Lessons 4–7

Solids and Liquids

Prepare

In this lesson set, students observe a variety of objects and materials to describe and classify them by their properties. In Lesson 4, students observe the properties of various samples of matter. In Lesson 5, students classify various objects and materials by their observable properties and develop class descriptions of solids and liquids. In Lesson 6, students investigate the shapes of six different samples to improve their descriptions of solids and liquids. Finally, in Lesson 7, students observe sand and describe its properties to determine whether it is a solid or a liquid. The class then updates the anchor chart to include descriptions of solids and liquids.

Student Learning

Knowledge Statement

Classification of objects and materials requires observation of their properties.

Objectives

- Lesson 4: Observe objects and materials to describe their properties.

Concept 1: Properties of Matter

Focus Question

How can we describe and classify matter?

Phenomenon Question

In what ways are solids and liquids different?

- Lesson 5: Classify objects and materials by their properties.
- Lesson 6: Investigate solids and liquids to observe their properties.
- Lesson 7: Gather evidence to determine that sand is a solid.

Texas Essential Knowledge and Skills Addressed

2.2A	**Ask questions about organisms, objects,** and events **during observations and investigations.** (Addressed)
2.2C	**Collect data from observations using scientific tools.** (Addressed)
2.2D	**Record and organize data using pictures, numbers, and words.** (Addressed)
2.2E	**Communicate observations and justify explanations using student-generated data from simple descriptive investigations.** (Addressed)
2.4A	**Collect, record, and analyze information using tools, including** computers, **hand lenses**, rulers, plastic beakers, magnets, collecting nets, **notebooks, and safety goggles** or chemical splash goggles, as appropriate; timing devices; weather instruments such as thermometers, wind vanes, and rain gauges; and materials to support observations of habitats of organisms such as terrariums and aquariums. (Addressed)
2.4B	**Measure and compare** organisms and **objects.** (Addressed)
2.5A	**Classify matter by physical properties, including** relative temperature, **texture, flexibility, and whether material is a solid or liquid.** (Addressed)

English Language Proficiency Standards Addressed

1A	Use prior knowledge and experiences to understand meanings in English.
3E	Share information in cooperative learning interactions.
4A	Learn relationships between sounds and letters of the English language and decode (sound out) words using a combination of skills such as recognizing sound-letter relationships and identifying cognates, affixes, roots, and base words.

Materials

		Lesson 4	Lesson 5	Lesson 6	Lesson 7
Student	Science Logbook (Lesson 4 Activity Guide)	•			
	Cotton ball from Lesson 1 (1 per group)			•	
	Science Logbook (Lesson 6 Activity Guide)			•	
	Science Logbook (Lesson 7 Activity Guide)				•
Teacher	Objects and materials observation (1 set per group): 4 oz clear plastic cups (8), 4 oz clear plastic jars with lids (4), blue or green plastic building blocks (2), blue or green dish soap (2 fl oz), plastic handheld magnifier (1 per student), blue or green marbles (2), marker (1 per class), masking tape, safety goggles (1 per student), seltzer (2 fl oz), plastic tray or 6 qt clear plastic bin (1, optional), metal washers (2), water (2 fl oz)	•			
	Pencil (1)	•			
	Shapes Image (Lesson 5 Resource A)		•		
	Objects and materials classification (1 set per group): 4 oz clear plastic jar with lid (1), blue or green plastic building block (1), blue or green dish soap sample from Lesson 4 (1), honey (2 fl oz), blue or green marble (1), marker (1 per class), masking tape, metal paper clip (1), safety goggles (1 per student), seltzer sample from Lesson 4 (1), clear plastic teaspoon (1), metal teaspoon from Lesson 3 (1), twig from Lesson 1 (1), metal washer (1), water sample from Lesson 4 (1)		•		
	Pouring stations: 4 oz clear plastic jars (4), 6 oz clear plastic rectangular containers (4), 8 oz clear plastic round containers (4), plastic building blocks (5), dish soap (2 fl oz), marbles (5), metal paper clips (5), safety goggles (1 per student), seltzer (2 fl oz), plastic tray or 6 qt clear plastic bin (1 per station, optional), water (2 fl oz)			•	
	Sand observation (1 set per student pair): 4 oz clear plastic jar with lid (1), plastic handheld magnifier (1 per student), sand (2 oz)				•
	Magnified Sand Photograph (Lesson 7 Resource)				•
	A Nest Is Noisy (Aston and Long 2015)				•

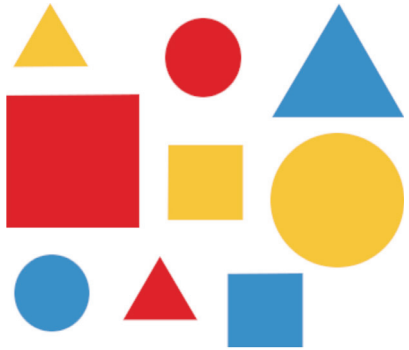
Preparation	Set up objects and materials observation activity. (See Lesson 4 Resource.)	•			
	Cue hummingbird adding material to nest video: http://phdsci.link/1541.	•		•	
	Set up objects and materials classification activity. (See Lesson 5 Resource B.)		•		
	Set up pouring stations. (See Lesson 6 Resource.)			•	
	Prepare a sand sample for each student pair by adding 2 oz sand to a 4 oz clear plastic jar. Seal each jar tightly.				•

Lesson 5

Objective: Classify objects and materials by their properties.

