

## Photo Description



This image shows a pond or small lake beginning to thaw in early spring. You can see bare trees standing along the shore, patches of melting ice and water, dried brown grasses, and some evergreen plants still visible. The water is starting to wake up after being frozen all winter long.

## Scientific Phenomena

**Anchoring Phenomenon:** Seasonal Phase Change of Water (Ice to Liquid)

This image captures the transition from winter to spring, where solid ice transforms into liquid water. Scientifically, as air temperatures rise above 32°F (0°C), thermal energy increases within the frozen water molecules. These molecules begin moving faster and break free from their rigid crystalline structure, causing the ice to melt into liquid water. This is a reversible physical change—water shifts its state based on temperature without becoming a different substance. For Kindergarten understanding: "When ice gets warmer, it turns into water. The sun's heat makes this happen!"

## Core Science Concepts

- **States of Matter:** Water exists in three forms—solid (ice), liquid (water), and gas (steam/vapor). This image shows the transition between two states.
- **Seasonal Temperature Changes:** Temperatures in temperate regions fluctuate dramatically across seasons. Winter brings freezing temperatures; spring brings warming, which triggers natural thawing processes.
- **Energy Transfer:** Heat energy from the sun warms the ice, providing the thermal energy needed to break chemical bonds holding the solid structure together.
- **Observable Patterns in Nature:** Seasonal changes follow predictable patterns. Students can observe that certain events (like ice melting) happen at predictable times of year.

### Pedagogical Tip:

Rather than lecturing about phase changes, invite students to predict what will happen to ice left on a windowsill. Let them observe actual ice cubes melting in the classroom over several days, recording changes with drawings or photos. This inquiry-based approach builds deeper understanding than verbal explanation alone.

### UDL Suggestions:

For multiple means of representation: Provide real ice cubes, pictures, and a video clip of ice melting so students can engage visually, tactilely, and through observation. For action & expression: Allow students to show understanding through dramatic play (pretending to be ice melting), drawing, or physically arranging objects to show solid to liquid transitions. For engagement: Connect to student experiences ("Remember the ice on the puddles outside last winter?") to make the phenomenon personally relevant.

## Zoom In / Zoom Out

### Zoom In (Molecular Level):

At the microscopic level, ice is made of water molecules locked tightly in a rigid lattice structure. When heat energy reaches the ice, individual water molecules vibrate faster and faster. Eventually, they vibrate so much they break free from their fixed positions and slide past one another—this is the moment ice becomes liquid water. The molecules themselves don't change; only their arrangement and movement do.

### Zoom Out (Ecosystem & Watershed Level):

This thawing pond is part of a much larger water cycle and ecosystem. As ice melts, it releases water back into the watershed, refilling streams, rivers, and groundwater. The thawing triggers ecological awakening: aquatic plants and animals that have been dormant or hibernating become active. Migratory birds return to breed. The entire spring ecosystem depends on this reliable seasonal thawing. This small pond connects to vast weather systems, continental climate patterns, and global water cycles.

## Discussion Questions

1. "What do you think happened to all the ice that was in this pond during winter?" (Bloom's: Remember | DOK: 1)
2. "Why do you think the ice started to melt? What changed from winter to spring?" (Bloom's: Analyze | DOK: 2)
3. "If we left an ice cube on the table in a warm classroom, what would happen to it over time? How is that the same as what happened to the pond?" (Bloom's: Compare | DOK: 2)
4. "Where do you think the water goes after the ice melts? Could it become ice again?" (Bloom's: Evaluate | DOK: 3)

## Potential Student Misconceptions

- Misconception: "Ice and water are completely different things; water becomes ice but ice doesn't become water again."
  - Clarification: Ice and water are the same material (H<sub>2</sub>O) in different forms. Heat turns ice into water; cold turns water back into ice. It's reversible!
- Misconception: "Ice melts because it 'wants to' or 'wakes up' in spring."
  - Clarification: Ice melts because the sun's heat energy raises the temperature above freezing. Temperature is what causes the change, not the season itself or the ice's preference.
- Misconception: "Water disappears when it melts or gets warm."
  - Clarification: Water doesn't disappear; it changes form. Warm water can evaporate into invisible water vapor that floats in the air, but it's still there. Eventually it comes back as rain or snow.

