Thawing Pond

Earth & Space Science | Lesson Guide

3rd Grade

Photo Description

This image shows a frozen or partially frozen pond surrounded by bare trees and patches of grass along a sloped shoreline. The water appears calm and icy, and the trees have no leaves, indicating it is late winter or early spring. The fence posts and brown vegetation show this is a rural or agricultural area where water is melting and the landscape is beginning to change.

Scientific Phenomena

Anchoring Phenomenon: This image captures the seasonal transition of water states—specifically the melting of ice as temperatures rise during the change from winter to spring.

Scientific Explanation: Ice melts when the temperature of the air and water around it rises above 32°F (0°C). During late winter and early spring, the sun's rays grow stronger and days become longer, warming the environment. The ice absorbs this heat energy and changes from a solid state to a liquid state. This is a reversible physical change where water molecules have more energy to move around freely, breaking apart the rigid structure of ice.

Core Science Concepts

- States of Matter: Water exists in three states—solid (ice), liquid (water), and gas (water vapor). Temperature determines which state water is in. When ice receives heat energy, it melts into liquid water.

- Seasonal Changes: Earth experiences seasonal cycles caused by the tilt of Earth's axis and its position relative to the sun. Spring brings warmer temperatures, longer days, and the melting of ice and snow from winter.

- Heat Energy Transfer: Heat energy moves from warmer objects to cooler objects. The warm spring air transfers heat to the cold ice, causing the ice to melt.

- Water Cycle: Melting is one stage in the water cycle. As ice melts into liquid water, that water can eventually evaporate into the atmosphere, condense into clouds, and fall as precipitation.

Pedagogical Tip:

Use a Think-Pair-Share strategy when discussing this image. First, have students think silently about "What do you notice?" for 30 seconds, then pair them to share observations, and finally invite pairs to share with the whole class. This gives all learners time to process and builds confidence in speaking.

UDL Suggestions:

UDL Strategy - Multiple Means of Representation: Provide students with both visual and tactile experiences. Show this photograph alongside a real ice cube melting in warm water (with close observation). This multimodal approach supports students with different learning preferences and those with visual processing differences.

Zoom In / Zoom Out

Zoom In: Molecular Level
At the microscopic level, ice is made of water molecules locked in a rigid, organized crystalline structure. When heat energy is added, these molecules vibrate faster and break free from their fixed positions. The molecules begin to slide past each other, transforming the solid into a liquid. The water molecules don't disappear—they're just arranged differently with more freedom to move.

Zoom Out: Watershed and Ecosystem
Zooming out, this pond is part of a larger watershed—a system where water flows downhill from high elevations to lower ones. When spring ice melts, it contributes to stream flow, groundwater recharge, and the awakening of aquatic ecosystems. The meltwater fills streams and rivers, providing habitat for fish and aquatic insects. The timing of spring melt is crucial for wetland plants, migratory birds, and the entire food web that depends on seasonal water availability.

Discussion Questions

1. What do you observe in this picture that tells you the weather is getting warmer? (Bloom's: Analyze | DOK: 2)

2. Why do you think the ice is melting now instead of staying frozen all year long? (Bloom's: Explain | DOK: 2)

3. If this pond had more ice on it, what do you think would happen to all that water when it melted? Where would it go? (Bloom's: Evaluate | DOK: 3)

4. Can ice turn back into water, and can water turn back into ice? How? (Bloom's: Understand | DOK: 1)

Potential Student Misconceptions

1. Misconception: "Ice and water are completely different things."
   - Clarification: Ice and water are both made of the same thing—H ,O molecules. The only difference is temperature and how tightly packed the molecules are. Heat energy changes ice into water, but the water can freeze back into ice if it gets cold again.

2. Misconception: "Ice melts because the sun pushes it away" or "Ice melts by itself."
   - Clarification: Ice melts because heat energy from the warm air, sun, and water transfers to the ice. Heat is the cause of melting. Without heat energy, ice stays frozen.

