




Preparation Guide


Level 2 Module 3

PLANTS

with Spotlight Lessons on Living Things and Their Environments

Materials: This section lists the quantity of each material necessary for the lesson. Lesson materials may be from a *PhD Science*® Texas materials kit, or the materials may be school-supplied items. In addition to having the listed materials, teachers should have access to the following common classroom items: sticky notes, chart paper, pencils, a whiteboard, and markers.

Resources: This section lists module resources (from the Module Resources section in the Teacher Edition) and core texts used in the lesson. Classrooms also need daily access to the module's Teacher Edition, Science Logbooks, and, if applicable, digital slides. A symbol () identifies resources that appear in the digital slides. Additional supports and Spanish resources are available in the Implementation Resources and Level Overview sections of the digital platform.

Preparation: This section identifies preparation teachers should complete before the lesson, including media teachers must cue before the lesson and activities that require setup. This section also describes advance preparation for upcoming lessons. For example, if teachers need to prepare 1 day in advance for an activity in Lesson 11, an advance preparation note appears in the Preparation section for Lesson 10. A symbol () identifies lessons with advance preparation notes.



Plants | Advance Preparation

Several activities in this module require advance preparation. A version of this list appears in the Module Overview of the Teacher Edition. The expanded version in this guide identifies all lessons for which preparation may take longer than a planning period. A symbol (†) identifies preparation that can be done earlier than the suggested time.


Lesson	Time in Advance	Investigation	Description
9	1 to 4 days	Animal and Flower Interaction Demonstration	Purchase fresh flowers with easily viewable pollen, such as lilies.
11	1 to 7 days	Blueberry Observation	Purchase fresh blueberries.
19	1 to 7 days	Huckleberry Observation	Purchase fresh huckleberries. If huckleberries are not available, use fresh blueberries.

Plants | Lesson Preparation



Lesson 1

Materials	<p>Kit Items None</p> <p>School-Supplied Items <input type="checkbox"/> Pencils or markers, at least 5 colors including blue, brown, gray, and green (24 sets)</p>
Resources	<p><input type="checkbox"/> Lesson 1 Resource: Mount St. Helens Photographs </p> <p><input type="checkbox"/> <i>Volcano: The Eruption and Healing of Mount St. Helens</i> (Lauber 1993)</p>
Preparation	<p><input type="checkbox"/> Access Mount St. Helens Science and Learning Center's Changing Landscape web page (http://phdsci.link/1620). </p>




Lesson 2

Materials	<p>Kit Items None</p> <p>School-Supplied Items None</p>
Resources	None
Preparation	<p><input type="checkbox"/> Access Mount St. Helens Science and Learning Center's Changing Landscape web page (http://phdsci.link/1620). </p>


Lesson 3

Materials	<p>Kit Items None</p> <p>Module 2 Kit <input type="checkbox"/> Flashlight with batteries (1)</p> <p>School-Supplied Items None</p>
Resources	<p><input type="checkbox"/> Lesson 3 Resource A: Forest Photograph </p> <p><input type="checkbox"/> Lesson 3 Resource B: Before and After Plant Photographs </p>
Preparation	<p><input type="checkbox"/> Prepare to distribute color copies of the Before the Eruption and Nine Years After the Eruption photographs in Lesson 3 Resource B to each student pair.</p>

