

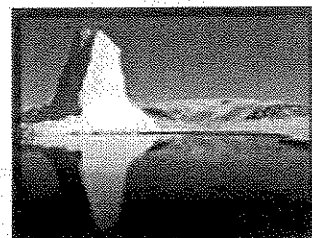
DESCRIPTION: This event emphasizes the use of process skills to complete tasks related to glaciation.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 Minutes

EVENT PARAMETERS: Teams may bring a four-function calculator, plus handwritten, typed, or computer-generated resources, including books, to the event. All resources must fit within the confines of an area no larger than 12" x 12" x 3".

THE COMPETITION: Participants will be presented with one or more tasks, each requiring the use of process skills. These skills include, but are not limited to, generating inferences, making predictions, problem solving, making and recording observations, formulating and evaluating hypotheses, interpreting data, and graphing. This event will address glaciation as it relates to Planet Earth only.



Topics of study may include, but are not limited to:

- Transformation from snow to glacial ice
- Mass balance: accumulation vs. ablation
- Types of glaciers: ice sheets (continental), ice caps, ice shelves, highland icefields, valley glaciers, piedmont glaciers, hanging glaciers
- Glaciers as indicators of climatic changes
- Glacial flow: internal deformation, basal sliding, movement over soft, deformable beds
- Large scale glacial erosional landforms: cirques, horns, fiords, glaciated valleys
- Glacial deposition landforms: terminal moraine, lateral moraine, drumlins
- Glacial meltwater deposition: outwash plains, kettle lakes, eskers
- Earth's glacial record: major periods of glaciation, rock record; sediment cores, ice cores, effects of precession and changes in Earth's tilt

REPRESENTATIVE ACTIVITY: Participants will determine the approximate area of the Grinnel Glacier using each of a series of twelve outline maps drawn intermittently over a period of more than 100 years. They will then enter this information onto a graph and use their results to respond to several interpretive questions. This activity may be found at:
http://www.tufts.edu/as/wright_center/fellows/sci_olympiad/sci_olympiad_geo.html.

SCORING: Points will be awarded for the quality and accuracy of responses. A minimum of three pre-identified questions will serve as tiebreakers.

RESOURCES: "Glaciers, Climate, and the Landscape" by Zach Smith, downloadable from the Wright Center for Innovative Science Education website, Tufts University, Boston:
http://www.tufts.edu/as/wright_center/fellows/zachfinal.pdf
 Glaciers, Hambrey, Michael, and Alean, Jurg, 2nd Edition, Cambridge University Press, 2004. ISBN 0 521 82808 2 hardback.

National Science Education Standards: Earth and Space Science, Content Standard D: Structure of the Earth System and Earth's History (Grades 5-8); Earth and Space Science, Content Standard D: Origin and Evolution of the Earth System (Grades 9-12). **National Geography Standard:** Number 7, Element 3: Physical Processes that Shape the Patterns of Earth's Surface.

DESCRIPTION: Students will answer questions involving content knowledge and process skills in the area of ecology and adaptation by examining different ecosystems.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 Minutes

EVENT PARAMETERS: Students may bring a non-programmable calculator. No other reference material will be allowed. References, training resources and suggested regional/state competition emphasis are available on the Official Science Olympiad Web Page at <http://www.soinc.org>.

THE COMPETITION:

1. 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.
2. Approximately 80% of the questions should deal the following ecological principles: Energy flow and food webs including a quantitative analysis of data (producers, primary, secondary and tertiary consumers, and decomposers, etc.); nutrient cycling, adaptation to and limiting factors of an ecosystem, carrying capacity, community interactions, predator-prey relationships, mutualism, parasitism, commensalisms; factors affecting population size (climate, resources, competition, etc); human impact upon ecosystems (global warming, invasive species, acid rain, erosion, pollution); life history strategies (age of reproduction, survival curves, seed dispersal); extinction, selection and migration. If stations are used, students must spend the same amount of time at each station.
3. Approximately 20% of the questions should deal with these two ecosystems for 2005: freshwater lakes & streams and estuaries. In future years, ecosystems will be chosen from the following list and rotated on a yearly basis: tundra, taiga, forests of all kinds including rain forests, grasslands, deserts, freshwater lakes and streams, estuaries, ocean shorelines/tidal pools, open oceans, thermal ocean vents.

SAMPLE QUESTIONS

1. Given a list of organisms and what each organism eats, construct a food web. Identify each organism as producer, consumer, or decomposer as appropriate
2. 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.
3. Provide three reasons why a grassland is easier to sustain over a number of years than a suburban lawn.
4. Compare the tundra with a tropical rain forest. 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?
5. Students are given data on temperature and rainfall for two different areas. They are asked to predict the kinds of organisms that will be present in each area.
6. Students are given information about the physical traits and life history of a fictitious organism. They are then asked in what kind of environment it might be expected to live.
7. Why are the seeds of some plants able to pass, unharmed, through the digestive system of an animal?

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.