Properties Of Matter

Physical Science | Lesson Guide

1st Grade

Photo Description

This image shows a car engine with a clear plastic container holding yellowish liquid (coolant). You can see hoses, metal parts, and tools nearby. The liquid inside the container is one of many liquids that help cars work properly. We can observe that liquids take the shape of their containers and flow when poured.

Scientific Phenomena

Anchoring Phenomenon: Liquids take the shape of their containers and can flow from one place to another.

Why This Happens (Scientific Explanation for Teachers):
Liquids are a state of matter with particles that move freely but stay close together. Unlike solids (fixed shape) or gases (spread out everywhere), liquids flow and conform to container shapes while maintaining relatively constant volume. In this image, the engine coolant—a liquid—fills the bottom of the transparent reservoir, demonstrating how liquids behave. The cooling system uses this property intentionally: the liquid flows through engine passages to absorb and distribute heat, then returns to the reservoir. This is a practical application of liquid properties in real-world engineering.

Core Science Concepts

* Liquids as a State of Matter: Liquids have no fixed shape but do have volume. They flow and take the shape of whatever container holds them—like the coolant in this reservoir.

* Observable Properties of Liquids: Liquids are wet, flow, can be poured, and look different colors (this coolant appears yellowish-green). First graders can observe these properties directly.

* Containers Hold Liquids: Solids and liquids need containers to hold them, but liquids need containers to keep their shape. Without a container, this coolant would spill.

* Liquids in Everyday Life: Liquids are all around us—water, milk, juice, oil, and coolant. Understanding liquids helps students recognize materials in their daily environment.

Pedagogical Tip:

For First Grade, avoid heavy vocabulary like "density" or "viscosity." Instead, focus on sensory observations: "Does it flow?" "Does it keep its shape?" "What color is it?" Use simple comparisons: "Is it more like water or more like honey?" Hands-on exploration with safe liquids (water, sand, blocks) is far more effective than explanation alone.

UDL Suggestions:

Representation: Provide images, real objects, and demonstrations simultaneously. Some students learn best by seeing, others by touching (with safe materials). Use consistent color-coding when discussing liquids vs. solids.

Action & Expression: Allow students to sort materials into "liquid" and "solid" categories. Provide opportunities for students to pour, observe, and describe liquids using visual supports (picture cards with "flows," "wet," "takes shape of container").

Engagement: Connect to student interests: "What liquids do you see at breakfast?" (milk, juice, syrup). Use sensory-rich language and real-world contexts to maintain engagement.

Zoom In / Zoom Out

Zoom In: Tiny Particles Moving (Microscopic Level)
If we could shrink down and look inside the yellow coolant liquid with a super-powerful microscope, we'd see billions of teeny-tiny particles (called molecules) bouncing around and sliding past each other. Unlike solid particles that are stuck in place, liquid particles are free to move and jostle around—that's why the liquid can flow! When the engine gets hot, these tiny particles move even faster and spread the heat throughout the whole cooling system. First graders don't need to know the word "molecules," but they can understand: "Inside every liquid are super-tiny pieces that like to move around."

Zoom Out: The Car's Cooling System (Larger System)
This one container is just one part of a much bigger system that keeps the entire car engine cool. Imagine the yellow coolant as a delivery worker: it travels through tubes and passages inside the hot engine, picks up heat, and carries it away to a radiator (like a car's air conditioner) where the heat escapes into the air. Then the cooled liquid flows back to this reservoir to do the job again and again. Without this liquid system, the engine would overheat and stop working. The car, the cooling system, the roads it drives on—it's all connected to help people travel safely.

Discussion Questions

1. "If we took the lid off this container, what do you think would happen to the yellow liquid?" (Bloom's: Predict | DOK: 2)
   Guides students to think about liquid behavior—it would spill because liquids flow.

2. "Why do you think the car needs a container to hold this yellow liquid instead of just leaving it loose in the engine?" (Bloom's: Analyze | DOK: 3)
   Encourages reasoning about the purpose of containers for liquids.

3. "Is the yellow liquid in this picture a solid or a liquid? How can you tell?" (Bloom's: Understand | DOK: 1)
   Asks students to classify and justify using observable evidence.

4. "What other liquids have you seen in containers at home or school?" (Bloom's: Remember/Apply | DOK: 1)
   Connects the concept to students' everyday experiences.

Potential Student Misconceptions

Misconception 1: "Liquids and solids are the same thing; they're just different colors."
Clarification: Liquids and solids behave very differently. A solid (like a block or pencil) keeps the same shape no matter where you put it. A liquid (like water or coolant) changes shape depending on its container. You can pour a liquid, but you can't pour a solid the same way. The color doesn't matter—it's about whether it flows or keeps its shape.

Misconception 2: "If a container has a hole, the liquid will stay inside because it's thick/heavy."
Clarification: Liquids always flow downward and spread out through holes or openings. The color, thickness, or how much liquid there is doesn't change this property. A hole means the liquid will leak or spill out—every time. This is why containers for liquids need to be closed or intact.

Misconception 3: "Only water is a liquid. Everything else in a car is a solid."
Clarification: Many liquids exist beyond water! Oil, milk, juice, paint, and coolant (like in the photo) are all liquids. They all flow, take the shape of their containers, and can be poured. Learning to recognize different liquids helps us understand the world around us—and how cars, factories, and kitchens all depend on liquids to work.