Lesson 4

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bins, clear plastic, 6 qt (2) <input type="checkbox"/> Containers, clear plastic, 16 oz (48) <input type="checkbox"/> Grow lamp, two-headed (1) <input type="checkbox"/> Plant labels, four different colors (8 of each color) <input type="checkbox"/> Precision knife (1) <input type="checkbox"/> Screens, 5 sq ft (3) <input type="checkbox"/> Seeds, fava bean (16) <input type="checkbox"/> Seeds, radish (80) <input type="checkbox"/> Spoons, plastic (24) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bags, resealable plastic (8) <input type="checkbox"/> Binder clips (4) <input type="checkbox"/> Bins, clear plastic, 6 qt (6) <input type="checkbox"/> Cups, clear plastic, 3.5 oz (8) <input type="checkbox"/> Graduated cylinder, 25 mL (1) <input type="checkbox"/> Rubber stoppers (6) <input type="checkbox"/> Ruler, metric (1) <input type="checkbox"/> Safety goggles, teacher (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Potting soil (48 cups) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Stapler with staples (1) <input type="checkbox"/> Water (access) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 5 requires the grow lamp, the prepared investigation plants and materials, and the prepared thick and thin screens. <input type="checkbox"/> Lesson 15 requires the graduated cylinder.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 4 Resource A: Fireweed Growth Photographs  <input type="checkbox"/> Lesson 4 Resource B: Plant Investigation Setup Instructions <input type="checkbox"/> Lesson 4 Resource C: Plant Investigation Procedure Sheets
<p>Preparation</p> <p></p>	<ul style="list-style-type: none"> <input type="checkbox"/> Cue “Mount St. Helens: Fireweed” video (http://phdsci.link/1632).  <input type="checkbox"/> Prepare plant investigation materials for students to observe in Lesson 4 and use in Lesson 5. (See Lesson 4 Resource B.) <input type="checkbox"/> Prepare to distribute a complete procedure sheet to each group. (See Lesson 4 Resource C.) <p>Advance Preparation for Lesson 11</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 to 7 Days Before: Purchase fresh blueberries.






Lesson 5

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boxes, cardboard, 12" × 12" × 12" (8) <input type="checkbox"/> Grow lamps, two-headed (2) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Tape (partial roll) <input type="checkbox"/> Water (access) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Investigation plants and materials from Lesson 4 (8 sets) <input type="checkbox"/> Thick and thin screens from Lesson 4 (1 each) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 6 requires the prepared investigation plants and materials.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 4 Resource B: Plant Investigation Setup Instructions <input type="checkbox"/> Lesson 4 Resource C: Plant Investigation Procedure Sheets <input type="checkbox"/> Lesson 5 Resource: Resource Conditions Setup Instructions and Procedure
<p>Preparation</p> 	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare plant investigation materials for students to observe in Lesson 4 and use in Lesson 5. (See Lesson 4 Resource B.) <input type="checkbox"/> Prepare to distribute a complete procedure sheet to each group. (See Lesson 4 Resource C.) <input type="checkbox"/> Prepare plant investigation boxes for each resource condition. (See Lesson 5 Resource.) Use the two-headed grow lamp from Lesson 4 plus one additional grow lamp. <p>Advance Preparation for Lesson 9</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 to 4 Days Before: Purchase fresh flowers with easily viewable pollen, such as lilies.




Lesson 6

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Tape measures, 1.5 m (8) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Rulers, metric (24) <input type="checkbox"/> Sentence strips (3) <input type="checkbox"/> String (500 cm) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pocket chart (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Investigation plants and materials from Lesson 5 (8 sets) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 26 requires the prepared investigation plants and materials. Students use the tape measures and the prepared investigation plants and materials throughout the module.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 6 Resource: Plant Investigation Facilitation Instructions <input type="checkbox"/> <i>Volcano: The Eruption and Healing of Mount St. Helens</i> (Lauber 1993)
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare string-measuring demonstration materials. Cut two pieces of string, one measuring 10 cm and one measuring 9 cm. Use tape and a marker to label the 10 cm string A and the 9 cm string B. <input type="checkbox"/> Prepare string measuring activity materials. Measure and cut enough pieces of string between 5 cm and 20 cm to give four strings of different lengths to each group.





Lesson 7

<p>Materials</p>	<p>Kit Items</p> <p>None</p> <p>School-Supplied Items</p> <p>None</p>
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 7 Resource A: Sonoran Desert Photograph  <input type="checkbox"/> Lesson 7 Resource B: Sonoran Desert Plants Photograph  <input type="checkbox"/> Lesson 7 Resource C: Desert Plants Article Adaptation  <input type="checkbox"/> Lesson 7 Resource D: Conceptual Checkpoint  <input type="checkbox"/> Lesson 7 Resource E: Investigation Information 
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute a copy of Lesson 7 Resources D and E to each student.