Launch 5 minutes

Display the image of shapes (Lesson 5 Resource A), and give students a few moments to observe the shapes.



▶ What do you notice about the picture?

- *I see triangles, squares, and circles.*
- *The shapes are red, purple, and blue.*
- *Some shapes are bigger than others.*

Refer to the class properties list.

Agenda

Launch (5 minutes)

Learn (25 minutes)

- Classify Objects and Materials (21 minutes)
- Debrief Classification Activity (4 minutes)

Land (5 minutes)

Content Area Connection: English

In previous levels, students sort objects into categories to gain a sense of the concepts the categories represent. Consider extending support by describing the shapes according to their attributes—for example, *polygon* (“multiple sides”), *triangle* (“three sides”), *quadrangle* (“four sides”). Encourage students to practice expanding their language skills by using some of the modeled words.

▶ How could you group the shapes by using some of the properties on the class list?

- *I could group the shapes by their shape!*
- *We could group the shapes by color.*
- *I think I could put all the smaller shapes together and all the bigger shapes together.*

Agree that students can group the shapes in different ways depending on the properties students choose to focus on. Tell students that they just shared different ways to classify the shapes. Explain that the term **classify** means to group things by the properties they have in common. Reiterate that students can classify the shapes by their color, shape, or size.

English Language Development

Introduce the term *classify* explicitly. Providing the Spanish cognate *clasificar* may help. Students may benefit from hearing synonyms such as *sort*, *group*, and *organize*. To support students as they classify samples in the lesson, consider providing sentence frames such as these:

- These samples are similar because they all are _____.
- We can classify these samples by _____.
- We classified these samples as _____ because they all _____.

Refer again to the class properties list, and ask students to consider the objects and materials they examined in Lesson 4.

▶ How could you classify the objects and materials you observed in the previous lesson?

- *We could sort them by color.*
- *I think all the samples that are wet should be together.*
- *We could put all the smooth objects in one group.*

Acknowledge that students could classify the objects and materials in various ways.

Teacher Note

Students may benefit from looking at their Science Logbooks from the previous lesson (Lesson 4 Activity Guide) to refresh their memories of the objects and materials they observed (1A).

Learn 25 minutes

Classify Objects and Materials (21 minutes)

Show students the samples they will classify. (See Lesson 5 Resource B.) Divide the class into groups. Instruct students to classify the samples into three groups. Tell students that when deciding how to classify the samples, they should focus on a property the samples have in common, such as size, color, or hardness. Emphasize that students should classify samples in containers according to the samples' properties and not the container's properties.

Safety Note

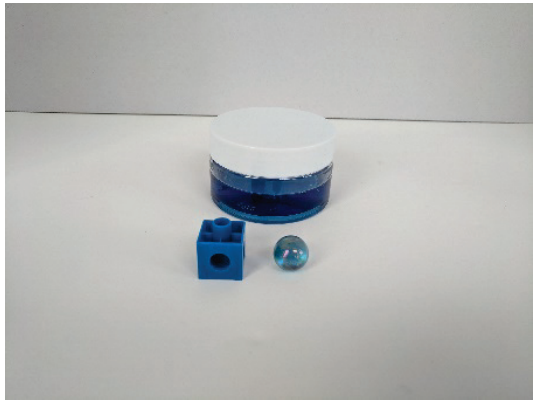
The objects and materials classification activity poses potential hazards. Ensure that jar lids are screwed on tightly and that students shake the jars gently and appropriately. To minimize the risk, review these safety measures and look for evidence that students are following them (2.1A):

- Wear safety goggles throughout the activity.
- Do not put any sample in or near your mouth.
- If a liquid spills, tell an adult right away.

Sample groups:

Silver samples: washer, paper clip, metal spoon

Blue samples: block, marble, dish soap



Differentiation

Some students may need support in completing the activity. Consider providing them with a smaller set of samples to classify and gradually giving them more samples to add to their established property groups.

Students needing an additional challenge may benefit from additional samples, a greater variety of samples, or a change in samples with each round.