Extension Activities

1. Liquid Sorting Exploration: Gather safe, age-appropriate liquids (water, milk, syrup, cooking oil in sealed containers) and solids (blocks, rocks, crayons). Have students sort items into "Liquid" and "Solid" categories using a two-column chart with pictures. Discuss why liquids need containers while solids do not.

2. Pouring Practice Station: Set up a water table or tray with funnels, cups, pitchers, and water. Let students pour water between different-shaped containers to observe that the liquid changes shape but stays the same amount. Ask: "Does the water look different? Does it still feel wet?"

3. "Liquids in My World" Picture Walk: Take students on a classroom/school walk to identify liquids they see (water fountain, paint in art area, hand sanitizer). Create a class book: draw or photograph each liquid found, and label it. Discuss: "What do all these things have in common?"

Cross-Curricular Ideas

Math Connection: Measuring Liquids
Have students use measuring cups and funnels at a water table to pour water into different containers (tall thin cup, short wide bowl, etc.). Ask: "Which container holds the most water? Does the water take a different shape?" Create a simple bar graph showing which container holds the most/least. This connects liquid properties to measurement and data representation.

ELA Connection: "Liquid Story Sequencing"
Read aloud a simple story about a liquid's journey (e.g., "The Journey of a Raindrop" or create one together). Have students sequence picture cards showing: liquid in container !’ liquid poured !’ liquid spreads !’ liquid collected again. Students dictate or write simple sentences like "First, the water was in the cup. Next, it poured out." This builds narrative structure and vocabulary.

Art Connection: Liquid Color Mixing
Set up a sensory-safe painting activity with liquids: water mixed with washable food coloring in squeeze bottles. Let students squeeze colored liquid onto paper or in cups to see how liquids mix and change color. Discuss: "What color did we make? Is the liquid still flowing? What shape does it make?" This explores liquids through creativity while reinforcing properties.

Social Studies Connection: "Liquids in Our Community"
Take a neighborhood walk or show pictures of places in your community where liquids are important: a fire station (water for fighting fires), a gas station (gasoline for cars), a restaurant (drinks and cooking oils), a doctor's office (medicines). Create a class poster: "Liquids Help Our Community." Students draw or glue pictures and label each one, building awareness that liquids serve important jobs in society.

STEM Career Connection

1. Automotive Technician / Mechanic
An automotive technician works on cars to keep them running smoothly and safely. Part of their job is checking and changing liquids like coolant, oil, and brake fluid. They use tools to open containers, measure liquids, and pour new ones into the right spots. It's like being a doctor for cars! If you like fixing things and working with tools, this could be a fun job for you.
Average Annual Salary: $38,000–$56,000 USD

2. Chemical Engineer

A chemical engineer creates liquids and other materials that people need, like coolant for cars, medicine, soap, and paint. They mix different ingredients together (like a recipe!) and test them to make sure they work the right way. They think about questions like: "Will this liquid stay cold? Will it flow smoothly? Is it safe?" They help invent new liquids that make cars, planes, and hospitals work better.
Average Annual Salary: $64,000–$108,000 USD

3. Radiator / Cooling System Specialist
This person designs and fixes cooling systems—the tubes and containers that carry coolant through engines. They make sure the liquid flows properly, doesn't leak, and keeps engines from getting too hot. They study how liquids move through pipes and containers to solve problems. If you like puzzles and how machines work, this job combines engineering and liquid science!
Average Annual Salary: $42,000–$62,000 USD

NGSS Connections

Performance Expectation:
K-PS1-1: Plan and conduct investigations to provide evidence that objects can be sorted and classified by the properties of the materials from which they are made.

Disciplinary Core Ideas:
K-PS1.A: Matter and its Interactions* – Students observe and describe that materials can be sorted by observable properties (shape, color, texture, size).

Crosscutting Concepts:
* Properties of Materials – Observing and describing the properties of solids and liquids helps students understand how materials behave.
* Systems and System Models – The cooling system demonstrates how liquids move through connected parts to accomplish a function.

Science Vocabulary

* Liquid: A material that flows and takes the shape of its container, like water or juice.

* Container: Something that holds or keeps things inside, like a cup, bottle, or reservoir.

* Flow: When something moves slowly from one place to another, like water pouring from a pitcher.

* Properties: The special characteristics of something that help you identify it, like color, shape, or whether it's wet.

* Solid: A material with a shape that stays the same, like a block, pencil, or rock.

External Resources

Children's Books:
What Is a Liquid? by Rebecca Stefoff (part of the Exploring States of Matter* series) – Simple, illustrated exploration of liquids in everyday life.
The Way Things Work* by Macaulay (simplified version for early readers) – Shows how liquids are used in real machines.
Liquids and Solids* by Lola M. Schaefer – Compares solids and liquids using relatable examples.

Instructional Note: This lesson anchors First Grade students in observable, concrete experiences with liquids. The car engine image is relatable and safe to discuss (not to disassemble!). Move from observation !’ sorting !’ comparison !’ real-world application to build conceptual understanding progressively throughout the unit.