

Animals and Plants Prepare for Winter

Insulating to Keep Warm

Pre-visit activity, all grades

Objective

Students will conduct an experiment observing the difference in insulation factors.

Materials

- 2 empty soup cans of the same size (per group)
- Cotton balls
- Paper/writing utensils
- 2 thermometers (per group)
- Hot water
- Rulers (to make graphs)
- Clock or watch
- Glue

Background

Many animals adapt to their winter environment by growing heavier fur. An animal's fur provides spaces in which air can be trapped. The trapped air serves as insulation-which slows the rate of heat loss. Winter pelts also often have hollow hair for the same purpose of insulation.

Preparation

Have students save tin cans the week before the activity.

Procedure

1. Younger grades can do this activity as a teacher led class activity, while older students can break up into smaller groups.
2. Each group should remove the labels from two tin cans. Have students turn one can upside down, open end on the table. Coat the outside of the can (including the bottom) with glue.
3. Put a layer of cotton balls over the glued surface. Wait for the glue to dry and fluff the cotton outward.
4. Fill both cans with hot water from the same container. Make sure that each can has an equal amount of water. Measure and record the water temperature, without letting the thermometer touch the can. Ask students what they think will happen to the water temperature in each can. Older students should write down their hypotheses.
5. Place the cans outside. If there is snow you can let them set the cans in the snow, making sure no snow falls in the cans. Different groups of older students might want to set their cans in different locations, for example: snow, sun, shade, pavement, grass, etc. Remember, each group's 2 cans must be in the same location. Have students measure and record the temperature of the water in each can every 5 minutes for the next half hour. If groups place their cans in different locations, have them record the conditions.
6. Groups of older students can construct a line graph of temperature vs. time from both cans to show how the water temperatures compared over the half hour. A bar graph of the final two temperatures for both cans could also be a simpler representation of the data. For younger students write the temperatures on the board for each can and ask which is colder/warmer. Touching the water in the two cans may also work for Kindergarteners. Discuss which can loses heat more rapidly, how the fluffed cotton acted like the hair on an animal's coat, and why the can with the cotton ball covering held the heat better.

Extensions

Use different materials/colors to cover the can. Make lids for both cans. Have groups of students think of their own ways to insulate the cans. Turn it into a contest between the groups and record the temperature changes of their personal insulating designs. Make sure they all place the cans in the same location so there isn't an unfair advantage.