Clear samples: water, seltzer, plastic spoon

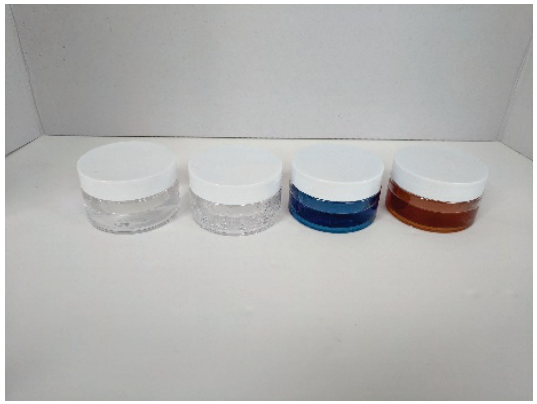
Brown samples: honey, twig

When students finish, ask them to share with the class the properties they used to classify the samples. After students share, tell them that they will complete a second round of classification. Encourage them to use other properties from the class list or new properties they think of to classify the samples. After students reclassify the samples, tell them that they will complete a final round of classification by making only two groups. Once students complete the final round, ask them to share their final classifications with the class.

Sample groups:

Dry samples: washer, marble, block, twig, paper clip, metal spoon, plastic spoon

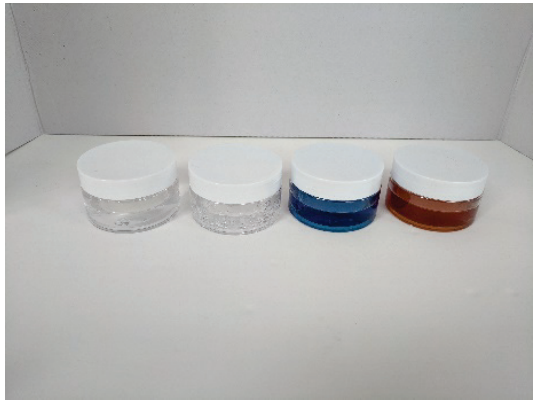
Wet samples: water, seltzer, dish soap, honey



Sample groups:

Hard samples: washer, marble, block, twig, paper clip, metal spoon, plastic spoon

Not hard samples: water, seltzer, dish soap, honey



Check for Understanding

Students classify objects and materials by their observable properties to identify patterns.

Evidence	Next Steps
Students' classifications should demonstrate that they have grouped the objects and materials by their observable properties and that all objects and materials in each group have at least one property in common.	If students' classifications do not reflect the properties the objects and materials have in common, review the class properties list with students, or prompt student thinking with questions such as these: How can you describe this sample? What other samples can you describe in the same way? What do both sample have in common?

Debrief Classification Activity (4 minutes)

As a class, discuss the criteria students used for their final classifications, including what all the samples in each group have in common.

▶ How did you classify the samples?

- *We separated the wet samples from the dry samples.*
- *We made one group for samples that are hard and another group for samples that aren't hard.*

Highlight student responses that mention classifying wet samples and dry samples. Refer to the class properties list, which includes color, texture, flexibility, hardness, size, weight, and shape. Point to each category, and ask students to raise their hands when they hear the category they used to classify their samples. Ask students who do not raise their hands to explain why.

Sample student response:

- *We put wet samples together and dry samples together, but wet and dry aren't on the class list.*

Acknowledge that the class list does not have a category that includes the terms wet or dry. Reveal that groups that used the terms wet and dry to classify the samples actually grouped their samples into liquids and solids. Tell students that liquids are not wet by themselves, but they can make the solids they come into contact with wet.

English Language Development

Introduce the terms *solid* and *liquid* explicitly. Providing the Spanish cognates for *solid* (*sólido*) and *liquid* (*líquido*) may be helpful. Consider pointing out other examples of solids and liquids students may be familiar with, such as foods and drinks they have for lunch (4A).

Land 5 minutes

Elicit students' prior knowledge of the terms *liquid* and *solid*.

▶ When have you heard or used the words *liquid* and *solid*?

- *I've heard water called a liquid before.*
- *I've used the word* solid *to talk about are hard things, like rocks.*

As students share, capture their ideas on the whiteboard.

▶ How would you describe the samples classified as solids?

- *All the solid samples are hard.*
- *The washers, marbles, and blocks made loud and clunky sounds when we shook them in the jar.*
- *In the last lesson, we could hold the washers, marbles, and blocks in our hands to look at them.*

▶ How would you describe the samples classified as liquids?

- *The liquid samples aren't hard.*
- *The liquid samples are in jars and got their jars wet.*
- *The water in the last lesson moved fast from one cup to the other cup.*

Work with students to develop class descriptions of solids and liquids. Capture student ideas on a sheet of chart paper.

Sample class descriptions:

- *Solids: hard, can hold in our hands*
- *Liquids: not hard, make solids wet, cannot hold in our hands*

Introduce the Phenomenon Question **In what ways are solids and liquids different?** Tell students that in the next lesson, they will investigate additional samples to learn more about solids and liquids.

Teacher Note

Keep the descriptions posted in the classroom as students refine their ideas about solids and liquids. Consider writing the descriptions on sentence strips, as students will develop more precise descriptions of these terms in the next lesson and formal definitions in Lesson 9.