

NATURAL INVENTIONS

First Grade: Modeling after Animals

OVERVIEW

For this activity, **head to the Ecosystems Gallery**. On the Upper Level, you will find the [Polar Zone](#) at the end of the gallery, right before you go outside. Lead your group into the Polar Zone to learn more about **biomimicry** – how humans invent things that “copy” how animals live in those environments.

Next Generation Science Standards

This lesson supports the following performance expectation:

- 1-LS1-1 Students who demonstrate understanding can use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Focus Question

What can we learn from animals about staying warm in cold temperatures?

Learning from Animals

Many human inventions are inspired by elements of nature. People have made better swimsuits by observing sharks, modeled office buildings after termite dens, and created Velcro after studying the burrs on plants. Things in nature are incredibly efficient and engineers use the most efficient elements of plants and animals to make our lives better.

In the Polar Zone, students will explore how some animals thrive in extremely cold temperatures. They will use these elements to design a jacket that could keep people warm in cold temperatures.

SMALL GROUP CHALLENGE

Help your group explore how animals keep warm in the North and South Poles. They should work together to complete the “Staying Warm at the Poles: Part 1” guide while in the Polar Zone.

1. Explain to your group that their challenge is to learn as much as possible about staying warm in the poles. They will work together to complete the five tasks.
2. **Draw animal that lives here:** Have students find one animal that lives at one of the poles and sketch it on the paper.
3. **Find an experiment about sunlight:** Students should experiment with the light and dark materials. They should discover that *dark* materials absorb the most heat. Polar bears even have black skin to better absorb the sun’s rays and keep warm.
4. **Find an exhibit about feathers, fur, and fat:** Students can see the different types of coverings animals have on their body to stay warm. Feathers trap pockets of air that help keep birds warm, while also repelling water. Fur keeps mammals warm by also trapping pockets of air and repelling water. Fat beneath the skin keeps mammals warm by trapping body heat. Ask students what they would prefer and why.
5. **Find the Ice Wall:** Have students test different materials on the ice wall to see which materials keep out the cold the best.
6. **Find something interesting:** Students should find one other thing that animals do to stay warm.

VISIT DEBRIEF

As you wind up your visit to the Ecosystems Gallery, ask students to reflect on what they found in the Polar Zone. Have students record a response to the focus question in their notebook: *What can we learn from animals about staying warm in cold temperatures?*



IN THE CLASSROOM: GOING FURTHER

You will need:

- Writing tools
- Staying Warm at the Poles: Part 2, or poster paper
- *Optional:* Building materials, such as craft sticks, modeling clay, string or yarn, cardboard, tape, etc.

Designing a Jacket for the Poles

At the Science Center, students took notes on different ways animals stay warm in cold temperatures. Now they will design a jacket for a human based off what they learned.

1. Have students work in small groups to design a jacket. Prompt them to think about all the things they looked for in the Science Center.
 - What color will your jacket be? What color absorbed heat the best at the poles?
 - What will your jacket be made of – feathers, fur, fat, or a combination of two or three of those elements?
 - What types of materials might you put inside the jacket to help trap heat? Think about what you learned at the Ice Wall.
 - What kind of “special feature” will your jacket have to stay warm? Be creative as you think of the animal you drew and something interesting you discovered that animals do in the poles.
2. Have each group draw their new type of jacket on the guide worksheet or poster paper.
3. Groups should share their inventions and explain what animals inspired their jackets.
4. *Optional:* After students draw their design, have them use basic craft materials to build a physical prototype – or model – of what their jacket would look like.

Lead a group discussion about how scientists and engineers often look to nature when they are inventing something new. This is called “biomimicry” because we are mimicking, or copying, things in nature (“bio”). What other examples of biomimicry can students think of? *Examples include airplanes → birds; helicopters → maple seed pods; diver fins → fish / shark fins; shape of cars → birds / fish; windmills / turbines → whale fins; glue → gecko feet*

Wrap up the experience by having students revise their answer to the focus question.



STAYING WARM AT THE POLES: PART 1



Draw an animal that lives here!

Find the experiment about sunlight. Which color absorbs the most heat?

Find the exhibit about feathers, fur, and fat. Which one would you want to keep warm? Why?

Find the Ice Wall. Test the different materials. Which one keeps you the warmest?

Find one interesting thing that animals at the poles do to keep warm:

STAYING WARM AT THE POLES: PART 2



Draw a design for a new type of jacket that would keep you warm in cold temperatures.
Label the parts.

What color is your jacket?

What materials is it made out of?

Which animal inspired your jacket?