Lesson 8

Materials	<p>Kit Items None</p> <p>School-Supplied Items None</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 Resource A: Blueberry Plant Illustrations  <input type="checkbox"/> Lesson 8 Resource B: Blueberry Plant Investigation Graph  <input type="checkbox"/> Lesson 8 Resource C: Blueberry Plant Investigation Photograph 
Preparation	None



Lesson 9

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Chenille stems, black (12) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck™ poster, Honey Bees (1) <input type="checkbox"/> Magnifiers, handheld, plastic (24) <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Equity sticks (class set) <input type="checkbox"/> Flowers, fresh, with visible pollen (12) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 11 requires the handheld magnifiers.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 9 Resource A: Bee on Blueberry Flowers Photograph  <input type="checkbox"/> Lesson 9 Resource B: Pollinators Illustration  <input type="checkbox"/> Lesson 9 Resource C: Pollen Grains Photograph 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Cue bumble bee flying to multiple flowers video (http://phdsci.link/1642).  <input type="checkbox"/> Prepare a dark-colored chenille stem for each student pair by bending one end of the stem into a small loop.





Lesson 10

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck cards, Fireweed Pollination (24) <input type="checkbox"/> Knowledge Deck poster, Fireweed Pollination (1) <p>School-Supplied Items</p> <p>None</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 10 Resource: Fireweed Seeds Photograph 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Cue honey bee on a flower slow-motion video (http://phdsci.link/1643). 






Lesson 11

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Gloves, disposable (24 pairs) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knife (1) <input type="checkbox"/> Magnifiers, handheld, plastic (24) <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <input type="checkbox"/> Sentence strips (4) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Blueberries, fresh (12) <input type="checkbox"/> Paper towels (24 sheets) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 19 requires the handheld magnifiers.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 11 Resource A: Ripening Blueberries Photograph  <input type="checkbox"/> Lesson 11 Resource B: Magnified Blueberries Photograph (optional) 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Slice enough fresh blueberries for every student to receive one half. Ensure that seeds are visible in each half.





Lesson 12

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck poster, Saguaro and Bat Interaction (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Glue sticks (24) <input type="checkbox"/> Scissors, blunt tip (24) <input type="checkbox"/> Writing implements, yellow (24) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 24 requires the Saguaro and Bat Interaction Knowledge Deck poster.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 12 Resource A: Saguaro Flower Photographs  <input type="checkbox"/> Lesson 12 Resource B: Pollination Model Cutouts  <input type="checkbox"/> Lesson 12 Resource C: Conceptual Checkpoint 
<p>Preparation</p> 	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute a copy of Lesson 12 Resources B and C to each student. <p>Advance Preparation for Lesson 19</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 to 7 Days Before: Purchase fresh huckleberries. If huckleberries are not available, use fresh blueberries.



Lesson 13

<p>Materials</p>	<p>Kit Items</p> <p>None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strip (1) <p>School-Supplied Items</p> <p>None</p>
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 Resource A: Blueberry Plant Illustrations  <input type="checkbox"/> Lesson 13 Resource A: <i>Tiger Lilies and Butterfly</i>  <input type="checkbox"/> Lesson 13 Resource B: Juniper Tree Photograph  <input type="checkbox"/> Lesson 13 Resource C: Juniper Pollen Cones Photograph  <input type="checkbox"/> Lesson 13 Resource D: Juniper Pollen Photograph 
<p>Preparation</p>	<p>None</p>



Lesson 14

<p>Materials</p>	<p>Kit Items None</p> <p>School-Supplied Items None</p>
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource A: Engineering Challenge Rubric <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual  <input type="checkbox"/> Lesson 14 Resource C: Map of Ash Spread from 1980 Eruption of Mount St. Helens  <input type="checkbox"/> Lesson 14 Resource D: Plants Grown in Washington State Illustration  <input type="checkbox"/> Lesson 14 Resource E: Pollinator Photographs  <input type="checkbox"/> <i>The Crayon Man: The True Story of the Invention of Crayola Crayons</i> (Biebow and Salerno 2019) <input type="checkbox"/> <i>Volcano: The Eruption and Healing of Mount St. Helens</i> (Lauber 1993)
<p>Preparation</p>	<p>None</p>



