

## 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<sub>2</sub>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

## Cross-Curricular Ideas

1. Math - Measurement & Patterns: Have students measure the length of icicles using non-standard units (like paper clips or blocks). Create a class chart showing which icicles are longest, shortest, and medium-sized. Students can order icicles from smallest to largest.
2. ELA - Descriptive Writing: Read the book *Water Is Water* by Miranda Paul together, then have students draw and write about their own observations of the frozen fountain. Encourage them to use describing words like "sparkling," "pointy," "cold," and "shiny" to describe what they see.
3. Art - Nature Sculptures: Create "ice sculptures" using white paint, paper, and cotton to make their own frozen fountain artwork. Students can cut and arrange materials to show how ice hangs from the fountain, exploring how shapes change when water freezes.
4. Social Studies - Seasonal Changes: Connect this photo to how different seasons affect communities. Discuss how winter weather impacts the town where the fountain is located - do people need different clothes? Do activities change? How do parks and public spaces look different in winter versus summer?

## STEM Career Connection

1. Water Engineer: Water engineers design and maintain fountains, water systems, and pipes that bring water to our homes and cities. They make sure fountains work properly and keep water clean and safe. These scientists need to understand how water freezes and moves through pipes, especially during cold weather. Average Annual Salary: \$96,000 USD
2. Meteorologist (Weather Scientist): Meteorologists study weather and predict when it will be cold enough for water to freeze. They use tools to measure temperature and help people prepare for freezing weather. These scientists study patterns to tell us when fountains might ice over! Average Annual Salary: \$97,000 USD
3. Landscape Designer: Landscape designers plan and create beautiful outdoor spaces like parks and plazas where fountains are located. They think about how weather affects plants, fountains, and public spaces throughout the year, and they make sure everything stays safe and beautiful in every season. Average Annual Salary: \$64,000 USD

## 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