Seasons

Earth & Space Science | Lesson Guide

4th Grade

Photo Description

This winter scene shows an old wooden wagon covered with thick white snow sitting in a snowy field. Snow has piled up on the wagon's top and wheels, while snow-covered evergreen trees stand nearby under a clear blue sky.

Scientific Phenomena

The Anchoring Phenomenon is snow accumulation and insulation. Snow forms when water vapor in clouds freezes into ice crystals that fall to Earth. Once on the ground, snow acts like a blanket, trapping air between the flakes. This creates an insulating layer that protects objects underneath from extremely cold temperatures. The snow on the wagon demonstrates how precipitation can accumulate on surfaces and change the landscape during winter weather patterns.

Core Science Concepts

1. States of Matter: Water exists as a solid (snow/ice), demonstrating how temperature changes cause matter to freeze and change form.

2. Weather Patterns: Snow formation requires specific atmospheric conditions including cold temperatures and water vapor in the air.

3. Insulation Properties: Snow traps air between flakes, creating a natural insulating material that protects plants and objects from extreme cold.

4. Seasonal Changes: Winter brings predictable changes in temperature, precipitation, and daylight that affect the environment.

Pedagogical Tip:

Use this image to help students make connections between their own winter experiences and scientific concepts. Ask them to share observations about snow from their daily lives before introducing formal vocabulary.

UDL Suggestions:

Provide multiple ways for students to explore this concept by offering hands-on snow experiments, visual diagrams of water cycle stages, and opportunities to draw or model their understanding of how snow forms and accumulates.

Zoom In / Zoom Out

Zoom In: At the microscopic level, each snowflake is made of tiny ice crystals with unique six-sided patterns. Water molecules arrange themselves in hexagonal structures as they freeze, creating the intricate designs we see in individual snowflakes.

Zoom Out: This snowy scene is part of Earth's larger water cycle system. The snow will eventually melt and flow into streams, rivers, and groundwater, providing fresh water for plants, animals, and humans across the watershed during spring and summer months.

Discussion Questions

1. What conditions do you think were needed for this much snow to accumulate on the wagon? (Bloom's: Analyze | DOK: 2)

2. How might the plants and small animals under this snow be affected by the thick white covering? (Bloom's: Evaluate | DOK: 3)

3. What do you predict will happen to this snow when spring arrives? (Bloom's: Apply | DOK: 2)

4. Why do you think the snow stuck to the wagon but we can see some bare ground in other areas? (Bloom's: Analyze | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Snow is not really water - it's a different substance."
   Clarification: Snow is frozen water in solid form. It will melt back into liquid water when temperatures rise above freezing.

2. Misconception: "All snowflakes look exactly the same."
   Clarification: While all snowflakes have six sides due to water's molecular structure, each one forms under slightly different conditions, making every snowflake unique.

3. Misconception: "Snow makes everything colder."
   Clarification: Snow actually insulates and protects things underneath from getting extremely cold by trapping warm air close to the ground.

Cross-Curricular Ideas

1. Mathematics - Measurement & Data: Have students measure snowfall amounts using a ruler or snow gauge over several days. Create a bar graph showing daily snow accumulation and calculate the total snowfall. This connects to measuring, comparing quantities, and representing data visually.

2. English Language Arts - Descriptive Writing: Ask students to write a detailed paragraph describing the winter scene using sensory words (what they see, hear, feel, smell). They could also write from the perspective of the wagon, imagining what it "experiences" during winter, combining creative writing with scientific observation.

3. Social Studies - Historical Transportation: Research how wagons like this one were used historically for farming and transportation before modern vehicles. Discuss how weather and seasons affected people's daily lives and work. This helps students understand how humans interact with their environment across time.

4. Art - Mixed Media Winter Scene: Students can create their own winter landscape using white paint, cotton balls, or torn paper to represent snow accumulation. This allows them to artistically interpret the scientific concepts of snow formation and layering while developing fine motor skills.

STEM Career Connection

1. Meteorologist - A meteorologist is a scientist who studies weather and the atmosphere. They track storms, predict snowfall, and help people prepare for severe winter weather. Meteorologists use special tools and computers to understand how snow forms and when it will fall. Average Annual Salary: $97,000

2. Climate Scientist - Climate scientists study long-term weather patterns and how Earth's climate changes over years and decades. They investigate how snow and ice affect our planet's temperature and what happens when snow melts. Their work helps us understand climate change and prepare for the future. Average Annual Salary: $104,000

3. Agricultural Engineer - Agricultural engineers design and improve farming equipment, including wagons and machinery like the one in the photo. They work to make sure farming tools work well in all types of weather, including heavy snow. These engineers combine science and problem-solving to help farmers succeed. Average Annual Salary: $85,000

NGSS Connections

- Performance Expectation: 5-ESS1-2 - Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
- Disciplinary Core Ideas: 5-ESS2.A - Earth's major systems interact through physical and chemical processes
- Disciplinary Core Ideas: 2-PS1.A - Different kinds of matter exist and can be described by their observable properties
- Crosscutting Concepts: Patterns - Students observe patterns in snow formation and accumulation
- Crosscutting Concepts: Systems and System Models - Snow is part of the water cycle system

Science Vocabulary

* Precipitation: Water that falls from clouds to Earth as rain, snow, sleet, or hail.
* Insulation: A material that prevents heat from moving from one place to another.
* Accumulation: The process of something building up or collecting over time.
* Freezing point: The temperature at which liquid water turns into solid ice (32°F or 0°C).
* Water cycle: The continuous movement of water between Earth's surface and the atmosphere.

External Resources

Children's Books:
- The Story of Snow by Mark Cassino
- Snowflake Bentley by Jacqueline Briggs Martin
- Snow is Falling by Franklyn Branley