Lesson 15

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Baking soda (4 tsp) <input type="checkbox"/> Chenille stems, black (2) <input type="checkbox"/> Coffee stirrers, wooden (8) <input type="checkbox"/> Filter, coffee (1) <input type="checkbox"/> Graduated cylinders, 10 mL (4) <input type="checkbox"/> Hook and loop fastener (8") <input type="checkbox"/> Pom-poms (8) <input type="checkbox"/> Sticks, cake pop (8) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Felt (1 sheet) <input type="checkbox"/> Foam blocks (8) <input type="checkbox"/> Jars without lids, clear plastic, 4 oz (4) <input type="checkbox"/> Jar lids, clear plastic, 4 oz (8) <input type="checkbox"/> Rulers, metric (24) <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <p>Module 2 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Craft sticks, jumbo (8) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Construction paper, black, 9" × 12" (10 sheets) <input type="checkbox"/> Scissors (1) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 requires the coffee stirrers, craft sticks, foam blocks, coffee filter, graduated cylinders, jars, cake pop sticks, and prepared black construction paper squares.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource A: Engineering Challenge Rubric <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual  <input type="checkbox"/> Lesson 15 Resource A: Materials Testing Stations Setup Instructions and Procedure <input type="checkbox"/> Lesson 15 Resource B: Pollen Transfer Key <input type="checkbox"/> Lesson 15 Resource C: Pollen-Collecting Materials Test Sample Results <input type="checkbox"/> Lesson 15 Resource D: Flower Photographs 
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare a materials testing station for each group. (See Lesson 15 Resource A.)


Lesson 16

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Baking soda (4 tsp) <input type="checkbox"/> Chenille stems, black (16) <input type="checkbox"/> Coffee stirrers, wooden (25) <input type="checkbox"/> Filters, coffee (16) <input type="checkbox"/> Graduated cylinders, 10 mL (8) <input type="checkbox"/> Hook and loop fastener (16") <input type="checkbox"/> Pom-poms (32) <input type="checkbox"/> Sticks, cake pop (25) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Foam blocks (16) <input type="checkbox"/> Jars, clear plastic, 4 oz (8) <input type="checkbox"/> Rulers, metric (8) <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <p>Module 2 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Craft sticks, jumbo (25) <input type="checkbox"/> Felt, 8" × 12" (8 sheets) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bags or boxes (8, optional) <input type="checkbox"/> Construction paper, black, 9" × 12" (8 sheets) <input type="checkbox"/> Scissors, blunt tip (8) <input type="checkbox"/> Tape (8 rolls) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Black construction paper squares from Lesson 15 (24) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 17 requires the prepared Engineering Challenge materials and pollination tool tests.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource A: Engineering Challenge Rubric <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual  <input type="checkbox"/> Lesson 15 Resource B: Pollen Transfer Key <input type="checkbox"/> Lesson 16 Resource: Pollination Tool Test Setup Photograph 
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare for pollination tool tests. Take 4 jars and 4 graduated cylinders, and add $\frac{1}{2}$ tsp of baking soda to each. Gather additional materials for pollination tool tests. <input type="checkbox"/> Note: If necessary, reuse 2" × 2" black construction paper squares and 9" × 12" black construction paper sheets from the materials testing stations in Lesson 15.



Lesson 17

<p>Materials</p>	<p>Kit Items None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <p>School-Supplied Items None</p> <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Engineering Challenge materials from Lesson 16 <input type="checkbox"/> Engineering Challenge pollination tool tests from Lesson 16 <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 18 requires the pollination tools created by students.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource A: Engineering Challenge Rubric <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual  <input type="checkbox"/> Lesson 15 Resource B: Pollen Transfer Key <input type="checkbox"/> Lesson 17 Resource: Engineer Profile: Eijio Miyako 
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare for pollination tool tests. Take 4 jars and 4 graduated cylinders, and add $\frac{1}{2}$ tsp of baking soda to each. Gather additional materials for pollination tool tests. <input type="checkbox"/> Note: If necessary, reuse 2" × 2" black construction paper squares and 9" × 12" black construction paper sheets from the materials testing stations in Lesson 15.



Lesson 18

<p>Materials</p>	<p>Kit Items None</p> <p>School-Supplied Items None</p> <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pollination tools from Lesson 17 (8)
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource A: Engineering Challenge Rubric <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual 
<p>Preparation</p>	<p>None</p>

Lesson 19

Materials	<p>Kit Items None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Magnifiers, handheld, plastic (24) <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Huckleberries or blueberries, fresh (12) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 22 requires the handheld magnifiers.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 19 Resource A: Huckleberry Plant Photograph  <input type="checkbox"/> Lesson 19 Resource B: Coyote Droppings Photograph  <input type="checkbox"/> <i>Volcano: The Eruption and Healing of Mount St. Helens</i> (Lauber 1993)
Preparation	None




