Fountain

Physical Science | Lesson Guide

2nd Grade

Photo Description

A big fountain has water shooting up and falling down in different levels. The water has turned into white icicles hanging from each part of the fountain. This happened because it got very cold outside.

Scientific Phenomena

This image represents the anchoring phenomenon of freezing water in motion. The fountain demonstrates how liquid water changes to solid ice when temperatures drop below 32°F (0°C). As water continuously flows and splashes from the fountain's tiers, the cold air temperature causes the water droplets and streams to freeze instantly upon contact with surfaces, creating dramatic icicle formations. This creates a perfect real-world example of matter changing states due to temperature changes.

Core Science Concepts

1. States of Matter: Water exists as a liquid when flowing but becomes solid ice when frozen
2. Temperature Effects: Cold temperatures cause water to freeze and change from liquid to solid
3. Water Cycle Processes: Freezing is one way water changes form in nature
4. Motion vs. Stillness: Moving water can still freeze when it's cold enough outside

Pedagogical Tip:

Use this image to help students make connections between their everyday experiences (like ice cubes in the freezer) and natural phenomena they observe outside during winter.

UDL Suggestions:

Provide multiple ways for students to explore freezing by offering hands-on ice experiments, visual diagrams of water molecules, and opportunities to draw or act out the freezing process to accommodate different learning preferences.

Zoom In / Zoom Out

1. Zoom In: At the tiny level we can't see, water molecules slow down and lock together in patterns when it gets cold enough, forming the solid crystals we call ice.

2. Zoom Out: This frozen fountain is part of the larger water cycle happening all around Earth, where water freezes in winter, melts in spring, and moves between oceans, clouds, and land throughout the year.

Discussion Questions

1. What do you think would happen to this fountain if the weather got warmer? (Bloom's: Predict | DOK: 2)
2. How is this frozen fountain similar to ice cubes in your freezer at home? (Bloom's: Compare | DOK: 2)
3. Why do you think some parts of the fountain have more ice than others? (Bloom's: Analyze | DOK: 3)
4. What other things have you seen that change from liquid to solid when it gets cold? (Bloom's: Remember | DOK: 1)

Potential Student Misconceptions

1. Misconception: "Only still water can freeze"
   Clarification: Moving water can freeze too when it's cold enough, as shown by this fountain
2. Misconception: "Ice and water are completely different things"
   Clarification: Ice and water are the same substance (H ,O) just in different states - solid vs. liquid
3. Misconception: "Water always freezes immediately when it's cold"
   Clarification: Water needs to reach exactly 32°F (0°C) to start freezing, and it takes time to change states

NGSS Connections

- Performance Expectation: 2-PS1-1 - Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties
- Disciplinary Core Ideas: 2-PS1.A - Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence

Science Vocabulary

* Freeze: When liquid water gets cold enough to turn into solid ice
* Temperature: How hot or cold something is
* Liquid: Matter that flows and takes the shape of its container, like water
* Solid: Matter that keeps its shape and doesn't flow, like ice
* Icicle: A pointed piece of ice that forms when dripping water freezes

External Resources

Children's Books:
- Water Is Water by Miranda Paul
- The Magic School Bus Wet All Over by Joanna Cole
- Ice Is Nice by Robin Nelson

YouTube Videos:
- "States of Matter for Kids" - Simple explanation of solids, liquids, and gases with fun animations (https://www.youtube.com/watch?v=ZjjQReXflQY)
- "How Do Icicles Form?" by SciShow Kids - Kid-friendly explanation of how icicles grow (https://www.youtube.com/watch?v=HQi3jbUjIxs)