Fountain

Physical Science | Lesson Guide

Kindergarten

Photo Description

A big fountain has water that looks like it turned into white ice. The water usually flows down from the top to the bottom. Now the water is frozen and looks like long white fingers hanging down.

Scientific Phenomena

The Anchoring Phenomenon is the freezing of moving water in a decorative fountain. This occurs when the air temperature drops below 32°F (0°C), causing the liquid water to change state into solid ice. The unique icicle formations happen because water continues to flow and freeze layer by layer, creating the dramatic cascading ice structures we observe.

Core Science Concepts

1. States of Matter: Water can exist as a liquid (flowing water) or solid (ice) depending on temperature
2. Freezing Process: When water gets very cold (32°F/0°C), it changes from liquid to solid
3. Temperature Effects: Cold air temperatures cause water to freeze and form ice
4. Water Movement: Water flows downward due to gravity, even as it begins to freeze

Pedagogical Tip:

Use concrete, hands-on experiences with ice cubes and warm water to help kindergarteners understand state changes. Let them touch and observe both states safely.

UDL Suggestions:

Provide multiple ways for students to explore this concept: visual observation of real ice, tactile experiences with safe ice play, and kinesthetic activities like "freezing" their bodies when music stops to represent state changes.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, water molecules slow down and form rigid crystal structures when they freeze, creating the solid ice we observe
2. Zoom Out: This frozen fountain is part of a larger weather system where cold air masses create freezing temperatures across entire regions, affecting water sources everywhere

Discussion Questions

1. What do you think happened to make the water look different? (Bloom's: Analyze | DOK: 2)
2. How do you think the weather affected this fountain? (Bloom's: Apply | DOK: 2)
3. What other places have you seen water turn into ice? (Bloom's: Remember | DOK: 1)

4. What do you predict would happen if the weather got warmer? (Bloom's: Evaluate | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Ice is not water anymore"
   Clarification: Ice is still water, just in a different form - it can melt back into liquid water

2. Misconception: "Only still water can freeze"
   Clarification: Moving water can also freeze when it gets cold enough, as shown in this fountain

3. Misconception: "Water freezes instantly"
   Clarification: Freezing takes time, and this fountain froze layer by layer over many hours

NGSS Connections

- Performance Expectation: K-PS1-1 - Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties
- Disciplinary Core Idea: K-PS1.A - Properties of materials can be observed and used to describe materials
- Crosscutting Concept: Patterns - Patterns in the natural world can be observed and used as evidence

Science Vocabulary

* Freeze: When water gets so cold it becomes hard ice
* Temperature: How hot or cold something is
* Liquid: Something that flows and takes the shape of its container
* Solid: Something that keeps its shape and feels hard
* Ice: Frozen water that is hard and cold

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 solid, liquid, and gas with animations (https://www.youtube.com/watch?v=ZnXKAaL8QjE)
- "How Water Freezes" - Kid-friendly demonstration of water turning to ice (https://www.youtube.com/watch?v=qBLyWlTeMXo)