

# Lessons 4–7

## Solids and Liquids

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### 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	
<b>Student</b>	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)				•	
<b>Teacher</b>	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)					•
	<i>A Nest Is Noisy</i> (Aston and Long 2015)					•

<b>Preparation</b>	Set up objects and materials observation activity. (See Lesson 4 Resource.)	•			
	Cue hummingbird adding material to nest video: <a href="http://phdsci.link/1541">http://phdsci.link/1541</a> .	•		•	
	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 4

**Objective:** Observe objects and materials to describe their properties.

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## Launch 5 minutes

Play the video of a hummingbird adding material to its nest (<http://phdsci.link/1541>).

Use an instructional routine such as Inside–Outside Circles to elicit student responses about what happens in the video and what questions students have after watching the video. 

- What did you see in the video?
  - *I saw a hummingbird carrying some fluffy white material in its beak.*
  - *It looked like the hummingbird uses its feet to push some fluff down in its nest.*
- What questions do you have about what you saw?
  - *Why does the hummingbird push the white fluff down with its feet?*
  - *How does the hummingbird choose the materials it uses to build its nest?*
  - *Do other birds use the same materials to build their nests?*

Discuss ways students might describe the material the hummingbird uses to build its nest. Refer to the class properties list developed in the previous lesson.

## Agenda

Launch (5 minutes)

Learn (25 minutes)

- Observe Samples (21 minutes)
- Debrief Observation Activity (4 minutes)

Land (5 minutes)



### Teacher Note

Inside–Outside Circles is a collaborative conversation routine in which the class is divided in half. One half becomes the inside circle, and the other half becomes the outside circle to form two concentric circles. Students in the inside circle pair up with students they face in the outside circle. Students in each pair take turns answering a question or discussing a topic. When student partners finish sharing, one circle rotates so students face new partners for a new question or topic.

The Inside–Outside Circles routine allows students to respond to questions or discuss information with many other students in a structured manner (3E).

Sample class list:

<i>Properties of Materials</i>
<i>Color: white, silver</i>
<i>Texture: smooth, shiny, not shiny</i>
<i>Flexibility: bends, twists, does not bend, does not twist</i>
<i>Hardness: hard</i>
<i>Properties of Objects</i>
<i>Size: long, short</i>
<i>Shape: round, pointy</i>
<i>Weight: heavy, light</i>

► Which words from the class list describe the hummingbird nest material?

- *The material is white and looks like it bends and twists.*
- *I think we need other words for the material because it looks soft and fluffy.*

Add new words students mention to the class list. Tell students that in this lesson, they will examine more objects and materials to help them explain why birds use different objects and materials to build nests.

## Learn 25 minutes

### Observe Samples (21 minutes)

Tell students they will observe six samples of objects and materials. Show students the samples and then the magnifiers, jars with lids, and cups they will use during the activity. (See Lesson 4 Resource.)  

► How could you use these items to observe the different samples?

- *We could use the magnifier to make the samples look bigger.*
- *I think we could put the samples into the cups. Then we could see what the samples do when we move the cups around.*



#### Teacher Note

If necessary, explicitly introduce the handheld magnifiers to students.



#### English Language Development

Students will encounter the term *sample* throughout the concept. Introduce the term explicitly, and explain that a sample is a small amount of an amount of a material or a small quantity of an object, and students can use it to find out more about that object or material. Invite students to share experiences they have had with samples of objects or materials (1A).

Establish with students that during the activity they will closely observe each sample with the magnifier, pour the samples from one cup into another to watch how they move, and shake the samples inside sealed jars to listen for sounds.



### Safety Note

The objects and materials observation activity poses potential hazards. Ensure that jar lids are screwed on tightly and that students shake the jars gently and appropriately. Consider providing a tray or plastic bin to each group to contain spills. 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.
- Do not touch liquid samples.
- Use both hands when shaking jars.
- If a liquid spills, tell an adult right away.

Divide the class into groups, and distribute the solid samples, magnifiers, cups, and unlabeled jar to each group. (See Lesson 4 Resource.) Tell students they will observe the washers, marbles, and blocks one sample at a time and write or draw their observations on the chart in their Science Logbooks (Lesson 4 Activity Guide).  Guide students through the following procedure step-by-step, reading aloud the name of each sample on the chart as students observe it and allowing students adequate time to make observations.

1. Look at the sample. Then use the magnifier to look at the sample more closely.
2. Touch the sample to find out what it feels like.
3. Place the sample in a cup. Pour the sample back and forth from one cup to the other, and watch how the sample moves.
4. Place the sample in an empty jar and screw the lid on tightly. Shake the jar and listen for sounds.
5. Write or draw what the sample looks, feels, and sounds like in the first box on the chart in your Science Logbook.
6. Write or draw how the sample moves from cup to cup in the second box on the chart.

