

# Lessons 7–8

## Plant Body Parts

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### Prepare

In Lessons 7 and 8, students build on their understanding of animal body parts as they explore the functions of plant body parts. Students begin by observing healthy and unhealthy plants, which leads them to wonder how plant body parts help plants survive. They then investigate a plant model to develop the understanding that roots absorb water, stems transport water, and leaves capture light. Students distill their learning to realize that plant body parts work together to help plants survive. In Lesson 8, students describe an acorn shell, tree bark, and prickles to explain that the properties of these body parts are related to their protective functions.

### Student Learning

#### Knowledge Statement

Plants have body parts with different functions. These body parts help plants survive.

### Concept 1: Body Parts

#### Focus Question

How do plants and animals use their body parts to survive in their environment?

#### Phenomenon Question

How do pond plants use their body parts to survive?



## Objectives

- Lesson 7: Use a model to observe roots, stems, and leaves and identify their functions.
- Lesson 8: Observe plant body parts to describe the relationship between the properties of plant body parts and their functions.

## Texas Essential Knowledge and Skills Addressed

- 2.4A **Collect, record, and compare 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 observation of habitats of organisms such as terrariums and aquariums.** (Addressed)
- 2.9A **Identify the basic needs of plants and animals.** (Addressed)
- 2.10B **Observe, record, and compare how the physical characteristics of plants help them meet their basic needs such as stems carry water throughout the plant.** (Introduced)

## English Language Proficiency Standards Addressed

- 2E Use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborated spoken language.
- 3B Expand and internalize initial English vocabulary by learning and using high-frequency English words necessary for identifying and describing people, places, and objects, by retelling simple stories and basic information represented or supported by pictures, and by learning and using routine language needed for classroom communication.



## Materials

		Lesson 7	Lesson 8
<b>Student</b>	Plant model activity (1 set per group): 3.5 oz clear plastic cup with blue water prepared by teacher (1), 3.5 oz clear plastic cup with gravel or soil prepared by teacher (1), empty 3.5 oz clear plastic cup (1), flashlight (1), plant model prepared by teacher (1), disposable pipette (dropper) (1)	•	
	Science Logbook (Lesson 8 Activity Guide)		•
<b>Teacher</b>	Cup A (healthy radish plants) and Cup B (unhealthy radish plants): 9 oz cups (2), gravel (1 cup), two-headed grow lamp (1), marker (1), disposable plate (1), potting soil ( $1\frac{1}{8}$ cup), radish seeds (10 to 12), scissors (1), sticky notes (2), access to water	•	
	Plant models: 1 cm diameter clear straws (2), 1 oz blue food coloring, 3.5 oz clear plastic cups (12), 9 oz cup (1), gravel or potting soil ( $\frac{3}{4}$ cups), absorbent white paper towels (6 sheets), copy of plant model template in Lesson 7 Resource C (1), metric ruler (1), scissors (1), water (8 oz)	•	
	Cattail Plants Photograph (Lesson 7 Resource D)	•	
	Plant Body Part Photographs (Lesson 8 Resource A)		•
	Acorn Demonstration Instructions (Lesson 8 Resource B)		•
	Acorn demonstration: acorn with seed (1), nutcracker or pliers (1)		•
	Acorn Shell Station (2 stations per class): acorns (2), plastic handheld magnifiers (2)		•
	Tree Bark Station (2 stations per class): plastic handheld magnifiers (2), wood pieces with bark (2)		•
	Prickles Station (2 stations per class): 8 oz clear plastic jars with lids (2), protective gloves (1, optional), plastic handheld magnifiers (2), marker (1), prickly stems (2), scissors (1), sticky notes (2), tape		•
Animal Body Part Photographs (Lesson 8 Resource D)		•	

<b>Preparation</b>	<b>8 Days Before:</b> Prepare radish plants in Cup A and Cup B. (See Lesson 7 Resource A.)	•	
	<b>1 Day Before:</b> Cut plant roots in Cup B. (See Lesson 7 Resource A.)	•	
	Prepare plant models. (See Lesson 7 Resource B.)	•	
	Cue moose eating water lilies video: <a href="http://phdsci.link/1455">http://phdsci.link/1455</a> .		•
	Set up protective plant body part stations. (See Lesson 8 Resource C.)		•

# Lesson 7

**Objective:** Use a model to observe roots, stems, and leaves and identify their functions.

## Launch 6 minutes

Display the radish plants in Cup A (healthy plants) to the class. Explain that radish plants do not usually grow in a pond environment, but they can still help students learn more about pond plants because most plants have similar kinds of body parts.  Then display the radish plants in Cup A alongside the radish plants in Cup B (unhealthy plants), and ask students to make observations.

