Precipitation Snow

Earth & Space Science | Lesson Guide

4th Grade

Photo Description

This image shows snow falling on a brick building surrounded by ivy-covered trees and courtyard spaces. You can see white snowflakes actively falling from the sky, covering the ground, roof, and trees in a winter weather event. This is a perfect example of precipitation—water falling from clouds to Earth's surface.

Scientific Phenomena

Anchoring Phenomenon: Active snowfall (frozen precipitation occurring in real time)

Why It's Happening:
Snow forms when water vapor in clouds freezes into ice crystals because the air temperature is below 32°F (0°C). As these ice crystals grow larger and heavier, they fall to Earth as snowflakes. This is part of the water cycle—a continuous process where water evaporates, forms clouds, and returns to Earth as precipitation.

Core Science Concepts

* The Water Cycle: Water moves between Earth's surface and atmosphere through evaporation, condensation, precipitation, and collection. Snow is one form of precipitation.

* States of Matter and Temperature: Water can exist as a solid (ice/snow), liquid (rain), or gas (water vapor). Temperature determines which state water is in.

* Weather Patterns and Precipitation Types: Different types of precipitation (rain, snow, sleet, hail) form under different atmospheric conditions. Snow occurs when it's cold enough for water droplets to freeze.

* Cloud Formation: Clouds form when water vapor condenses around tiny particles in the air. Different cloud types produce different types of precipitation.

Pedagogical Tip:

Fourth graders benefit from concrete, observable examples. Use this snowy image to anchor abstract water cycle concepts. Ask students to trace a water molecule's journey: "If that snowflake melts, where does the water go?" This helps them see the cycle as continuous and connected to their world.

UDL Suggestions:

To support diverse learners: (1) Provide visual water cycle diagrams alongside the photo for students who need visual scaffolding; (2) Allow students to draw or label the water cycle stages rather than write; (3) Offer tactile experiences like handling ice cubes or observing water evaporation in sealed bags to engage kinesthetic learners; (4) Use multiple representations—photos, diagrams, and real objects—to make the concept accessible to all learners.

Zoom In / Zoom Out

Zoom In: Microscopic Level — Inside a Snowflake
When you look at a single snowflake under a microscope, you see it's made of tiny ice crystals arranged in beautiful, symmetrical patterns. These patterns form because water molecules freeze in specific geometric shapes based on the temperature and humidity in the cloud. Each snowflake's pattern is unique—like a fingerprint—because the conditions it experiences as it falls are slightly different. No two snowflakes are exactly alike, even though they all follow the same freezing rules!

Zoom Out: Planetary System — The Global Water Cycle
The snow falling in this courtyard is part of an enormous, planet-wide system. Water evaporates from oceans, lakes, and rivers all over Earth. It rises into the atmosphere, forms clouds, and falls as precipitation—sometimes as snow in cold places like this, and as rain in warmer regions. Some of that snow will melt and flow into rivers that eventually reach the ocean, where it evaporates again, continuing the cycle endlessly. This same water has been cycling through our planet for billions of years—the water in this snowfall might have once been in a dinosaur's body or an ancient ocean!

Discussion Questions

1. "What do you think happens to all this snow when spring arrives and the weather gets warmer?" (Bloom's: Understand | DOK: 1)

2. "Why do you think snow falls in winter but rain falls in other seasons? What's different about the air?" (Bloom's: Analyze | DOK: 2)

3. "If you traced one snowflake from the moment it forms in a cloud until it melts in spring, what journey would it take?" (Bloom's: Evaluate | DOK: 3)

4. "How might this snowy weather affect the plants and animals shown in the picture over the next few months?" (Bloom's: Analyze | DOK: 2)

Potential Student Misconceptions

Misconception 1: "Snow comes from the ocean, not from clouds."
Clarification: Snow actually forms from water vapor in clouds, not directly from the ocean. The water starts in the ocean (or lakes and rivers), evaporates into invisible water vapor that rises into the air, and then condenses to form clouds. The snow falls from those clouds. Students may think snow is a completely different substance because it looks and feels different from liquid water, but it's the same water in a different state.

Misconception 2: "Snow is just frozen rain."
Clarification: While both rain and snow are precipitation, snow doesn't have to start as rain and then freeze. Snow forms directly in clouds when water vapor freezes into ice crystals—without ever becoming liquid first. The air has to be cold enough (below 32°F) for this to happen. If it warms up as the snow falls, it might melt and become rain, but pure snow forms from ice crystals in cold clouds.

Misconception 3: "Melted snow disappears forever."
Clarification: When snow melts, the water doesn't disappear—it becomes part of the water cycle again. It might soak into the ground (becoming groundwater), flow into streams and rivers, or evaporate back into the air as water vapor. Students may think melting snow "goes away," but it's actually just changing form and location as it continues cycling through Earth's systems.

Extension Activities

1. Snowflake Study: If snow is available, collect fresh snowflakes on dark paper or cloth and observe them with magnifying glasses. Compare different snowflakes and discuss why each one has a unique pattern. Connect to the idea that ice crystals form in different shapes based on temperature and humidity conditions.

