Water Cycle

Earth & Space Science | Lesson Guide

2nd Grade

Photo Description

This image shows a bright yellow daffodil flower covered in snow and frost, with green stems and buds also frosted white. The wooden fence in the background is also covered with snow. The flower is still blooming even though cold winter weather has returned, showing how plants and water in nature interact during changing seasons.

Scientific Phenomena

This image represents an unexpected freeze event during early spring—when warm weather returns briefly, plants begin to grow and flower, but then cold temperatures return and freeze water into ice and snow on those new plants.

Why this is happening scientifically: As the season changes from winter to spring, temperatures warm and plants sense the longer daylight, triggering them to bloom. However, late spring freezes are common in many regions. When temperatures drop below 32°F (0°C), water vapor in the air freezes directly onto plant surfaces (called frost), and liquid water becomes snow. The daffodil itself is hardy and can survive these temperature swings, but the frost creates a striking visual of the water cycle in action.

Core Science Concepts

* The Water Cycle: Water changes forms—from liquid (rain, dew) to solid (snow, frost, ice) to gas (water vapor)—and moves between Earth's surface and the air. In this image, we see water frozen as frost and snow on plants.

* Temperature and States of Matter: When temperatures drop below 32°F (0°C), water freezes and changes from a liquid to a solid. When it's cold enough, water vapor in the air can freeze directly into ice crystals without becoming liquid first—this is called frost or deposition.

* Plant Life Cycles and Seasons: Plants respond to seasonal changes in temperature and daylight. Daffodils bloom in early spring, but unexpected late freezes can still affect them. The plant's genes help it survive cold snaps.

* Observable Weather Patterns: We can observe and describe how water appears in different forms in our environment—snow, frost, ice, and liquid water—during the same day or season.

Pedagogical Tip:

Tip for Second Grade Success: Rather than using the technical term "deposition," simply say "frost is when water in the air freezes into ice crystals." Show students real frost formations on classroom windows or bring in photographs. Let them touch (safely) or observe frost melting to build tactile and visual understanding. Second graders learn best through direct observation and concrete examples.

UDL Suggestions:

UDL Strategy – Multiple Means of Engagement: Create a sensory experience by allowing students to observe frost or ice in the classroom (perhaps in a freezer or on a cold window). Pair this with visual images like this daffodil photo. For students who cannot safely touch cold surfaces, provide magnifying glasses to observe frost details, or show slow-motion video of frost or ice crystals forming. This addresses varied sensory preferences and physical abilities.

Discussion Questions

1. "What do you think happened to make the white frost and snow appear on the flower and leaves overnight?" (Bloom's: Understand | DOK: 1)

2. "Why do you think the daffodil flower is still yellow and bright even though it's covered in snow? What does that tell us about the flower?" (Bloom's: Analyze | DOK: 2)

3. "If we left this flower outside on a sunny day, what would happen to the frost and snow? Where would the water go?" (Bloom's: Apply | DOK: 2)

4. "How is frost different from rain? How are they the same?" (Bloom's: Evaluate | DOK: 3)

Extension Activities

Activity 1: Frost Observation Hunt
Take students outside on a cold morning (or to a freezer) to observe and draw frost formations on plants, grass, or car windows. Have them use magnifying glasses to see the ice crystal details. Back inside, discuss what they saw and how frost forms. This builds observational skills and concrete understanding of state changes.

Activity 2: Water Cycle in a Bag
Create a simple closed water cycle by drawing water on a resealable plastic bag, sealing it, and taping it to a sunny window. Over several days, students observe the "water" moving up (evaporation) and down (condensation) inside the bag as a model of the real water cycle. Connect this to the daffodil photo by explaining that the same process happens with the frost and snow melting.

Activity 3: Flower Resilience Exploration
If possible, obtain hardy spring bulbs or flowers (or use the image). Discuss why some plants can survive freezing temperatures and early snow. Have students sort pictures of spring flowers by which ones might survive a freeze and which might not, based on visual characteristics (thick stems, strong petals, etc.). This introduces the concept of plant adaptation in an age-appropriate way.

NGSS Connections

Performance Expectation:
K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time.

Disciplinary Core Ideas:
* K-ESS2.D Weather and Climate - Students observe that water can be found in different forms (solid ice, liquid water, water vapor/gas) and that these forms change with temperature.

Crosscutting Concepts:
* Patterns - Students recognize patterns in the changing states of water and seasonal weather patterns.
* Systems and System Models - Students begin to understand the water cycle as a system where water moves and changes form.

Science Vocabulary

* Frost: Tiny ice crystals that form when very cold air touches plants, flowers, or other objects on the ground.

* Freeze: When a liquid (like water) becomes solid (like ice) because the temperature drops below 32°F (0°C).

* Water Cycle: The continuous movement of water from Earth's surface into the air and back down again, changing forms as it moves.

* Evaporation: When liquid water turns into invisible water vapor (a gas) and floats up into the air, usually when the sun warms it.

* Condensation: When water vapor (a gas) in the air cools down and becomes liquid water again, like droplets on a cold window.

* Daffodil: A spring flower that blooms early in the year, usually with yellow or white petals and a trumpet-shaped center.

External Resources

Children's Books:
The Snowy Day* by Ezra Jack Keats – A classic story about a child exploring snow, ideal for connecting snow and winter weather to student experience.
Come On, Rain!* by Karen Hesse – Explores the water cycle through poetic text about rain and weather changes.
Up in the Sky: The Story of Evaporation* by Maria Gordon – A simple picture book explaining how water moves in the water cycle.

YouTube Videos:
* "The Water Cycle Song" (2:30) by Have Fun Teaching – An upbeat, animated song that explains evaporation, condensation, and precipitation in kid-friendly language. URL: https://www.youtube.com/watch?v=cbV46wY5g3s

* "How Frost Forms" (3:15) by National Geographic Kids – A short, clear explanation with real footage of frost forming on plants and explaining why it happens. URL: https://www.youtube.com/watch?v=fqYSVmn0TYY

Implementation Note for Teachers: This lesson works best as part of a multi-week unit on seasons and the water cycle. Use this image as an "anchoring phenomenon"—return to it throughout the unit as students learn more. Second graders benefit from repeated, multi-sensory exposure to the same concepts across different contexts.