

# **Animal warmth: Insulators vs. Conductors**

## **Grade Level 5**

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### **References:**

- “Staying Warm in Antarctica” Kiersten Madden & Cheryl Park

### **Benchmarks & Objective:**

PS 2- Trace how thermal energy can transfer from one object to another.

LS 4- Summarize that organisms can survive only in ecosystems in which their needs can met. The world has different ecosystems and distinct ecosystems support the lives of different organisms.

### **Materials:**

- Ice water bath
- Freezer (Optional)
- Hot water (maybe a microwave with some microwaveable mugs)
- Thermometers
- Vegetable shortening

Below are additional options (may be modified)

- Styrofoam
- Packing peanuts
- Feathers
- Plastic gloves (or baggies)
- Cotton balls
- Construction Paper
- Tin Foil
- Paper Clips

### **Target Concept:**

- Students will learn that heat is conducted through some materials better than others. Animals are able to stay warm in cold environments by insulating themselves with fat and feathers. (People use fabric and build shelters with insulation).

### **Initial Introduction:**

Students will discuss the following: Why do we wear oven mitts when we pull metal cookie sheets out of the oven? Why do many cooking utensils have rubber handles? How do people & animals stay warm when it is cold outside? What materials are the warmest? (I may bring in

some expedition clothing from Byrd Polar Research Center for the kids to examine.) We will generate a list of materials that keep people warm.

### **Procedure:**

Students will be asked to make warm-blooded ‘animals and people’ by filling baggies with warm water (can dye it red if you want too). Filled bags will be covered by another empty bag that they will use to simulate clothing, or animal protection. The kids will be told that they need to keep their animals warm because they live in the Arctic. They will need to provide warmth with any of the items that they would like. They must explain why they are choosing the materials they are using for protection before the experiment is performed.

Students will hypothesize which of the other materials might also protect the animal, and which might not? (later identifying insulators and conductors) If there is time, these materials should be tested too.

The kids will be asked how they will measure how well their animal is staying warm with the layer they choose for protection. They will likely decide to use a thermometer to measure the blood temperatures before and after a one minute ice bath.

We will reinforce the idea of having controls in an experiment and the students will likely choose an empty bag over a warm water bag as the control. We will ask them how many times they would like to perform the experiment and why? (Have the students recall a previous experiment when multiple measurements were made to ensure the results were good).

### **Target Observations:**

- Students will observe that some materials act as insulators (fat, feathers, etc.), whereas others act as conductors (aluminum foil)
- Students will learn the basics of conduction.
- Students will review animal adaptations from earlier lesson plans.
- Students will recall the importance of having a control in an experiment.

### **Summary & Discussion:**

Students will find that people protect themselves from cold environments by wearing insulating layers, much like the insulating fur, feathers and fat of some Arctic animals. Students will learn how these materials act as insulators keeping the heat of the animals from flowing into the cold air and water. Students will see that some materials, including metal act as heat conductors. Heat rapidly flows into the cold metal causing rapid heat loss from the warm water bag.

### **Extensions (Optional):**

- Students can put together their own experiment to protect their animals from the heat (this time their animals will have cool blood and be put in a hot bath)