- How do the plants in Cup A look different from the plants in Cup B? 
  - *The plants in Cup A look fine. The plants in Cup B look like they're sick.*
  - *The plants in Cup B are falling over.*
- What do you wonder about these plants?
  - *I wonder what happened to the plants in Cup B.*
  - *Did the plants in Cup B get water?*
- What might have caused the plants in Cup B to look sick?
  - *Maybe someone forgot to water them.*
  - *Maybe they didn't get enough sunlight.*

Use student responses to review that plants need light and water to survive. Suggest that students observe the body parts of the plants to look for clues about why the plants in Cup B do not look healthy.

## Agenda

Launch (6 minutes)

Learn (24 minutes)

- Observe Plant Body Parts (4 minutes)
- Model Leaf Function (6 minutes)
- Model Root and Stem Functions (14 minutes)

Land (5 minutes)



### English Language Development

Students will encounter the term *grow* throughout the module. English learners may benefit from acting out the meaning of *grow* or watching videos of plants growing (2E).



### Teacher Note

Refer to the plants objectively (e.g., the plants in Cup A, the plants in Cup B) to empower students to make their own observations about the health of each plant.

► Which body parts do the plants in both cups have?

- *Both cups have plants with leaves and a stem.*
- *I think all the plants have roots in the soil.*

Identify the leaves and stems of the plants in each cup. Then gently remove a single plant from Cup A so students can see its roots. Next, gently remove a single plant from Cup B. 

► What do you notice?

- *The plant from Cup A has roots, but the plant from Cup B does not.*

Confirm that the plants in Cup B are missing roots. Highlight that the body parts of the plants in Cup A and Cup B are the same except for the roots, and emphasize that the roots are the only different body part. Revisit the understanding that animals use their body parts in many different ways to survive, and have students Think–Pair–Share in response to the following question:

► Do you think plants also use their body parts to help them survive? Why or why not?

- *Maybe. I know plants have body parts like leaves. But I don't know what they do.*
- *Yes. The plants with no roots in Cup B look too sick to live, so I think plants need roots to survive.*

Tell students that in this lesson they will investigate the functions of plant body parts to find out why the plants in Cup B do not look healthy. 

## Learn 24 minutes

### Observe Plant Body Parts (4 minutes)

Display the healthy plants in Cup A. Review the name of each plant body part (leaves, stem, roots) and write the name of each body part in a separate column to create a class chart. Label the chart Plant Body Part Functions. As students respond to the following prompts, record student responses in the relevant column. 

Remind students that plants need to take in light and water to survive. 



#### Teacher Note

The radish plants are fragile at this stage of growth. Remove the plants carefully to prevent the stems from breaking.

When displaying the plant from Cup A, gently brush off as much soil from the roots as possible so they are visible to students.



#### Teacher Note

Discard the plants removed from the cups before continuing the lesson. During the rest of the lesson, refer to the remaining plants in each cup.



#### Differentiation

Consider adding drawings to the chart to support student understanding (2E).



#### Teacher Note

The goal of this lesson is for students to identify these main functions of plant body parts: absorbing water (roots), transporting water (stems), and capturing light (leaves). Secondly, leaves take in small amounts of water from rain, and stems take in small amounts of light. If students mention these secondary functions, validate their responses, and then guide their focus back to the main function of each plant part (3B).



#### Teacher Note

This lesson set uses the phrase *take in* to describe plants capturing light and absorbing water to meet their needs (3B).

- ▶ Which plant body part do you think takes in light? Why do you think so?
  - *Sometimes I see the Sun shining on a plant’s leaves and stem. Maybe they take in light.*
  - *The roots are under the ground, so I don’t think they can get light.*

Then explain to the class that watering a plant wets the soil, and the water settles into the soil.