3. Misconception: "When ice melts, it disappears."
   - Clarification: Ice doesn't disappear—it transforms into liquid water. The water is still there; you just can't see it as a solid anymore. You can still measure it and it still has weight.

Extension Activities

1. Melting Race Experiment: Give each student an ice cube and have them predict how long it will take to melt at room temperature. They can hold it in their hand, place it in warm water, put it in the sun, or keep it in a cool location. Students observe and record which melts fastest and slowest, and discuss why. This directly connects to the heat transfer concept shown in the photo.

2. Water Cycle Diagram Creation: Have students create a labeled diagram or poster showing how water from a melting pond travels through the water cycle (evaporation, condensation, precipitation). They can use the thawing pond as their starting point and illustrate where that water goes next.

3. Seasonal Observation Journal: Create a simple observation chart where students sketch and describe this pond location across different seasons (winter, spring, summer, fall). If possible, take photos of the same location monthly or use archival images. Students predict and observe how the landscape, ice, vegetation, and animal activity change with seasons.

Cross-Curricular Ideas

- Math: Create a simple bar graph showing daily temperatures over two weeks and predict when the pond will be completely thawed based on the temperature trend. Students can measure ice cube melting times and compare results using mathematical language (faster, slower, same).

- ELA/Language Arts: Write a story from the perspective of a melting ice cube or a frog waking up in the spring pond. Students can read and discuss spring-themed picture books and write descriptive sentences about seasonal changes using sensory words (cold, wet, dripping, flowing).

- Social Studies: Explore how farmers and communities in different climates depend on spring melt for water supply, crops, and fishing. Discuss how indigenous peoples and early settlers planned their activities around seasonal water patterns and spring thaw.

- Art: Create mixed-media artwork showing the transition from winter to spring using blue tissue paper for ice, white for snow, and green for new growth. Students can also paint or draw landscapes showing frozen water transforming into flowing water.

STEM Career Connection

1. Hydrologist: A scientist who studies water on Earth—where it is, how it moves, and how it changes. A hydrologist might measure how much water flows from a melting pond into nearby streams and study how that water helps plants and animals. Average Salary: $82,560 USD

2. Environmental Scientist: Someone who studies how living things and their environment interact and change with seasons. They might observe animals returning to a pond in spring and track how the pond ecosystem wakes up after winter. Average Salary: $73,230 USD

3. Meteorologist: A weather scientist who studies temperature, rain, snow, and ice. A meteorologist predicts when winter will end and spring will begin by tracking temperature changes that cause ice to melt. Average Salary: $97,840 USD

NGSS Connections

Performance Expectation:
3-PS1-1 Plan and conduct an investigation to provide evidence that the mixing of two liquids or a solid and liquid might result in new substances.

Disciplinary Core Ideas:
- 3-PS1.A Materials can be liquid or solid. Heating solids can transform them into liquids.
- 3-LS2.C Energy is needed for life processes. Organisms obtain energy from food, which comes from plants.

Crosscutting Concepts:
- Energy and Matter Matter changes states when heat energy is added or removed.
- Cause and Effect Temperature changes (cause) result in changes to the state of matter (effect).

Science Vocabulary

- Melt: When a solid, like ice, changes into a liquid, like water, because it gets warmer.
- Freeze: When a liquid, like water, changes into a solid, like ice, because it gets colder.
- Temperature: How hot or cold something is, usually measured with a thermometer.
- States of Matter: The three forms that materials can take—solid, liquid, and gas.
- Heat Energy: The energy that makes things warmer and can cause ice to melt.
- Season: A time of year with its own weather patterns, like spring, summer, fall, and winter.

External Resources

Children's Books:
- Come On, Rain! by Karen Hesse (explores water and seasonal change)
- Time for Bed by Mem Fox (seasonal rhythms and nature's cycles)
- Spring is Here by Will Hubbell (observing spring changes in nature)