Lesson 20

Materials	<p>Kit Items None</p> <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Scissors (1)
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 20 Resource A: Coyote Movement Map  <input type="checkbox"/> Lesson 20 Resource B: Coyote Dropping and Huckleberry Plant Data  <input type="checkbox"/> Lesson 20 Resource C: Huckleberry Seed Movement Cards <input type="checkbox"/> Lesson 20 Resource D: Huckleberry Seed Movement Display Cards <input type="checkbox"/> <i>Volcano: The Eruption and Healing of Mount St. Helens</i> (Lauber 1993)
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare huckleberry seed movement cards. (See Lesson 20 Resource C.) <input type="checkbox"/> Prepare huckleberry seed movement display cards. (See Lesson 20 Resource D.)


Lesson 21

Materials	<p>Kit Items None</p> <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Markers, dark-colored (24) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll)
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 21 Resource A: Class Model Cards <input type="checkbox"/> Lesson 21 Resource B: Food Chain Cards <input type="checkbox"/> <i>Volcano: The Eruption and Healing of Mount St. Helens</i> (Lauber 1993)
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare class model cards. (See Lesson 21 Resource A.) <input type="checkbox"/> Prepare food chain cards. (See Lesson 21 Resource B.)



Lesson 22

Materials	<p>Kit Items None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Magnifiers, handheld, plastic (24) <p>School-Supplied Items None</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 19 Resource A: Huckleberry Plant Photograph  <input type="checkbox"/> Lesson 22 Resource A: Cocklebur Plant Photograph  <input type="checkbox"/> Lesson 22 Resource B: Huckleberry and Bur Cards
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare huckleberry and bur cards. (See Lesson 22 Resource B.) <input type="checkbox"/> Cue mule deer video (http://phdsci.link/1674). 


Lesson 23

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck poster, Fireweed Pollination (1, optional) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Magnifiers, handheld, plastic (24) <input type="checkbox"/> Sentence strips (5) <p>School-Supplied Items</p> <p>None</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> <i>Seeds Move!</i> (Page 2019)
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Cue mule deer video (http://phdsci.link/1674). 

Lesson 24

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck cards, Saguaro and Bat Interaction (24) <input type="checkbox"/> Knowledge Deck poster, Saguaro and Bat Interaction (1) <p>School-Supplied Items</p> <p>None</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 24 Resource A: Seed Travel Models <input type="checkbox"/> Lesson 24 Resource B: Conceptual Checkpoint  <input type="checkbox"/> Lesson 24 Resource C: Sonoran Desert Plant Photographs 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute copies of Lesson 24 Resources A and B to each student.


Lesson 25

Materials	<p>Kit Items</p> <p>None</p> <p>School-Supplied Items</p> <p>None</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 25 Resource: Kinds of Plants Around Mount St. Helens Graph  <input type="checkbox"/> <i>Volcano: The Eruption and Healing of Mount St. Helens</i> (Lauber 1993)
Preparation	<p>None</p>


Lesson 26

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Meter stick (1) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Rulers (6) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Graph chart paper (9 sheets) <input type="checkbox"/> Scissors (1) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Investigation plants and materials from Lesson 5 (8 sets) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 27 requires the investigation plants and materials.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 26 Resource A: Sample Plant Investigation Data <input type="checkbox"/> Lesson 26 Resource B: Bar Graph Template Preparation Procedure
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare one bar graph template for each group and one for demonstration. (See Lesson 26 Resource B.)




Lesson 27

Materials	<p>Kit Items</p> <p>None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strip (1) <p>School-Supplied Items</p> <p>None</p> <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Investigation plants and materials from Lesson 26 (8 sets)
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 27 Resource: Plants Grown Under Ideal Conditions Cards
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute a color copy of either the fava bean plant or radish plant card to each group. (See Lesson 27 Resource.) <input type="checkbox"/> Cue “Mount St. Helens: Plant Recovery” video (http://phdsci.link/1697). 