- ▶ Which body part do you think takes in water from the soil? Why do you think so?
  - *The roots are in the soil, so maybe they take in water.*
  - *Sometimes I see some water on leaves after it rains. Maybe they can take in water.*

Sample class chart:

Leaves	Stem	Roots
Take in light? Take in water?	Takes in light?	Take in water?

### Model Leaf Function (6 minutes)

Display the healthy plants in Cup A and tell students they will use a model of one of these plants to find out the functions of different plant body parts. Hold up one plant model, and work with students to determine that the twisted portion inside the straw represents a stem, the flat pieces on top represent leaves, and the twisted pieces on the bottom represent roots. 🌱🔍

Tell students they will first use the plant model to find out which body part takes in light.

Divide the class into groups. Provide each group with an empty cup, a cup with soil or gravel, a plant model, and a flashlight. Then explain to students how to place the plant model into the cup and add soil or gravel to the cup to anchor the plant. (See Lesson 7 Resource B.) Provide about 1 minute for groups to set up their models.

Then tell students they will use the flashlight to shine light on the plant model, and explain the procedure. (See Lesson 7 Resource B.) Emphasize that students should pay close attention to which plant body parts have light shining on them and which parts do not. 👤👤👤 Demonstrate this activity by holding a flashlight directly above a plant model without turning it on. Then instruct groups to follow the procedure with their own plant model and flashlight.



#### Extension

Another function of roots is to provide stability to the plant. The roots act as anchors to help the plant stand upright. Students do not explore this function of roots in this lesson, but some classes may wish to discuss this function. Consider completing the following demonstration to help students visualize this function.

Place a model plant into an empty 3.5 oz cup and slowly add the premeasured soil or gravel to cover the roots. Clarify that the soil or gravel represents the ground in the model. Ask students to describe the plant’s position in the cup. Then trim off the roots of a model plant and complete the demonstration again. Again, ask students to describe the plant’s position in the cup. Students should notice that the model plant with roots stands upright and the model plant without roots cannot stand upright (3B).



#### Spotlight on Knowledge and Skills

In this lesson, students use models to demonstrate how plant body parts, especially roots and stems, work together to meet a plant’s needs. Models are never exact copies of the phenomenon they represent. Guide students to compare the parts of the plant model with the parts of one of the radish plants in Cup A.



#### Differentiation

Some students may struggle with the abstract nature of this prompt. Guide them to notice which plant part seems to “touch” or “catch” the most light (2E).



**Teacher Note**

Consider turning off overhead lights to make the function of leaves easier for students to observe.

After groups make observations, focus their attention to the class chart

- Which plant body part do you think takes in light? Why do you think that?
  - *I think the leaves take in light because they are at the top of the plant. In our model, they had a lot of light on them.*
  - *I think the leaves take in light because they were the part that got the most light in our model. The stem was mostly in the shade and the roots were in the soil.*

Confirm that the leaves of a plant take in light to help the plant survive. Update the class chart to reflect that the main function of leaves is to take in light.

Sample class chart:

Leaves	Stem	Roots
Take in light Take in water?	Takes in light?	Take in water?

**Model Root and Stem Functions (14 minutes)**

Point out the need for students to continue exploring their models to find out the functions of stems and roots. Remind students that they noticed that leaves take in light for the plant but they are not yet sure which plant body part takes in water.

Explain that to find out which plant body part takes in water, students will use water that has been colored blue to make it easier to observe. Explain the procedure to students. (See Lesson 7 Resource B.) Then distribute a cup with blue water and a disposable pipette (dropper) to each group, and use a group’s cup with blue water to demonstrate how to pick up and release the water with the dropper. Clarify that this action represents rainwater settling into the soil. Tell students that they should not touch the leaves of the plant model with the dropper. Also instruct them not to touch the plant model after they add the water. Then instruct groups to transfer their blue water to their plant models.

After students transfer the water, have them closely observe and discuss the changes that occur. The majority of each plant model should turn blue after about 3 to 5 minutes. 

Bring students back together as a class and have them Think–Pair–Share in response to the following questions.

