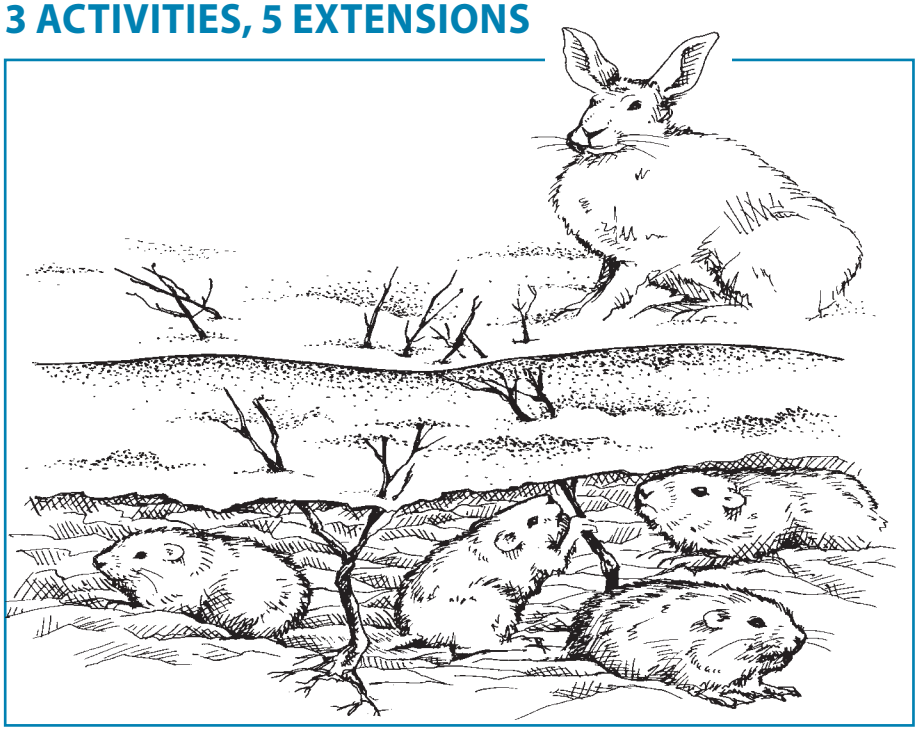
Snow Blanket

3 ACTIVITIES, 5 EXTENSIONS



Section 1
TUNDRA ACTIVITIES

Grade Level: K - 9

NGSS: K-PS3-1, K-LS1-1, MS-PS3-3.

Subjects: Science

Skills: Analyzing, estimating, predicting

Duration: 2 days: 45 minutes each

Group Size: 2 - 3

Setting: Indoors & outdoors

Vocabulary: Air, conductor, heat energy, insulator, snow crystals

Objective:

Students will describe the insulating function of snow in an ecosystem.

Teaching Strategy:

Students perform a series of simple experiments to show that snow creates insulation that can keep animals warm.

Materials:

For each group: 2 clear jars, marking pen or tape, box of corn flakes, 2 film canisters or margarine tubs (at least 1 container per group should have a lid), powdered gelatin, 2 thermometers, snow shovel or trowel.
OPTIONAL: hand lenses, embroidery hoops, down-filled clothing or sleeping bag, clear plastic or dark fabric.

Background:

See INSIGHTS *Section 1, Elements that Create Tundra.*

Procedure:

DAY ONE:

EXPERIMENT A

Optional: IN ADVANCE, prepare enough hand lenses and snow catchers so that each team of 2 to 3 students has one of each. Tie hand lenses to a yarn necklace. Make snow catchers by stretching clear plastic wrap or dark fabric over a small embroidery hoop.

1. Ask students to pretend they have a visitor from a hot, sunny country who has never seen snow. Ask them to describe snow to the visitor. Make at least 3 categories on the board as you record their ideas. For example, students may describe snow's appearance, the games they play in it, and the effects it has on our lives or animals' lives.

2. Take the class outside to look at falling snowflakes. Tell students that they will measure snow. A volunteer should carry a clear jar or pitcher to collect fresh snow. Explain that each snowflake snow crystal has six sides, but no two snowflakes are identical.

3. Working in teams of two or three, students may "catch" snowflakes on their jacket sleeves (darker colors show off the snow better) or other snow catchers and examine each flake's design. If possible, students should use hand lenses.

4. Collect a snow sample in the jar and mark the level of

snow on its side by using a marking pen or tape.
5. After returning to the classroom, ask students to estimate how many minutes it will take for the snow to melt. Record all of the students' time estimates on the board.

