TOLEDO ZOO EDZOOCATION ACADEMY

Staying Cozy When It's COLD: Adaptations to Arctic Weather

3RD GRADE LESSON PLAN

MATERIALS:

Craft supplies – large sheets of white drawing paper (1 per 5 students) markers, crayons, masking tape

Biofacts – Arctic fox fur, polar bear hide, Arctic tern, Arctic plants posters of other Arctic animals (ptarmigan, musk oxen, walrus, seals, etc.)

Other – shortening, burrow model, map w/lines of latitude and longitude, two cans, two thermometers, fur, cloth, plastic coverings, rubber bands

OVERVIEW/OBJECTIVE:

- Students will understand where the Arctic is and describe what it looks, feels and sounds like there.
- Students will demonstrate that they can find the Arctic on a map using 66 degrees (include explanation of imaginary lines and latitude.)
- Students will understand the term "Arctic Adaptation" and learn how these traits help animals to survive in extreme cold.
- Students will demonstrate that they understand this concept by creating an imaginary Arctic plant or animal with three adaptations to Arctic habitat.

BACKGROUND INFORMATION: In order to survive in the extreme cold (up to -50 degree temperatures, extremes of light and dark and scarce energy in the Arctic region, all living things evolve special traits that help them to survive in this frozen, severe environment.
The Arctic is not a country or continent, but rather a geographic region of similar climate and weather patterns that is largely ice and ocean with some areas of tundra (permafrost).

VOCABULARY:

Adaptation - traits that help an organism to survive in a particular environment (habitat)

Arctic – the ocean and surrounding land at the top of the world (from the Greek word *arkos*, meaning bear.

Insulation – a layer(s) of a substance that helps keep heat in or cold out, and prevents heat, cold, etc. from transferring across easily.

Latitude – imaginary line around the circumference of the globe that divides the world into sections

Permafrost – constantly frozen sub-soil (usually no more than four feet from surface of earth)

Tundra – a treeless area between the ice cap and the tree line of the Arctic regions with a permanently frozen soil line

ENGAGE

Pour room temperature water in two empty soda cans with thermometers sticking out of hole at top. Wrap one can in cotton cloth secured with rubber bands; the other in a layer of shortening, then fur. Ask the students to make a hypothesis about which can will stay warmer when the cans are set into a pan of ice cubes and water. Record temps after 1 minute, 3 minutes and 5 minutes.

EXPLORE

Today we're going to look at some of the adaptations (special tricks or traits) that help animals survive in the Arctic. Where is this place called the Arctic? Use globe and flat map, then have each child find and circle the area using lines of latitude on their maps. Ask students what is it like there? What does it look like, how does it feel, and what might you hear there?

Now that students have a sense of the Arctic as a remote, stark place that is cold, sparsely populated with people and animals, with oceans, ice and tundra, ask them to guess what every living thing that lives there might need to survive? (Answer: A way to survive the cold.)

Look at polar bear adaptations:

Thick, hollow fur; black skin, 4-inch layer of blubber, small ears, pigeon-toed, large feet (swimming and ice)

EXPLAIN

Arctic animals use many tricks to survive. Migrating, slowing metabolism, "antifreeze" in body, storing food, winter- white color/summer-speckled with color, ptarmigan – feathered feet, burrow under snow, etc.

- Get Fat - blubber, extra weight
- Hooded seal pup – must gain weight quickly – puts on 44 pounds in 4 days! For humans to do that, we would have to eat 38,500 extra calories in 4 days or 17 Big Macs, 42 Cheeseburgers, 25 Fries, 12 Chocolate Milkshakes, 15 Hot Fudge Sundaes
- Sleep In – hibernate
- Build An Igloo – ptarmigan (dives into snow to make snow burrows without tracks!)
- Snuggle Tight – red polls huddle in groups for warmth
- Skip Town – migrate
- Wear the right coat – white in winter/mottled in summer –fox, hare, wolf
- Be willing to do things that are unusual
  Arctic mosquitoes – they walk (!) if it's too windy to fly

  Wood frog – freeze solid in winter (no sun), thaws in summer –and no frostbite!