Lesson 28

Materials	<p>Kit Items None</p> <p>School-Supplied Items <input type="checkbox"/> Scissors (1)</p>
Resources	<p><input type="checkbox"/> Lesson 3 Resource B: Before and After Plant Photographs </p> <p><input type="checkbox"/> Lesson 28 Resource: Key Term Cards</p>
Preparation	<p><input type="checkbox"/> Prepare key term cards. (See Lesson 28 Resource.)</p>

Lesson 29

Materials	<p>Kit Items None</p> <p>School-Supplied Items None</p>
Resources	<p><input type="checkbox"/> Lesson 29 Resource A: Yellowstone National Park Photograph </p> <p><input type="checkbox"/> Lesson 29 Resource B: Geyser Willow Photograph </p>
Preparation	<p><input type="checkbox"/> Cue “Mount St. Helens: A Natural Experiment” video (http://phdsci.link/2460). </p> <p><input type="checkbox"/> Prepare to distribute End-of-Module Assessment to each student.</p>

Lesson 30

Materials	<p>Kit Items None</p> <p>School-Supplied Items <input type="checkbox"/> Scissors (1)</p>
Resources	<p><input type="checkbox"/> Lesson 29 Resource A: Yellowstone National Park Photograph </p> <p><input type="checkbox"/> Lesson 29 Resource B: Geyser Willow Photograph </p> <p><input type="checkbox"/> Lesson 30 Resource: Recurring Themes and Concepts Cards</p>
Preparation	<p><input type="checkbox"/> Score End-of-Module Assessment and write individual feedback.</p> <p><input type="checkbox"/> Select at least one End-of-Module Assessment item for the class to debrief, and prepare a sample response for that item to share with students.</p> <p><input type="checkbox"/> Prepare Recurring Themes and Concepts cards. (See Lesson 30 Resource.)</p> <p><input type="checkbox"/> Select student work products that show evidence of three-dimensional learning, and display them in different areas of the classroom. Student work products may include the anchor model, other class charts, selected Science Logbook pages, and Engineering Challenge designs.</p>




Living Things and Their Environments | Advance Preparation

An activity in this module requires advance preparation. A version of this list appears in the Module Overview of the Teacher Edition. The expanded version in this guide identifies all lessons for which preparation may take longer than a planning period. A symbol (†) identifies preparation that can be done earlier than the suggested time.






Lesson	Time in Advance	Investigation	Description
7	1 Day†	Leafcutting Ant Station	Collect 80 leaves. Ensure that the leaves are safe for students to handle.

Living Things and Their Environments | Lesson Preparation





Lesson 1

Materials	<p>Kit Items None</p> <p>Module 1 Kit <input type="checkbox"/> Rulers (24)</p> <p>School-Supplied Items None</p> <p>Item Reuse <input type="checkbox"/> Lesson 2 requires the class comparison chart.</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 1 Resource A: Longleaf Pine Forest and Cypress Slough Photographs  <input type="checkbox"/> Lesson 1 Resource B: Big Thicket National Preserve Maps  <input type="checkbox"/> Lesson 1 Resource C: Big Thicket Weather Data 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Obtain a photograph that shows the landscape of a local area, approximately 30 miles from the school. If a photograph is not available, access Google Maps™ mapping service (http://phdsci.link/1310). Click on the Search button, and enter the area's name in the top left Search box. Then zoom in on a road by the area to enter Street View. Alternatively, click the 3D button in the bottom right corner, and use the zoom and tilt controls to customize the view until the landscape is visible. <input type="checkbox"/> Print enough copies of the Big Thicket weather data for each student pair to receive a copy of either the temperature data or precipitation data. Half of the pairs should receive temperature data, and the other half should receive precipitation data. (See Lesson 1 Resource C.)



Lesson 2

Materials	<p>Kit Items None</p> <p>Module 1 Kit <input type="checkbox"/> Sentence strips (4)</p> <p>School-Supplied Items <input type="checkbox"/> Pocket chart (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll)</p> <p>Prepared Items from Previous Lessons <input type="checkbox"/> Class comparison chart from Lesson 1</p>
Resources	<p><input type="checkbox"/> Lesson 2 Resource A: Big Thicket Floodplain Map </p> <p><input type="checkbox"/> Lesson 2 Resource B: Big Thicket Diagram </p> <p><input type="checkbox"/> Lesson 2 Resource C: Elevation Diagram Cards</p> <p><input type="checkbox"/> Lesson 2 Resource D: Big Thicket National Preserve Animal Photographs </p>
Preparation	<p><input type="checkbox"/> Cue longleaf pine forest video (http://phdsci.link/2515)  and cypress slough video (http://phdsci.link/2516) </p> <p><input type="checkbox"/> Prepare elevation diagram cards. (See Lesson 2 Resource C.)</p>





