ECOLOGY

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

1. **DESCRIPTION:** Students will answer questions involving content knowledge and process skills in the area of ecology and adaptations in featured North American biomes.

   A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 Minutes

2. **EVENT PARAMETERS:** Each team may bring only one 8.5" x 11" sheet of paper, which may be in a sheet protector sealed by tape or laminated, that may contain information on both sides in any form from any source without annotations or labels affixed along with two stand-alone non-programmable, non-graphing calculators (Class II).

3. **THE COMPETITION:**

   This event will be composed of three parts of approximately equal point value.
   The event will emphasize these process skills as they apply to ecology: defining variables; analyzing data from graphs and tables; presenting data in graphs and tables; forming hypotheses; making calculations and predictions. If stations are used, students must spend the same amount of time at each station.
   a. Part 1: Review of the General Principles of Ecology
      i. General Principles of Ecology - food webs and trophic pyramids, nutrient cycling, community interactions, population dynamics (including density dependent/independent limiting factors, carrying capacity, doubling time, exponential/logistical growth and how to calculate population growth), extinction, selection and migration. At the regional and state level, the general ecological principles should focus on local and regional ecology.
      ii. **Division C State and Nationals only:** life history strategies (e.g., age structure, survival curves, life tables, succession, R and K strategies)
   b. Part 2: Terrestrial Ecosystems
      i. **Ecology of the Tundra, Taiga and Deciduous Forests**
      ii. Understand basic concepts of biodiversity (e.g., importance, different types)
      iii. **Div. C State and Nationals only:** Be able to apply knowledge of biodiversity (plot maps, simulations of selection effects on populations)
      iv. **Div. C Nationals only:** Understand terminology and be able to calculate biodiversity of sample data (species richness, Simpson index, Shannon-Wiener index)
   c. Part 3: Human Impact on Ecosystems
      i. Topics such as climate change, invasive species, acid deposition (including acid rain), erosion, and chemical contamination (pollution)
      ii. The pros and cons of using alternative energy and its effect on the environment
      iii. Understand the goals of conservation biology and how they can be obtained
      iv. Reclamation of disturbed areas versus reintroduction of species
      v. **Division C State and Nationals only:** Be able to answer questions as they pertain to case studies
      vi. **Division C only: adding indigenous knowledge or traditional ecological knowledge (TEK) to our "toolkit"**

4. **SAMPLE QUESTIONS:**
   a. **Division B:**
      i. From the description of community interactions, create a food web. Then predict what would happen to the food web if the primary producers were greatly reduced in number by a disease.
      ii. Given a description of the interaction between two species, identify the type of community interaction.
      iii. List three ways a tundra is different than a taiga.
      iv. Compare a tundra with a taiga. What kinds of adaptations may be common in both environments? How are the organisms in each environment adapted for the rates of nutrient recycling that you would expect to find?
   b. **Division C:**
      i. Given a complex food web, create a trophic pyramid and determine the amount of energy in each level when given a quantity of energy entering the producer level.
      ii. Students are given a graph depicting the changes in two interacting populations of different species in a habitat. Predict which population is the predator and which is the prey. Give reasons for your choices.

iii. Determine the population growth rate for an area given r (rate of increase) and N (number of individuals).
iv. Students are given three age structures and asked to determine which population has the highest birth rate, death rate, doubling time, and mean age.

5. **SCORING:** Questions will be assigned point values. Students will be ranked from highest to lowest score. Ties will be broken by pre-determined tiebreaker questions.

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

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