- ▶ What happened to the water you added to the cup?
  - *The water went into the plant model and kept going up to the leaves at the top.*
  - *The water went up the stem of our plant model.*
- ▶ Which plant body parts seemed to take in the water? How do you know?
  - *I think all the parts took in water because they all turned blue.*
  - *The roots, the stem, and the leaves took in water because they all are wet now.*

Confirm that water traveled through all three plant body parts, and then hold up one of the plant models. Remind students that they are trying to determine which plant body part takes in water from the soil.

- ▶ Which body part do you think takes in water from the soil?
  - *The water probably went into the roots first because they are in the soil.*

Confirm that the main function of roots is to take in water from the soil, and update the class chart.

- ▶ What happened after the roots took in water?
  - *The water kept going up the stem and into the leaves.*
  - *The whole plant turned blue.*
- ▶ Why might a plant need water to travel through its body? 
  - *Maybe the whole plant needs water, not just the roots.*
- ▶ What do you think a stem does for a plant?
  - *A stem moves the water up from the roots to the leaves.*
  - *The stem is where water goes from the ground to the leaves.*

Update the class chart to reflect that the stem moves water from the roots to the leaves of a plant.



### Differentiation

If students need more guidance to understand that roots take in water, consider carefully removing one of the plant models from its cup and displaying the blue model roots.



### Teacher Note

Students may notice that the leaves of the plant models droop after they absorb water. This drooping is a limitation of using paper towels for the model. Clarify that the leaves of real plants do not droop.



### Teacher Note

To help students understand the need for water transport through a stem, help them make connections to their own experiences. Ask a question such as this: When you drink, does the water stay in your mouth, or do you need to swallow it? Clarify that all parts of a plant or animal's body need water.

Sample class chart:

Leaves	Stem	Roots
Take in light Take in water?	Takes in light? Moves water from roots to the leaves	Take in water

## Land 5 minutes

Display the unhealthy plants in Cup B. Reveal that the roots of the plants in Cup B were removed with scissors.

- What happened to the plants when the roots were removed?
  - *I think the missing roots hurt the plants because they couldn't take in water from the soil anymore.*
  - *The plants weren't getting water from the soil, and plants need water to survive.*

Build on student responses to confirm that the plants could not take in enough water without their roots. Then ask students to think about the functions of the stem and leaves.

- Do you think a radish plant could survive without leaves or a stem? Why or why not?
  - *No. Without leaves, a plant probably couldn't get enough light.*
  - *I don't think a radish plant could survive without a stem because the stem moves water. Other parts of the plant need water too, not just the roots.*

Display the healthy plants in Cup A and have students think about how the parts of a plant work together to help it survive.

- How do leaves, a stem, and roots work together to help a plant survive?
  - *The roots get water from the soil, and then the stem moves the water up to the leaves. The parts work together so the whole plant gets water.*
  - *Its leaves take in the light a plant needs.*



**Check for Understanding**

Students observe how plant parts work together to help a plant survive.

Evidence	Next Steps
<p>Students describe how plant parts work together to help a plant survive including that roots take in water from soil, a stem moves water up from a plant’s roots to its leaves, and leaves take in light.</p>	<p>If students do not accurately describe how plant parts work together to help the plant survive, prompt student thinking with questions such as the following: What parts of the plant did you see in the model? What does each part do? How does that help the plant survive?</p>

Use student responses to summarize that the roots, stem, and leaves work together to help a plant survive. Then introduce the Phenomenon Question **How do pond plants use their body parts to survive?**, and display the photograph of the cattail plants (Lesson 7 Resource D). Remind students that they observed this photograph on the class plant and animal chart in Lesson 2.



- Do you think pond plant body parts have the same functions as radish plant body parts? Why or why not?
- *Yes, because the cattails also have leaves, a stem, and roots. I think they have the same functions.*
  - *I think pond plant body parts are like radish plant body parts because we learned that most plants have leaves, roots, and a stem.*

Draw attention to student responses that describe radish plants and pond plants as having parts with the same functions. Confirm that, in most plants, the function of roots is to take in water, the function of a stem is to move water from roots to leaves, and the function of leaves is to take in light.