Lesson 3

Materials	<p>Kit Items None</p> <p>School-Supplied Items <input type="checkbox"/> Computers or tablets with internet access (6)</p> <p>Item Reuse <input type="checkbox"/> Lesson 4 requires the computers or tablets.</p>
Resources	<p><input type="checkbox"/> Lesson 2 Resource D: Big Thicket National Preserve Animal Photographs </p> <p><input type="checkbox"/> Lesson 3 Resource: Bird Photographs </p>
Preparation	<p><input type="checkbox"/> Prepare three Great Blue Heron Stations and three Red-Cockaded Woodpecker Stations. Prepare three color copies of each bird photograph. (See Lesson 3 Resource.) Place one computer or tablet and one bird photograph (heron or woodpecker) at each station. Cue either the great blue heron video (http://phdsci.link/2544) or the red-cockaded woodpecker video (http://phdsci.link/2545) at the corresponding stations. Ensure that the photograph and the video at each station are for the same kind of bird.</p> <p><input type="checkbox"/> Cue great blue heron video (http://phdsci.link/2544) </p> <p><input type="checkbox"/> Cue red-cockaded woodpecker video (http://phdsci.link/2545) </p>



Lesson 4

Materials	<p>Kit Items None</p> <p>Module 1 Kit <input type="checkbox"/> Sentence strips (2)</p> <p>School-Supplied Items <input type="checkbox"/> Computers or tablets with internet access (6) <input type="checkbox"/> Scissors (1)</p> <p>Item Reuse <input type="checkbox"/> Lesson 6 requires the computers or tablets.</p>
Resources	<p><input type="checkbox"/> Lesson 2 Resource D: Big Thicket National Preserve Animal Photographs </p> <p><input type="checkbox"/> Lesson 4 Resource A: Animal Stations Setup Instructions</p> <p><input type="checkbox"/> Lesson 4 Resource B: Animal Stations Procedure Sheets and Photographs</p>
Preparation	<p><input type="checkbox"/> Cue great blue heron video (http://phdsci.link/2544). </p> <p><input type="checkbox"/> Set up animal stations. (See Lesson 4 Resource A.)</p>


Lesson 5

Materials	<p>Kit Items None</p> <p>School-Supplied Items <input type="checkbox"/> Glue sticks (24) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll)</p> <p>Item Reuse <input type="checkbox"/> Lesson 6 requires the class bullfrog life cycle model.</p>
Resources	<p><input type="checkbox"/> Lesson 2 Resource D: Big Thicket National Preserve Animal Photographs </p> <p><input type="checkbox"/> Lesson 5 Resource A: American Bullfrog Photographs </p> <p><input type="checkbox"/> Lesson 5 Resource B: American Bullfrog Life Cycle Cards</p> <p><input type="checkbox"/> Lesson 5 Resource C: Gulf Fritillary Caterpillar and Butterfly Photographs </p> <p><input type="checkbox"/> Lesson 5 Resource D: Gulf Fritillary Butterfly Life Cycle Cards</p> <p><input type="checkbox"/> Lesson 5 Resource E: Butterfly Life Cycle Article Adaptation </p> <p><input type="checkbox"/> Lesson 5 Resource F: Butterfly Life Cycle Cards</p>
Preparation	<p><input type="checkbox"/> Prepare American bullfrog life cycle cards. (See Lesson 5 Resource B.)</p> <p><input type="checkbox"/> Prepare gulf fritillary butterfly life cycle cards. (See Lesson 5 Resource D.)</p> <p><input type="checkbox"/> Prepare butterfly life cycle cards. (See Lesson 5 Resource F.)</p>


Lesson 6

<p>Materials</p>	<p>Kit Items None</p> <p>Module 1 Kit <input type="checkbox"/> Sentence strips (3)</p> <p>School-Supplied Items <input type="checkbox"/> Computers or tablets with internet access (6) <input type="checkbox"/> Scissors (1)</p> <p>Prepared Items from Previous Lessons <input type="checkbox"/> Class bullfrog life cycle model from Lesson 5</p>
<p>Resources</p>	<p><input type="checkbox"/> Lesson 2 Resource D: Big Thicket National Preserve Animal Photographs </p> <p><input type="checkbox"/> Lesson 6 Resource A: Life Cycle Needs Stations Setup Instructions</p> <p><input type="checkbox"/> Lesson 6 Resource B: Life Cycle Needs Stations Procedure Sheets and Animal Information Cards</p>
<p>Preparation</p> 	<p><input type="checkbox"/> Prepare life cycle needs stations. (See Lesson 6 Resources A and B.)</p> <p>Advance Preparation for Lesson 7</p> <p><input type="checkbox"/> 1 Day Before: Collect 80 leaves. Ensure that the leaves are safe for students to handle. If leaves are not available, cut 80 leaf shapes from green construction paper.</p>




