Thawing Pond

Earth & Space Science | Lesson Guide

1st Grade

Photo Description

This image shows a pond that is beginning to thaw in early spring. You can see bare trees standing near the water's edge, patches of brown leaves and grass on the ground, and a frozen or partially frozen pond with open water visible. The water is melting because the weather is getting warmer.

Scientific Phenomena

Anchoring Phenomenon: Seasonal changes in water—specifically, the transition from frozen to liquid water (ice melting) as temperatures increase during spring.

Why It's Happening: As winter ends and spring arrives, the air temperature rises above 32°F (0°C). This warmth transfers energy to the ice covering the pond, causing the frozen water molecules to move faster and break apart from their solid structure. The ice changes into liquid water, and the pond "thaws." This is a reversible phase change driven by seasonal temperature cycles.

Core Science Concepts

1. States of Matter: Water can exist as a solid (ice), liquid (water), or gas (water vapor). Temperature determines which state water is in.

2. Energy and Temperature: Heat energy from the sun and warmer air causes ice to melt into liquid water. More warmth = faster melting.

3. Seasonal Patterns: Spring brings warmer temperatures that cause winter ice and snow to melt. This is a predictable, repeating pattern in nature.

4. Water Cycle Connection: Thawing is one part of the water cycle; melted water flows into streams, evaporates, and eventually falls as rain or snow again.

Pedagogical Tip:

Use real ice melting in the classroom during this lesson. Give small groups ice cubes in cups and have them observe and describe changes over time. This hands-on experience helps First Graders understand that melting is a real, observable process they can witness directly, not just an abstract concept.

UDL Suggestions:

Representation: Provide visual anchor charts showing the three states of water with pictures and real objects (ice cube, cup of water, steam from warm water). Action & Expression: Allow students to show understanding through drawing, dramatizing ice melting (body movements), or sorting pictures of frozen vs. melted water. Engagement: Connect to students' personal experiences: "Have you seen ice on puddles? What happened to it when the sun came out?"

Zoom In / Zoom Out

Zoom In: Molecular Level
At the microscopic level, ice is made of water molecules arranged in a tight, organized crystal structure. When heat energy is added, these molecules vibrate faster and faster until they break free from their fixed positions. They begin to move randomly around each other—now they are liquid water! The molecules are the same; only their arrangement and movement have changed.

Zoom Out: Ecosystem & Watershed Level
This single thawing pond is part of a larger watershed system. As ice and snow melt across an entire landscape in spring, water flows downhill into streams, rivers, and larger bodies of water. This seasonal thaw refills groundwater, fills reservoirs, and provides water for plants, animals, and human communities. The thawing phenomenon we see at one pond is part of a region-wide water cycle that sustains entire ecosystems.

Discussion Questions

1. "What do you think happened to make this ice start to melt?" (Bloom's: Remember | DOK: 1)

2. "How is ice different from water? Why do you think they look different?" (Bloom's: Understand | DOK: 1–2)

3. "If we brought this pond inside where it's warm, what would happen faster than it melting outside?" (Bloom's: Analyze | DOK: 2)

4. "Where do you think all this melted water goes? What happens to it next?" (Bloom's: Evaluate | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Ice melts because it gets old or tired."
   - Clarification: Ice melts only when it gets warmer (heat energy). Temperature is the reason ice turns into water, not time passing or age.

2. Misconception: "The water disappears when ice melts."
   - Clarification: The water doesn't disappear—it's still there, just in a different form. Liquid water takes up the same amount of space or slightly less than ice (which is why ice floats).

3. Misconception: "You need fire or a stove to melt ice."
   - Clarification: The sun's warmth, room-temperature air, or even your warm hands can melt ice. Any heat source works!

Extension Activities

1. Ice Melting Race: Give students three ice cubes in separate clear cups. Place one in sunlight, one in shade, and one indoors on a table. Observe and record (with drawings) which melts first. Discuss why. This shows the role of heat energy from different sources.

2. Seasonal Water Observations: Take photos of the same outdoor location (puddle, pond edge, or water feature) once a week for 4–6 weeks as temperatures change. Create a picture timeline showing how water changes with the seasons. Write or dictate observations: "What do you notice changing?"

3. Freeze & Thaw Experiments: Freeze water in various containers (cups, ice cube trays, balloons) and observe as they thaw. Record predictions before and observations after: Does all ice melt at the same speed? Why or why not? This reinforces that temperature and surface area affect melting rate.

Cross-Curricular Ideas

1. Math: Measure and record the height of ice as it melts over several days. Create a simple bar graph showing how much melted each day. Compare heights: "Which day had the biggest change?"

2. ELA - Writing & Language Arts: Write or dictate sentences about spring using sequence words: "First the ice freezes. Then it melts. Next the pond is full of water." Read Spring picture books and discuss seasonal changes in nature.

3. Social Studies: Discuss how spring thawing affects people and animals. "What do animals do in spring when snow melts? Why do farmers need melted water?" Connect to local geography: "Are there ponds or rivers near our town that freeze in winter?"

4. Art: Create a sensory collage representing ice (white, cold textures) and water (blue, flowing materials). Or paint a before-and-after picture showing a frozen pond and a thawed pond with animals returning.

STEM Career Connection

1. Hydrologist ($80,000–$95,000/year): A scientist who studies water—where it is, how it moves, and how it changes with seasons. Hydrologists watch ponds and rivers to understand spring thaws and help communities prepare for flooding or water shortages.

2. Weather Forecaster/Meteorologist ($85,000–$105,000/year): A scientist who predicts weather and temperature changes. They tell us when ice will melt in spring and help farmers and communities plan ahead for seasonal water availability.

3. Ecosystem Biologist ($60,000–$85,000/year): A scientist who studies plants and animals in nature. When ponds thaw in spring, ecosystem biologists observe how frogs, fish, plants, and insects return to the water after winter.

NGSS Connections

Performance Expectation:
1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns in the observable world.

Disciplinary Core Ideas:
- 1-ESS1.A—Patterns and cycles: The sun warms Earth's land and water, creating observable patterns like seasonal changes.
- 1-PS1.A—Structure and properties of matter: Different materials have different observable properties, including whether they are solid or liquid.

Crosscutting Concepts:
- Patterns—Seasonal patterns repeat: spring always brings warming and thawing.
- Energy and Matter—Heat energy causes changes in matter (solid ice becomes liquid water).

Science Vocabulary

* Freeze: When water gets so cold that it turns into solid ice.

* Melt: When ice or snow gets warm and turns into liquid water.

* Thaw: To change from frozen (ice) to not frozen (liquid water) because of warmth.

* Temperature: How hot or cold something is; measured in degrees.

* Solid: A form of matter that has a fixed shape and doesn't flow, like ice.

* Liquid: A form of matter that flows and takes the shape of its container, like water.

External Resources

Children's Books:
- Spring by Robin Nelson (Simple, photo-based text about seasonal changes)
- Thaw by Manya Stojic (Beautifully illustrated story about animals and spring thawing)
- It's Spring! by Linda Glaser (Explores how warming temperatures wake up nature)