circulation changes, climate changes, and biotic migrations.
   g. Isostatic adjustments – plate thickness, and the impact of mass wasting and glaciation. Hypsometry and the elevation/depth of continental and oceanic crust.
   h. Recognition of natural hazards due to plate tectonics and their mitigation.
   i. Magma formation – geological settings, chemistry, and properties.
   j. Geologic history of North America: Evolution of the North American craton, Rocky Mountains, Appalachian Mountains and Yellowstone Hot Spot.
   k. Interpretation of geophysical data to understand plate tectonics including brittle and ductile deformation in rocks. Magnetic anomalies, gravity anomalies, stress, and seismicity.
   l. Geophysical tools to obtain data to interpret physical structure of the Earth.
   m. Geological settings of ores, hydrothermal, hydrocarbons in relation to tectonics processes and features.
4. SAMPLE QUESTIONS/TASKS:
   a. Using maps and available datasets, plot the horizontal movement of lithospheric features and respond to interpretative questions, including calculations.
   b. Using a paleogeography reconstruction of the late Cretaceous identify the location of major plate boundaries represented (https:..deeptimemaps.com/).
   c. Deconstruct geological event histories from cross sections and block diagrams
   d. Interpret expression of Earth's surface features from topographic/bathymetric maps and satellite data.
   e. Given a rate of loading or unloading of ice sheets, estimate vertical lithospheric movement due to isotactic adjustments.
   f. Interpretation of magnetic and gravity anomalies to infer subsurface geological features.
5. SCORING: Team with the highest score wins. Points will be awarded for the quality and accuracy of responses. Selected questions may be used as tiebreakers.