After students observe the solid samples, distribute the liquid samples, cups, and labeled jars according to the instructions in Lesson 4 Resource. Have students observe the water, seltzer, and dish soap one at a



### Teacher Note

Clarify with students that a sample may be one item, but it may also be two or more of an item, such as the two plastic building blocks they will observe.



### Differentiation

Consider grouping students with varying capabilities to support student learning (3E).

time, and tell them they will continue to write or draw their observations in their Science Logbooks. Guide students through the following procedure step-by-step, reading aloud the name of each sample on the chart as students observe it and allowing students adequate time to make observations.

1. Look at the sample. Then use the magnifier to look at the sample more closely.
2. Pour the sample into a clean cup. Pour the sample back and forth from cup to cup, and watch how the sample moves.
3. Pour the sample into an empty jar and screw the lid on tightly. Shake the jar and listen for sounds.
4. Write or draw what the sample looks and sounds like in the first box on the chart in your Science Logbook.
5. Write or draw how the sample moves from cup to cup in the second box on the chart.

Sample student response: 

Sample	What does it look like? What does it feel like? What does it sound like?	How does it move from cup to cup?
Washers	<ul style="list-style-type: none"> <li>▪ Shiny, silver, round, smooth, hard, make a loud sound</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fall one at a time out of the cup</li> </ul>
Marbles	<ul style="list-style-type: none"> <li>▪ Round, blue, smooth, hard, make a loud sound</li> </ul>	<ul style="list-style-type: none"> <li>▪ Roll over each other and fall out of the cup</li> </ul>
Blocks	<ul style="list-style-type: none"> <li>▪ Square, blue, smooth, hard, make a clunky sound</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fall one at a time out of the cup</li> </ul>
Sample	What does it look like? What does it sound like?	How does it move from cup to cup?
Water	<ul style="list-style-type: none"> <li>▪ Clear, wet, makes a splashing sound</li> </ul>	<ul style="list-style-type: none"> <li>▪ Moves fast</li> </ul>
Seltzer	<ul style="list-style-type: none"> <li>▪ Clear, bubbly, wet, makes a fizzy sound</li> </ul>	<ul style="list-style-type: none"> <li>▪ Moves fast</li> </ul>
Dish soap	<ul style="list-style-type: none"> <li>▪ Blue, thick, wet, doesn't make a sound</li> </ul>	<ul style="list-style-type: none"> <li>▪ Moves slow and drips</li> </ul>



**Teacher Note**

While it is acceptable at this point in the module for students to describe the liquid samples as wet and the solid samples as dry, do not add the terms *wet* or *dry* to the class list.

## Debrief Observation Activity (4 minutes)

Ask groups to share their observations with the class. As students share new descriptive words, add the words to the class properties list. ✓ Reflect with students on how the class list has grown.

*Sample class list:*

<p style="text-align: center;"><i>Properties of Materials</i></p> <p><i>Color: white, silver, clear, blue</i></p> <p><i>Texture: smooth, shiny, not shiny, fluffy, bubbly</i></p> <p><i>Flexibility: bends, twists, does not bend, does not twist</i></p> <p><i>Hardness: hard, soft</i></p> <p style="text-align: center;"><i>Properties of Objects</i></p> <p><i>Size: long, short</i></p> <p><i>Shape: round, pointy, square</i></p> <p><i>Weight: heavy, light</i></p>
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## Land 5 minutes

Ask students to reflect on the class properties list.

- What new questions do you have about the properties of objects and materials?
  - *What other properties can we add to our list?*
  - *How can materials that are so different have some of the same properties?*
  - *Is everything a property?*



### Check for Understanding

As students share, listen for them to identify patterns in the properties of the samples they observed. As necessary, prompt students to consider that objects and materials can share one property or more (e.g., color, texture) and that students can group objects and materials by the particular properties they share (e.g., blue, smooth).

Highlight student responses that refer to the distinction between properties of materials and properties of objects. Show students a pencil and ask them to describe its properties.

*Sample student responses:*

- *The pencil is long and thin.*
- *The pencil is light.*
- *The pencil is yellow and has a pink eraser.*
- *The pencil is hard and smooth.*

Break the pencil in half. Ask students to think about which of the pencil's properties changed and which stayed the same.

*Sample student responses:*

- *Each pencil piece is shorter than the whole pencil, but the pieces are still thin.*
- *I think each piece is lighter than the whole pencil.*
- *The pencil pieces are still yellow, and the eraser is still pink.*
- *The pencil pieces are still hard and smooth except at the broken ends.*

Summarize student responses to state that although the pencil's size, weight, and shape changed when it broke in half, the properties of the materials the pencil is made of did not change. Explain that just like a pencil can change size, weight, and shape without the properties of its materials changing, any object can change its size, weight, and shape while keeping the same material properties. Remind students that because an object's size, weight, and shape can change even if its materials do not change, these properties describe objects but not materials.

Tell students that in the next lesson, they will explore some of their other questions about properties as they continue to observe and describe properties of objects and materials.