

Title: How Much Water is in the Snow?

Objective: Compare the amount of water in the snow under different conditions

Time: 15-20 minutes outdoors (additional 10-15 minutes inside for measuring and discussion once the snow has melted)

Materials Needed: Snow shovel, containers for snow collection (pairs of plastic containers: ice cream pails, cool whip bowls, mixing bowls), journals, pencil, measuring devices (beakers, graduated cylinders, liquid measuring cups)

Activity

Theme: Snow

Topic Water content in a snowpack

Suggested Grade Level: K-5

Indoors or Outdoors: Outdoors & Indoors

Directions:

1. Before class, scout out a location on your schoolyard where the snow has not been walked on, or been compacted by people. Select a location that has a snow depth of 8” or more if possible. While inside form groups of 2-3 students for this activity.
2. Once outside, review how snowflakes form and how snowflake shapes differ (as learned in lessons such as *Snowflake Match*).
3. Use a shovel to cut a “vertical face” in the snow. Model how to feel for different textures of snow within the cut by brushing the vertical face with your glove/mitten. Inform the class that each small group will have their own “cut” to investigate.
4. Spread out and cut enough vertical faces for each group to observe the texture of snow at different heights in the snowpack.
5. After 1-2 minutes, ask each group to provide a statement about their findings.
6. Snow collection will now take place. Each group will receive two containers of the same size/type with which to collect snow.
7. Ask how/where they may collect their samples? Suggestions include filling the containers with: fluffy snow, crusty snow, compact snow from a snowbank, snow from the top/bottom of the snowpack, students packing in as much as they can, etc.
8. Each group should collect two different types of snow to fill their two containers to the rim. Label the containers and take the filled containers inside.
9. Once the snow is melted, observe the amount of water in each container. Then pour each into a measuring device. Document findings (sketch/write) in journals. Compare amounts from both containers to the total amount of water the container can hold.

Discussion Questions:

1. Which type of snow (method of filling your container) yielded the most water? How does this relate to the shape of snowflakes?
2. If we repeated this investigation, would you change how your group collected your snow? If so, how and why?

Science and Engineering Practices:

1. Asking questions (science); 3. Planning and carrying out investigations; 4. Analyzing and interpreting data; 8. Obtaining, evaluating, and communicating information.

Crosscutting Concepts:

1. Patterns; 2. Cause and effect: mechanism and explanation; 3. Scale, proportion, and quantity.

Disciplinary Core Ideas:

Earth and Space Sciences: ESS 2: Earth's systems; Physical Sciences: PS 1: Matter and its interactions.

Background Information:

- Light, fluffy snow is composed of about 7% water and 93% air.
- Hard, compacted snow (often found in snow drifts) is composed of about 35-40% water and 60-75% air.
- A snowpack of 8" or more may possess layers of snow of different textures. Some layers may brush free like grains of sugar, while others may be firm and stick together. These layers form over time due to gravity, snowflake metamorphosis, and snow falls that occur in different weather conditions.

Extension:

- Use the data collected (ml of water) to calculate the percentage of water in the snow for each container.
For example: Students fill a bowl with light, fluffy snow. That snow, when melted, yields 21ml of water. The bowl, when filled with water, can hold 300ml of water. So, the fluffy snow contained 7% water and 93% air.

Additional Resources:

- *Snowflake Bentley* by Jacqueline Briggs Martin
- *SnowCrystals.com* - Kenneth G. Libbrecht

Correlates with:

Greeting - Snowfall Greeting (p. 32)

Interdisciplinary Lesson - Snow Poem (p. 113)