Matter

Physical Science | Lesson Guide

1st Grade

Photo Description

Big white ice sticks hang down from the roof. The ice is long and pointy. Some ice pieces are thick and some are thin.

Scientific Phenomena

This image shows icicle formation as an anchoring phenomenon. Icicles form when snow or ice on a roof melts from warmth (sun or heat from inside a building), flows down as liquid water, and then refreezes when it reaches the colder air at the roof's edge. This creates the characteristic pointed, downward-hanging ice formations. The process demonstrates the water cycle in action and phase changes between solid and liquid states of matter.

Core Science Concepts

1. States of Matter: Water exists in different forms - solid ice, liquid water, and can change between these states
2. Melting and Freezing: Heat makes ice turn into water (melting), and cold makes water turn into ice (freezing)
3. Temperature Effects: Warm temperatures cause melting, cold temperatures cause freezing
4. Gravity: Water flows downward because gravity pulls it down

Pedagogical Tip:

Use ice cubes in warm and cold water to demonstrate melting and freezing in real-time. Students can observe and predict what will happen, making the abstract concept concrete and observable.

UDL Suggestions:

Provide multiple ways for students to explore this concept: tactile experiences with ice, visual observations of melting, and kinesthetic activities like acting out water molecules moving fast (liquid) or slow (solid) to accommodate different learning preferences.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, water molecules move faster when heated (becoming liquid) and slower when cooled (becoming solid ice). The molecules arrange themselves in organized patterns when frozen.

2. Zoom Out: This icicle formation is part of the larger water cycle system where water continuously moves between solid, liquid, and gas states throughout Earth's atmosphere, contributing to weather patterns and seasonal changes.

Discussion Questions

1. What do you think happened to make these ice sticks? (Bloom's: Analyze | DOK: 2)
2. Why do you think the icicles are pointing down instead of up? (Bloom's: Apply | DOK: 2)
3. What would happen to these icicles on a very warm day? (Bloom's: Predict | DOK: 3)
4. Where else have you seen ice change into water? (Bloom's: Remember | DOK: 1)

Potential Student Misconceptions

1. Misconception: "Ice is not water" - Students may think ice and water are completely different substances.
   Clarification: Ice and water are the same substance (H ,O) in different states.

2. Misconception: "Cold makes icicles grow down" - Students may think cold pushes the ice downward.
   Clarification: Gravity pulls the liquid water down as it flows and then freezes, creating the downward shape.

3. Misconception: "Icicles only form when it's snowing" - Students may think active precipitation is needed.
   Clarification: Icicles form from melting existing snow/ice, not from new snowfall.

Cross-Curricular Ideas

1. Math - Measurement & Comparison: Students can measure icicles of different lengths using non-standard units (paper clips, blocks, craft sticks). Create a graph showing which icicles are longest, shortest, and medium-length. Compare quantities: "Are there more thick icicles or thin icicles?"

2. ELA - Descriptive Writing & Poetry: Students can use sensory words to describe icicles (pointy, cold, shiny, smooth, hard). Write simple poems or sentences about what icicles look like and feel like. Read books about winter and cold weather to build vocabulary.

3. Art - Texture & Sculpture: Students create icicles using white paint, glue, and salt on blue paper to explore texture. Make 3D icicles from paper towel tubes, white streamers, and tape. Create winter scenes by cutting and arranging white paper strips to represent icicles.

4. Social Studies - Seasonal Patterns & Community: Discuss how winter weather affects people in the community (what people wear, how they play, how neighborhoods change). Students can share experiences seeing icicles or snow in their own neighborhoods and create a class weather calendar to track cold days.

STEM Career Connection

1. Weather Scientist (Meteorologist): A meteorologist is a scientist who studies the weather and temperature outside. They measure how cold it is, watch for snow and ice, and tell people what the weather will be like tomorrow. Meteorologists help us understand why icicles form and when it will be freezing cold. Average Salary: $97,000 USD per year

2. Building Inspector: A building inspector checks houses and roofs to make sure they are safe, especially in winter. They look for icicles and ice on roofs because they can be dangerous if they fall. They help people understand how to keep their homes safe during cold, snowy weather. Average Salary: $61,000 USD per year

3. Environmental Scientist: An environmental scientist studies water, ice, and how weather changes affect our Earth. They observe the water cycle and learn why ice forms and melts. They help us understand climate and seasons so we can take care of our planet. Average Salary: $71,000 USD per year

NGSS Connections

- Performance Expectation: 1-PS4-3: Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light
- Disciplinary Core Idea: 2-PS1.A - Different kinds of matter exist and many of them can be either solid or liquid
- Crosscutting Concept: Patterns - Patterns in the natural world can be observed and used as evidence

Science Vocabulary

* Icicle: A hanging piece of ice that forms when water freezes while dripping
* Melt: When something solid becomes liquid because it gets warm
* Freeze: When liquid water becomes solid ice because it gets cold
* Temperature: How hot or cold something is
* Gravity: The force that pulls things down toward the ground

External Resources

Children's Books:
- Snow is Falling by Franklyn M. Branley
- The Story of Snow by Mark Cassino
- Water as a Solid by David Dreier