

Solids and Liquids

Narrative Summary

In this unit, students investigate the similarities and differences in a variety of common solids and liquids. First, they observe, describe, and compare a collection of solid objects, focusing on such properties as color, shape, texture, and hardness. They also perform tests to determine whether the objects roll or stack and float or sink, as well as whether they are attracted to a magnet. Investigations of liquids center on how various liquids look and feel, their fluidity, how they mix with water, and their degree of absorption. In a final lesson, students compare the properties of solids and liquids and identify how they are similar and different.

Science Content

Solids and liquids have observable properties that can be described and compared. Some properties of solids and liquids are shape, color, texture, miscibility, and fluidity or viscosity. These properties can be used to sort the solids and liquids studied in the classroom and to investigate new materials. Physical science concepts studied include motion, magnetism, and buoyancy as they relate to solids and liquids. Reading selections in the unit address pollutants, weather, and rocks.



Assessment

In Lesson 1, students are asked to observe, describe, and compare two solids—a spoon and a steel ball. Students’ oral descriptions of these objects and a written description of what they know about solids provide a pre-unit assessment of their skills in observing and describing the properties of solids. Lesson 10 serves as a pre-assessment for the second half of the unit, in which students observe and

describe the properties of liquids. Following Lesson 16 is a post-unit assessment that is matched to Lessons 1 and 10 and helps determine students’ growth in concepts and skills throughout the unit. An activity called “guess my reason” helps in assessing students’ observational skills. This opens up the possibility of many “right” answers. Embedded assessments in Lessons 9 and 15 challenge students to apply what they have learned in the unit as they conduct tests to learn more about two new solids and liquids. Additional assessments at the end of the unit include an investigation in which students mix cornstarch and water, suggestions for helping students share what they have learned with visitors, and strategies for reviewing student work.

Goals for Solids and Liquids

In this unit, students expand their awareness of the properties of solids and liquids. Their experiences introduce them to the following concepts, skills, and attitudes.

Concepts

- Solids and liquids can be described by their properties.
- Some properties of solids are color, shape, ability to roll or stack, hardness, magnetic attraction, and whether they float or sink.
- Some properties of liquids are color, tendency to flow, degree of viscosity or fluidity, whether they are miscible with water, and whether they float or sink in water.
- Tests can be performed to investigate properties of solids and liquids that cannot otherwise be observed.

Skills

- Observing and describing the properties of solids and liquids.
- Conducting tests to investigate the properties of solids and liquids.
- Sorting solids into groups on the basis of their properties.
- Comparing similarities and differences among solids.
- Comparing similarities and differences among liquids.
- Applying tests to investigate new solids and liquids.
- Comparing the properties of solids with the properties of liquids.
- Communicating ideas, observations, and experiences through writing, drawing, and discussion.

Attitudes

- Accepting that there is more than one way to describe solids and liquids.
- Recognizing the importance of organizing information and results on charts.
- Developing an interest in investigating the physical world.



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Fundamental Concepts and Principles Addressed (K–4)

Science as Inquiry

Abilities necessary to do scientific inquiry

- Ask a question about objects, organisms, and events in the environment.
- Plan and conduct a simple investigation.
- Employ simple equipment and tools to gather data and extend the senses.
- Use data to construct a reasonable explanation.
- Communicate investigations and explanations.

Understandings about scientific inquiry

- Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.
- Scientists use different kinds of investigations, depending on the questions they are trying to answer.
- Simple instruments, such as magnifiers, provide more information than scientists obtain using only their senses.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).
- Scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat the investigations.
- Scientists review and ask questions about the results of other scientists' work.

Physical Science

Properties of objects and materials

- Objects have many observable properties, including size, weight, shape, and color.
- Objects are made of one or more materials, such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.
- Materials can exist in different states.

Position and motion of objects

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing its position over time.
- The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull.

Light, heat, electricity, and magnetism

- Magnets attract and repel each other and certain kinds of materials.

Life Science

Organisms and their environments

- When an organism's environment changes, some plants and animals survive and reproduce, and others die or move.
- Humans change environments in ways that can either be beneficial or detrimental for themselves and other organisms.

Earth and Space Science

Properties of earth materials

- Earth materials include solid rocks. These materials have different physical properties that make them useful in different ways.

Changes in the earth and sky

- Weather changes from day to day and over the seasons.

Science and Technology

Understandings about science and technology

- People have always had questions about their world. Science is one way of answering questions and explaining the natural world.
- Scientists and engineers often work in teams with different things that contribute to the results.

- Women and men of all ages, backgrounds, and groups engage in a variety of scientific and technological work.
- Tools help scientists make better observations, measurements, and equipment for investigations.

Science in Personal and Social Perspectives

Personal health

- Safety and security are basic needs of humans. Safety involves freedom from risk or danger.

Changes in environments

- Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, and activities of organisms, including humans.

Science and technology in local challenges

- People are inventing new ways of doing things, solving problems, and getting work done.

History and Nature of Science

Science as a human endeavor

- Men and women have made a variety of contributions throughout the history of science.
- Many people choose science as a career. Many people derive great pleasure from doing science.

Unifying Concepts and Processes

Systems, order, and organization

Evidence, models, and explanation

Constancy, change, and measurement

Form and function