

INTRODUCTION TO THE ARCTIC: INTRODUCTION

Areas located north of the Arctic Circle are known as arctic ecosystems. Arctic ecosystems are characterized by the inability to support tree growth. This is due to the short summers, lack of sunlight, and temperatures below ten degrees Celsius, which prevent trees from completing their annual growth cycle. In addition, the permanently frozen ground (known as permafrost) prevents roots from growing deep enough to absorb water, and the extreme winds would hinder growth, as well. Most plants in the arctic grow low to the ground. Lichen (describing a symbiotic relationship between a fungus and an alga) are abundant here. Animals of the arctic include caribou, reindeer, walrus, polar bears, the arctic hare, and birds such as the arctic tern and the snow goose.

KEY WORDS

arctic	hibernation	carrying capacity
adaptation	migration	food web
tundra	permafrost	insulation

FOCUS QUESTIONS

1. What is the arctic?
2. Where is the arctic?
3. What plants live in the arctic?
4. What people live in the arctic?
5. What special adaptations to organisms have to live in the arctic?
6. How do you think our pipeline will be affected by melting permafrost?

LEARNING OBJECTIVES

The students will

- identify the location of the arctic.
- define arctic characteristics.
- identify two plants that live in the arctic.
- identify three animals that live in the arctic.
- identify two groups of people native to the arctic.
- identify two major lifestyles of native arctic peoples.
- compare arctic environment characteristics with other environments.
- identify special adaptations needed for survival in the arctic.
- Identify organisms and inhabitants of the arctic environments.

MATERIALS

Student lab books with worksheets

- Pre-assessment
- Focus questions
- Slideshow questions
- Lab worksheets

Permafrost Activity (per group)

- 1 plastic shoebox
- 1 liter of freshwater
- ¼ liter of small gravel stones
- ¼ liter of dirt
- ¼ liter of moss
- 6 toothpicks
- 1 solid cubic piece of clay (6-7 cm per side, in shape of small house)
- Graph paper

Caribou Carrying Capacity Activity

- Graph paper
- Calculators

Food Web Activity

- Link-up cards

Blubber, Feathers, and Fur Activity

- 1 large container with ½ gallon of water and several trays of ice
- 1 bottle of hot water for each student (representing a warm blooded animal)
- 1 quart-sized sealable plastic bag per student
- 2 snack-size sealable plastic bags per student
- Fur and feathers (available at craft stores)
- 1 jar of solid vegetable shortening (representing blubber)
- Small rocks

Habitat Concentration Activity

- Concentration cards

Blubber Mitten Activity (additional activity)

- Crisco (or other fat)
- 2 sealable sandwich bags
- 1 bowl of water with ice cubes

AUDIO-VISUAL MATERIALS

- Computer, projector/monitor, screen
- Slideshow: “Introduction to Arctic”

LEARNING PROCEDURE

See “Lesson 1 Activity Instructions” for details.

- A. Pre-Assessment **(20 minutes)**
- B. “Introduction to Arctic” Power Point **(20 minutes)**
- C. Permafrost Activity, Parts 1 and 2 **(30 minutes)**
- D. Caribou Carrying Capacity Activity **(20 minutes)**
- E. Blubber, Feathers, and Fur Activity **(20 minutes)**
- F. Bering Sea Food Web Link-up Game **(30 minutes)**
- G. Habitat Concentration Activity **(25 minutes)**
- H. Conclusion and wrap-up discussion **(15 minutes)**

Additional Activity: Blubber Mittens

STANDARDS

Alaska State Standards:

- SA** The student will demonstrate an understanding of the processes and applications of scientific inquiry.
- (5) SA1.1** asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating.
 - (5) SA1.2** using quantitative and qualitative observations to create their own inferences and predictions.
- SA1** The student will develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend arguments.
- SA2** The student will develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.
- (5) SA2.1** supporting their statements with facts from a variety of resources and by identifying their sources.
- SA3** The student will develop an understanding that culture, local knowledge, history, and interactions with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.
- (5) SA3.1** identifying the limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survives.

National Science Education Standards

Content Standard A: Scientific Inquiry

All students will develop abilities necessary to do scientific inquiry.

Identify questions that can be answered through scientific investigations.

Design and conduct a scientific investigation.

Use appropriate tools and techniques to gather, analyze and interpret data.

Develop descriptions, explanations, predictions and models using evidence.

Think critically and logically to make the relationships between evidence and explanations.

Communicate scientific procedures and explanations.

All students will gain an understanding about scientific inquiry.

Different kinds of questions suggest different kinds of scientific investigations.

Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.

Scientific explanations emphasize evidence, have logically consistent arguments and use scientific principles, models and theories.

RESOURCES

National Research Council (U.S.), (1996). *National Science Education Standards: observe, interact, change, learn*. Washington, D.C.: National Academy Press.

Project 2061 (American Association for the Advancement of Science), (2001). *Atlas of Science Literacy*. Washington, DC: American Association for the Advancement of Science: National Science Teachers Association.

Blubber Mitten Activity is from www.library.thinkquest.org.

Blubber, Feathers and Fur Activity is a modification of "blubber bags" from the Marine Mammal Center in San Francisco.

Permafrost Activity, Part 1 is adapted from www.pbs.org.

FEEDBACK

We value your feedback on this lesson.

Send us your comments to: khoffman@pwssc.org

PWSSC Discovery Programs

Prince William Sound Science Center

P.O. Box 705 Cordova, Alaska 99574

907-424-5800

907-424-5820 (fax)

info@pwssc.org

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