EVALUATION

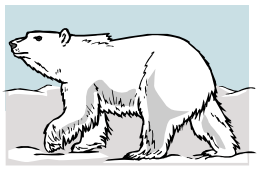
Students will work in learning groups of 4 – 5 people to create an animal or plant with three adaptations to help it survive in the Arctic. They will give the animal a creative name and be ready to present their animal to the group, explaining the adaptations and how they help the imaginary animal to survive.

EXTENSION

IF YOU HAVE COMPUTERS, THIS IS A FUN ACTIVITY!

One of our polar bears is wild caught from Barrow, Alaska. It was orphaned by its mother and discovered beneath a porch.

To show how much colder it is in the Arctic than the continental U.S., it if fun to have the kids look up the local temperature and then visit at the following website to check out the temp in Barrow in the Arctic Circle:



http://iwin.nws.noaa.gov/iwin/ak/hourly.html

- **Do an experiment with black cloth and white cloth – set in sunshine on window sill for 5 minutes. Which feels warmer? Put thermometers on cloth and repeat experiment. What do you find?**
- **Geography - use a map or globe to find all the countries that have all or part of their land within the Arctic Circle. Have the class put them in alphabetical order.**
- **Math: In string or yarn, measure out the average length/ ht. / wt. of a polar bear. Have the students measure themselves in yarn and compare. How many "students tall" is a polar bear?! How many polar bears wide and long is the classroom? (Do the same with polar bear feet.)**
- **Social Studies: Study some of the famous Arctic explorers and learn about some of the hardships that happened during Arctic exploration. Learn about Inuit culture.**
- **Physical Education: Play some Inuit children's games.**
- **Art: Learn about scrimshaw, and then have students carve an Arctic animal in a soft bar soap, like Ivory, using a plastic knife.**
- **Language arts: Learn five Inuit words. Write a poem about the Arctic**
- **Other:**

- Research ways Arctic peoples adapt to the extremes of living there.

- Make a Venn diagram to show how children there and in the continental U.S. are the same and different

- Learn about oil spills (and effects on animals) and brainstorm ways of cleaning them up.

- Learn about global warming…what is it? Why is it happening? How does it affect the Artic?

Books to read with class:

Julie of the Wolves by Jean Craighead George (Ages 9–12)
Nutik, the Wolf Pup by Jean Craighead George (Ages 4-8)
Water Sky by Jean Craighead George (Ages 9-12)
Tundra Discoveries by Ginger Wadsworth (Ages 4-8)

Pipaluk and the Whales by **John Himmelman** **(Ages 4-8)**

Websites:

Information: http://www.seaworld.org/arctic/index.html

Game: http://www.mnh.si.edu/arctic/game/

Polar bears: www.polarbearsinternational.org

All kinds of Arctic Information: http://www.athropolis.com/links/arctic.htm

COOL FACTS:

- The Polar Regions received their names from the Greeks: the Arctic is so called for the Great Bear, Arctus, in the northern sky; the opposite of that, Antarctic, means "no bear."
- The Arctic is a continent of ice, capable of producing icebergs the size of Belgium. (find Belgium on a world map!). Amazingly, the average iceberg holds enough freshwater to supply a family of five for 100,000 years.

PROFICIENCIES MET

SCIENCE

Earth and Space Sciences

Earth Systems

6. Investigate that soils are often found in layers and can be different from place to place.

Life Sciences

Diversity and interdependence of Life

2. Relate animal structures to their specific survival functions (e.g., obtaining food, escaping or hiding from enemies

6. Describe how changes in an organisms' habitat are sometimes beneficial and sometimes harmful.

Science and Technology

Abilities to do technological design

4. Use a simple design process to solve a problem (e.g., identify a problem, identify possible solutions and design a solution).

Scientific Inquiry

3. Read and interpret simple tables and graphs produced by self/others

6. Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations).

MATH

Measurement Standard

4. Read thermometers in both Fahrenheit and Celsius scales.

Geometry and Spatial Sense Standard

Spatial Relationships

3. Find and name locations on a labeled grid or coordinate system; e.g. a map or graph.

Data Analysis and Probability Standard

9. Conduct a simple experiment or simulation of a simple event, record the results in a chart, table or graph, and use the results to draw conclusions about the likelihood of possible outcomes.