Frost On Car

Physical Science | Lesson Guide

Kindergarten

Photo Description

This image shows tiny ice crystals covering a surface, sparkling in the early morning sunlight. The crystals look like a blanket of white, frosty sparkles that formed overnight when it was very cold outside. In the background, you can see bare trees and a house, which helps us understand this happens in winter.

Scientific Phenomena

Anchoring Phenomenon: Frost formation through condensation and freezing.

Why it happens: When the air gets very cold at night (near or below 32°F/0°C), water vapor in the air turns directly into ice crystals without becoming liquid water first. This process is called deposition. The cold surface of the car provides a perfect place for these invisible water droplets in the air to land and freeze into the beautiful ice crystals we see in the photo. This is the same process that creates patterns on windows in winter!

Core Science Concepts

* States of Matter: Water exists in three forms—liquid (water), solid (ice), and gas (water vapor in air). Frost shows us the solid state of water.

* Temperature and Change: When temperature drops below freezing, water changes from an invisible gas into visible ice crystals we can see.

* Heat Energy: Objects lose heat at night, making their surfaces cold enough for frost to form. The sun brings heat energy in the morning to melt the frost.

* Surface Properties: Different surfaces (like a car hood) are better at collecting frost than others because they cool down faster and hold onto coldness longer.

Pedagogical Tip:

For Kindergarteners, avoid complex vocabulary like "deposition" in direct instruction. Instead, use the simpler phrase "water from the air turns into ice when it gets very, very cold." Use hand motions (pretend water vapor rising, then falling as ice crystals) to make the concept concrete and memorable.

UDL Suggestions:

Provide multiple means of engagement by letting students experience frost firsthand: place wet cloths outside on a cold night, or create "frost" indoors using salt and ice in a clear container. Offer visual supports (pictures of frost, ice, and water) and allow kinesthetic learners to act out the water cycle with movement. Some students may benefit from a "frost hunt" during outdoor exploration to make the phenomenon personally relevant.

Discussion Questions

1. What do you see on the car in this picture? (Bloom's: Remember | DOK: 1)
2. Why do you think the frost looks shiny and sparkly? (Bloom's: Analyze | DOK: 2)
3. Where do you think the frost came from before it landed on the car? (Bloom's: Understand | DOK: 2)
4. What do you think will happen to the frost when the sun comes up and makes it warmer? (Bloom's: Predict | DOK: 3)

Extension Activities

1. Frost Hunt Outdoor Walk: On a cold morning, take students outside to observe frost on grass, car windows, leaves, or playground equipment. Have them touch the frosty surfaces (safely) and describe what they feel. Ask: "Is it wet? Is it cold? Is it smooth or bumpy?" Create a simple picture chart of where frost was found.

2. Make Frost Indoors: Fill a clear cup with ice and salt, and place it in the freezer for 15-20 minutes. Remove it carefully and observe the frost forming on the outside. Students can draw or paint what they see using white paint on blue or gray paper to create a frost art project.

3. Daily Frost Observation Journal: On cold mornings throughout winter, have students check a designated car window or outdoor surface and draw what they observe. Create a simple pictograph showing "Frost Days" vs. "No Frost Days" to explore patterns in weather.

NGSS Connections

Performance Expectation: K-PS1-1 Plan and conduct an investigation to describe and classify different kinds of objects by their observable properties.

Disciplinary Core Ideas:
- K-PS1.A Properties of Matter (observable properties of objects)
- K-ESS2.D Weather and Climate (observable weather patterns)

Crosscutting Concepts:
- Patterns (Frost forms in patterns; it appears regularly in cold seasons)
- Cause and Effect (Cold temperature causes water to freeze into frost)

Science Vocabulary

* Frost: Tiny ice crystals that form on cold surfaces when the air is very, very cold at night.

* Ice: Frozen water that is hard and slippery.

* Temperature: How hot or cold something is.

* Crystal: A shiny, solid piece of something with a special shape, like snowflakes or frost.

* Freeze: When liquid water turns into hard, solid ice because it gets very cold.

External Resources

Children's Books:
The Snowy Day* by Ezra Jack Keats (explores winter phenomena and ice)

Come On, Rain!* by Karen Hesse (water cycle and weather observation)
Big Snow* by Berta and Elmer Hader (seasonal weather patterns)

YouTube Videos:
* "How Frost Forms" by National Geographic Kids — Simple, visual explanation of frost formation with beautiful nature footage. https://www.youtube.com/results?search_query=how+frost+forms+national+geographic+kids

* "Winter Weather and Ice Crystals" by Crash Course Kids — Age-appropriate introduction to how water freezes and forms ice patterns. https://www.youtube.com/watch?v=jTiLz_y5r6s