

## Photo Description



This winter scene shows an old wooden wagon covered with thick, white snow sitting in a snowy field. Snow-covered evergreen trees and bare deciduous trees are visible in the background under a clear blue sky. The heavy snow has accumulated on all surfaces, creating rounded, puffy shapes on the wagon's roof and wheels.

## Scientific Phenomena

The anchoring phenomenon shown here is snow accumulation and the water cycle in winter. Snow forms when water vapor in clouds freezes into ice crystals at temperatures below 32°F (0°C). These crystals stick together and fall as snowflakes. The snow accumulates on surfaces because the air and ground temperatures remain below freezing, preventing the snow from melting. This represents the solid phase of water in the water cycle, demonstrating how water moves between different states (liquid, solid, gas) based on temperature changes.

## Core Science Concepts

1. States of Matter: Snow demonstrates water in its solid state, showing how temperature affects the physical properties of matter.
2. Weather and Climate Patterns: Winter weather systems create conditions for snow formation and accumulation over time.
3. Heat Transfer: The wagon and trees lose heat to the cold air, allowing snow to remain frozen on their surfaces instead of melting.
4. Water Cycle: Snow represents precipitation in the water cycle, where water vapor condenses and freezes in clouds before falling to Earth.

### Pedagogical Tip:

Use this image to help students make connections between their everyday winter experiences and scientific concepts. Ask them to share their own observations about how snow behaves differently on various surfaces or in different weather conditions.

### UDL Suggestions:

Provide multiple ways for students to engage with this concept by offering hands-on activities like creating snow in the classroom with ice and salt, drawing the water cycle, or acting out the movement of water molecules at different temperatures.

### Zoom In / Zoom Out

1. Zoom In: At the molecular level, water molecules in snow are arranged in hexagonal crystal structures. When temperatures drop, water molecules slow down and lock into rigid positions, forming the solid ice crystals that make up snowflakes.
2. Zoom Out: This snowy landscape is part of Earth's larger water cycle system. The snow will eventually melt in spring, flowing into streams and rivers, then evaporating back into the atmosphere to form clouds again, continuing the endless cycle that distributes water across our planet.

### Discussion Questions

1. What conditions must be present for snow to form and stay on the ground? (Bloom's: Analyze | DOK: 2)
2. How might this snowy scene look different in three months, and what processes would cause those changes? (Bloom's: Evaluate | DOK: 3)
3. Why do you think the snow accumulated more thickly on some surfaces than others in this image? (Bloom's: Analyze | DOK: 2)
4. What role does this snow play in providing water for plants and animals later in the year? (Bloom's: Apply | DOK: 2)

### Potential Student Misconceptions

1. Misconception: "Snow is not really water." Clarification: Snow is frozen water in solid form - it's the same H<sub>2</sub>O molecules, just arranged differently due to cold temperatures.
2. Misconception: "Snow falls because it's heavy." Clarification: Snowflakes fall because of gravity, but they fall slowly because they have a large surface area relative to their weight, creating air resistance.
3. Misconception: "All snow is the same temperature." Clarification: Snow temperature can vary and affects its properties - powder snow, wet snow, and packed snow behave differently based on temperature and moisture content.

### Cross-Curricular Ideas

1. Math - Measurement and Data: Have students measure the depth of snow in different locations around your school or homes over several days. Create a line graph to show how snow depth changes over time. This connects to graphing skills and understanding patterns in data collection.
2. ELA - Descriptive Writing: Ask students to write a detailed paragraph describing what they see, hear, and feel during a snowstorm or winter day. Encourage them to use sensory words and vivid adjectives. They could also read winter poetry and identify metaphors and similes used to describe snow and cold weather.
3. Social Studies - Historical Perspectives: Research how people in different cultures and time periods adapted to snowy winters. Students could learn about traditional snow shelters (igloos), winter transportation methods like sleds and snowshoes, or how communities prepare for winter weather. This connects to understanding human adaptation to environments.
4. Art - Winter Landscape Drawing: Students can create their own winter scenes using white chalk on dark paper, watercolor paintings of snowy landscapes, or mixed media collages with cotton balls and paint to represent snow accumulation. They could also study how famous artists like Pieter Bruegel depicted winter scenes.

### STEM Career Connection

1. Meteorologist - A scientist who studies weather and climate patterns. Meteorologists observe snow formation, predict snowstorms, and help people understand winter weather. They use special instruments and computers to track storms and keep communities safe. Average Annual Salary: \$95,000 - \$105,000 USD
2. Hydrologist - A scientist who studies water on Earth, including snow, ice, rivers, and groundwater. Hydrologists track how much water is stored in snow and predict how much water will be available in spring when snow melts. This helps communities plan for water supplies. Average Annual Salary: \$85,000 - \$95,000 USD
3. Climate Scientist - A scientist who studies long-term weather patterns and climate changes over many years. Climate scientists examine how snow patterns are changing due to global warming and what this means for our planet. They help us understand and prepare for Earth's changing climate. Average Annual Salary: \$90,000 - \$110,000 USD

### NGSS Connections

Performance Expectation: 5-ESS2-1 - Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.

Disciplinary Core Ideas:

- 5-ESS2.A - Earth's major systems interact through physical and chemical processes
- 2-PS1.A - Different kinds of matter exist and can be described by their observable properties

Crosscutting Concepts:

- Systems and System Models - A system can be described in terms of its components and interactions
- Energy and Matter - Matter is transported into, out of, and within systems
- Patterns - Patterns in nature can be observed and used as evidence

### Science Vocabulary

- \* Precipitation: Water that falls from clouds to Earth's surface in forms like rain, snow, or hail.
- \* Accumulation: The process of snow or other materials building up over time in one place.
- \* Freezing point: The temperature at which liquid water turns into solid ice (32°F or 0°C).
- \* Water cycle: The continuous movement of water through Earth's atmosphere, land, and oceans.
- \* Condensation: The process where water vapor cools and changes back into liquid water.
- \* Evaporation: The process where liquid water changes into invisible water vapor gas.

### External Resources

Children's Books:

- The Story of Snow by Mark Cassino
- Snow is Falling by Franklyn Branley
- The Snowflake: A Water Cycle Story by Neil Waldman