VARIATION:
Collect 2 samples and place one near the heater and one near the window.

6. Ask one student to be the official "snow checker." She will announce when the snow has melted. After the snow has melted, check the class's estimates to discover who was closest to the right time.

7. Mark the level of water in the jar with a marker or tape. Ask students what they think was taking up the space between the snow mark and the water mark. *Snow crystals are solid water molecules that are separated by air until they melt. Liquid water molecules have little or no air between them.*

EXPERIMENT B
1. Prepare for the next demonstration by asking students to brainstorm another way to do the first experiment using something besides snow flakes. Suggest food items containing air. For example, anything that is whipped or frothy such as whipped cream; or, anything dry that can be crushed or squished to lesser volume such as crackers or dry cereal.

2. Fill a jar or pitcher with corn flakes. Mark the fill level on the jar. Ask a volunteer to crush the flakes to simulate melting snow. Mark the new level of flakes in the jar and discuss how much space in the jar (and in the cereal box) was taken by air.

3. Help students generalize and apply what they've observed in the preceding demonstrations. Some animals such as mice, lemmings, and insects live beneath the snow in the winter. How can the air in the snow help these animals? Explain that *they can breathe the air, and the trapped air insulates them from the cold.*

DAY TWO
EXPERIMENT C
1. Choose a shaded area and perform this experiment early in the day to avoid the warmth of direct sun.

2. Explain to the students that they will be working with a powder called gelatin that dissolves in hot water and thickens when cooled.

3. Fill a measuring cup with hot water. Empty one package of gelatin into water and stir thoroughly. Fill all film canisters or margarine tubs half full with the gelatin solution.

4. Divide students into groups of two or three. Each group chooses a shaded site to dig a snow pit one foot deep. Give each group two film canisters, one lid, and two thermometers. Students place the canister without the lid on the surface of the snow and bury the other canister with the lid one foot deep in the snow. Place one thermometer next to each of the canisters.

5. After five minutes, check the surface canisters for signs of jelling. When they begin to jell, students dig up the buried container and compare the progress of the two. *(The container above the snow should have jelled first.)*

6. Check the thermometers. Students should find that the top layer of snow is cooler than the deeper, more thickly insulated levels.

7. Discuss with the students that snow acts as an insulator, just like a blanket or a jacket. Some animals depend on snow to keep them from getting too cold in the winter. For example, lemmings in the Arctic spend their entire winter under the snow, not hibernating, but actively scurrying around eating, avoiding predators, and having babies.

8. Discuss the basic similarity between snow and many common insulation materials such as down fill and Styrofoam. *(They all trap air!)*

Evaluation:
1. Finish the sentence "Snow is like a blanket because. . ."

2. Could people live under the snow? Why or why not?

3. Windblown ridges in the north are often barren of plant life. Apply what you know about snow to speculate why

plants don't grow on these ridges.

EXTENSIONS:

A. **How much insulating air is in compacted snow?** Fill two clear containers, one with fresh snow and one with snow that has been crammed into the container by students to represent compacted snow. Fill to the same level. Allow the snow to melt and compare the amount of air in the fresh snow to the lesser amount in the compacted snow.

B. **Compare the insulating value of tracked and untracked snow.** Repeat the DAY TWO part of this activity in compacted snow. Choose a site that has been trodden by people or vehicles. Be sure to read thermometers carefully.

C. **Make "Baked Alaska!"** Follow cookbook directions to prepare this delicious dessert. Baked Alaska is a layer of cake topped by a thick layer of ice cream, covered by an inch of meringue (whipped egg whites) and then baked for three to five minutes. The ice cream does not melt because the meringue is a poor heat conductor. Like snow, meringue is full of air bubbles that don't carry heat well. Meringue insulates the ice cream from the oven's heat.

D. **Design a make-believe "animal" that could thrive under or in the snow** during the winter *(*see also *"Design Your Tundra Animal"* in *Section 3).*

E. **Build "Blubber Mitts" that illustrate the insulating properties of fat.** Make your own insulated mitts *(see "Blubber Mitts" in Section 3).*

Credit:

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Curriculum Connections:

(See appendix for full citations)

Books:

One Small Square: Arctic Tundra (Silver)

Scholastic's The Magic School Bus in the Arctic: A Book About Heat (Cole) K-3

The Secret Language of Snow (Williams)

Tundra (Sayre)

Teacher Resources:

(See appendix)

Snow is a good insulator because air is trapped between snow crystals. Air is a poor conductor of heat; therefore, objects surrounded by snow-trapped air stay warm.