## Extension Activities

1. Ice Melt Observation Station: Place ice cubes in clear containers in different locations (sunny windowsill, shaded corner, refrigerator, warm water). Have students predict which will melt fastest and check daily, recording observations with pictures or tally marks. Discuss why some melted faster than others.
2. Freeze and Thaw Experiment: Fill small paper cups with water and place in the freezer overnight. The next day, bring them to the classroom and let students observe as the ice melts. They can draw pictures showing ice ! water or act out the molecules with their bodies (standing still as ice, moving around as liquid water).

3. Spring Nature Walk: Take students outside to observe signs of spring and thawing—melting snow or ice, muddy areas, emerging plants, returning birds. Collect natural items (twigs, dried leaves) and create a spring display while discussing what melting ice reveals (soil, seeds, rocks).

### Cross-Curricular Ideas

- Math: Create a simple graph showing daily ice cube size (in toothpicks or cubes) as it melts over a week. Count how many days it takes to melt completely.
- ELA/Literacy: Read or listen to "Come On, Rain!" by Karen Hesse (about water cycles and seasonal change) and create class story about "Where Ice Goes in Spring." Students draw and dictate their ideas.
- Art: Freeze water with food coloring to make colored ice shapes. As they melt on paper, students observe the color changes and create ice-melt art. Discuss how water moves and blends colors.
- Social Studies: Discuss how spring thawing affects people—farmers plant crops, children play outside, animals have babies. Compare communities in warmer vs. colder climates and how seasons affect people differently.

### STEM Career Connection

- Hydrologist: Scientists who study water in all its forms—ice, liquid, and vapor. They track how much snow and ice melt each spring and predict flooding. They help communities prepare for seasonal water changes. Average Salary: \$84,000/year
- Meteorologist/Weather Scientist: Experts who predict temperature changes and weather patterns. They use thermometers and technology to track when ice will melt and warn people about dangerous flooding or storms. Average Salary: \$96,000/year
- Aquatic Biologist: Scientists who study pond and lake animals and plants. When ice melts, they observe what creatures wake up and how ecosystems change. They help protect water habitats. Average Salary: \$71,000/year

### NGSS Connections

Performance Expectation:

K-PS1-1: Plan and conduct an investigation to provide evidence that matter can be broken down, moved around, and rearranged, but the total amount of matter is conserved.

Disciplinary Core Ideas:

- K-PS1.A Structure and Properties of Matter – Matter exists in different states (solid, liquid, gas) and can change states.
- K-ESS2.D Weather and Climate – Weather varies day to day and across seasons; we can observe and describe patterns.

Crosscutting Concepts:

- Patterns – Seasonal melting follows a predictable pattern each year.
- Energy and Matter – Heat energy causes matter to change state.

### Science Vocabulary

- Ice: Water that has become hard and cold when the temperature drops below freezing.
- Melt: When something solid (like ice) turns into liquid (like water) because it gets warm.
- Temperature: How hot or cold something is.
- Thaw: When frozen ground or ice warms up and unfreezes.
- Seasonal: Something that happens during a certain time of year, like spring or winter.

- Solid: Something hard and firm that keeps its shape, like ice or a rock.

### External Resources

Children's Books:

- "Come On, Rain!" by Karen Hesse – A beautiful story about seasonal water cycles and the joy of spring rain.
- "Time for Bed" by Mem Fox – While primarily about bedtime, it includes gentle language about seasonal rest and awakening in nature.
- "In the Tall, Tall Grass" by Denise Fleming – Features spring emergence and seasonal awakening in a poetic, interactive format.