2. Water Cycle in a Bag: Create a mini water cycle experiment by placing water in a sealed plastic bag, taping it to a sunny window, and observing evaporation and condensation over several days. Have students draw and label what they observe, connecting it to the snowfall phenomenon in the photo.

3. Snow Measurement and Prediction: If snow falls during the school year, have students measure snowfall daily using a ruler or snow gauge. Create a graph to track accumulation over time and make predictions about when snow might melt based on temperature forecasts. This connects to weather patterns and data collection.

Cross-Curricular Ideas

Math Connection: Measurement and Graphing
Have students measure snowfall daily using a ruler or snow gauge (if snow is available in your region). Create a bar graph or line graph to track how many inches fell each day. This connects to data collection and representation while reinforcing the observation that precipitation amounts vary. Students can also calculate total snowfall, compare it to previous years' averages, and make predictions about when all the snow might melt based on temperature forecasts.

ELA Connection: Descriptive Writing and Poetry
Ask students to observe the photo and write vivid, sensory descriptions of a snowy day: "What do you see? What might you hear? What would it feel like to stand in this snow?" Have them write acrostic poems using the word "SNOWFALL" or "WINTER" where each line describes an aspect of precipitation. This deepens their observational skills while building vocabulary related to weather and the water cycle.

Social Studies Connection: Climate and Regional Differences
Use this snowy image to explore how weather and climate differ across regions and how people adapt to different precipitation patterns. Discuss: "What countries and regions get a lot of snow? Which places rarely see snow? How do people build houses and dress differently based on the climate?" Students can research or compare their community's winter weather to places with different climates, understanding how geography influences daily life and human adaptation.

Art Connection: Winter Landscape Observation and Sketching
Have students sketch the architectural and natural elements in this photo, focusing on how snow changes the appearance of buildings, trees, and open spaces. They could create their own winter landscape drawings or paintings, experimenting with color and texture to show falling snow, frost on plants, and how white snow contrasts with brick buildings and dark tree branches. This combines observation skills with creative expression while reinforcing the visual evidence of precipitation in the environment.

STEM Career Connection

Meteorologist (Weather Scientist)
Meteorologists study weather and climate patterns, including precipitation like snow. They use instruments, satellites, and computer models to predict weather, understand why snow forms, and track storms. A meteorologist might explain why it's snowing today, predict how much snow will fall, and warn communities if dangerous winter weather is coming. They help keep people safe by giving them time to prepare for severe weather. Average Annual Salary: $97,000 USD

Hydrologist (Water Systems Scientist)
Hydrologists study water in all its forms—rain, snow, groundwater, and rivers—and how it moves through Earth's systems. They investigate how snowmelt flows into streams and rivers, how much water soaks into the ground, and how water cycles through watersheds. A hydrologist might measure snowfall in mountains to predict how much water will be available in rivers during spring, or study how snow affects soil and groundwater. Average Annual Salary: $84,000 USD

Climate Scientist
Climate scientists study long-term weather patterns and how Earth's climate is changing over time. They examine data about snowfall, temperature, and precipitation from all over the world to understand climate trends and predict future conditions. A climate scientist might study whether certain regions are getting more or less snow than they did 50 years ago, and why. This helps communities prepare for future weather changes. Average Annual Salary: $102,000 USD

NGSS Connections

Performance Expectation:
4-ESS2-1: Make observations and measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

Disciplinary Core Ideas:
- 4-ESS2.A Earth's materials are made from minerals and rocks. Different kinds of rocks form from different processes.
- 4-ESS3.B Natural hazards are processes or events in the physical environment that humans find inconvenient, damaging, or fatal.

Crosscutting Concepts:
- Patterns Weather patterns repeat in predictable ways; snow is more common in winter.
- Cause and Effect Cold temperatures cause water vapor to condense and freeze into snow.
- Systems and System Models The water cycle is a system where water continuously moves between Earth and atmosphere.

Science Vocabulary

* Precipitation: Water that falls from clouds to Earth in the form of rain, snow, sleet, or hail.

* Snowflake: A single crystal of ice that forms when water vapor freezes in cold clouds.

* Condensation: The process where water vapor (a gas) cools and turns into liquid water droplets or ice crystals.

* Evaporation: The process where liquid water turns into water vapor and rises into the atmosphere.

* Freezing Point: The temperature (32°F or 0°C) at which water turns from a liquid into a solid (ice).

* Weather: The condition of the atmosphere at a specific place and time, including temperature, precipitation, and wind.

External Resources

Children's Books:
- The Snowy Day by Ezra Jack Keats — A classic picture book showing a child's winter adventure and how snow changes the landscape
- Snow by Manya Stojic — A picture book that explores snow and winter from multiple perspectives
- Come On, Rain! by Karen Hesse — While focused on rain, this book beautifully illustrates precipitation and the water cycle in poetic language