Lesson 7

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Clay, modeling, nonhardening ($\frac{1}{2}$ lb) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <p>Module 2 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Manila folders (2) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Desks (2) <input type="checkbox"/> Leaves (80) <input type="checkbox"/> Scissors (1) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 requires the group behavior class chart.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 7 Resource A: Big Thicket Animal Group Photographs  <input type="checkbox"/> Lesson 7 Resource B: Group Behavior Stations Setup Instructions <input type="checkbox"/> Lesson 7 Resource C: Group Behavior Stations Procedure Sheets
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Set up group behavior stations. (See Lesson 7 Resources A, B, and C.)


Lesson 8

Materials	<p>Kit Items</p> <p>None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strip (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Scissors (1) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Group behavior class chart from Lesson 7
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 2 Resource D: Big Thicket National Preserve Animal Photographs  <input type="checkbox"/> Lesson 8 Resource: Group Behavior Cards <input type="checkbox"/> <i>PACKS: Strength in Numbers</i> (Salyer 2020)
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare group behavior cards. (See Lesson 8 Resource.)

Lesson 9

Materials	Kit Items None School-Supplied Items <input type="checkbox"/> Scissors (1)
Resources	<input type="checkbox"/> Lesson 9 Resource A: Term Cards <input type="checkbox"/> Lesson 9 Resource B: Great Smoky Mountains National Park Map  <input type="checkbox"/> Lesson 9 Resource C: Great Smoky Mountains National Park Environment Photographs  <input type="checkbox"/> Lesson 9 Resource D: Data Tables <input type="checkbox"/> Lesson 9 Resource E: Great Smoky Mountains National Park Animal Information Cards <input type="checkbox"/> End-of-Spotlight Assessment Rubric
Preparation	<input type="checkbox"/> Prepare term cards. (See Lesson 9 Resource A.) <input type="checkbox"/> Cue Great Smoky Mountains National Park aerial video (http://phdsci.link/2567).  <input type="checkbox"/> Prepare to distribute a copy of Lesson 9 Resource D to each student. <input type="checkbox"/> Prepare Great Smoky Mountains National Park animal information cards. (See Lesson 9 Resource E.) <input type="checkbox"/> Prepare to distribute End-of-Spotlight Assessment to each student.

Lesson 10

Materials	Kit Items None School-Supplied Items <input type="checkbox"/> Scissors (1)
Resources	<input type="checkbox"/> Lesson 9 Resource C: Great Smoky Mountains National Park Environment Photographs  <input type="checkbox"/> Lesson 10 Resource: Recurring Themes and Concepts Cards
Preparation	<input type="checkbox"/> Cue Great Smoky Mountains National Park aerial video (http://phdsci.link/2567). <input type="checkbox"/> Score End-of-Spotlight Assessment and write individual feedback. <input type="checkbox"/> Select at least one End-of-Spotlight Assessment item for the class to debrief, and prepare a sample response for that item to share with students. <input type="checkbox"/> Prepare Recurring Themes and Concepts cards. (See Lesson 10 Resource.)

Plants | Works Cited

Biebow, Natascha, and Steven Salerno (illustrator). 2019. *The Crayon Man: The True Story of the Invention of Crayola Crayons*. Boston: Houghton Mifflin Harcourt. [All references to *The Crayon Man* are from this source.]

Lauber, Patricia. 1993. *Volcano: The Eruption and Healing of Mount St. Helens*. New York: Simon & Schuster Books for Young Readers. [All references to *Volcano* are from this source.]

Page, Robin. 2019. *Seeds Move!* New York: Beach Lane Books. [All references to *Seeds Move!* are from this source.]

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Salyer, Hannah. 2020. *PACKS: Strength in Numbers*. Boston: Houghton Mifflin Harcourt. [All references to *PACKS* are from this source.]