




# Preparation Guide


## Level 1 Module 3

### SURVIVAL

#### with Spotlight Lessons on Earth Materials

**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.




## Survival | Advance Preparation

Several activities in this module require advance preparation. See the lesson resources for more details on material preparation and instructions. 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
4	1 day <sup>†</sup>	Preparing the Crayfish Tank	Prepare crayfish and tanks. Temporarily remove the aquarium shelter from each tank before introducing crayfish to students for observation.
4	10 days <sup>†</sup>	Classroom Crayfish	Order crayfish. Note that some states require permits or have additional restrictions that may prolong ordering times.
8	8 days	Radish Plant Observation	Prepare radish plants in Cup A and Cup B. (See Lesson 8 Resource A.)
8	1 day	Radish Plant Observation	Cut plant roots in Cup B. (See Lesson 8 Resource A.)
8	1 day <sup>†</sup>	Plant Model Investigation	Prepare plant models. (See Lesson 8 Resource B.)
20	5 days	Light Investigation	Prepare radish plants and two boxes with an opening on top for light investigation. (See Lesson 20 Resource B.)

# Survival | Lesson Preparation



## Lesson 1

<p><b>Materials</b></p>	<p><b>Kit Items</b> None</p> <p><b>School-Supplied Items</b> None</p>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 1 Resource A: Pond Environment Photograph </li> <li><input type="checkbox"/> Lesson 1 Resource B: Environment Painting </li> <li><input type="checkbox"/> <i>Over and Under the Pond</i> (Messner and Neal 2017)</li> </ul>
<p><b>Preparation</b></p> 	<ul style="list-style-type: none"> <li><input type="checkbox"/> Identify a large, open outdoor area (e.g., sports field, school lawn) to take students to during the Lesson 1 Launch.</li> </ul> <p><b>Advance Preparation for Lesson 4</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>10 Days Before:</b> Order crayfish. (See Lesson 4 Resource A.) Note that some states require permits or have additional restrictions that may prolong ordering times.</li> </ul> <p><b>Advance Preparation for Lesson 8</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>8 Days Before:</b> Prepare radish plants in Cup A and Cup B. (See Lesson 8 Resource A.)</li> </ul>

## Lesson 2

<p><b>Materials</b></p>	<p><b>Kit Items</b> None</p> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sentence strips (2)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Glue stick (1)</li> <li><input type="checkbox"/> Pocket chart (1)</li> <li><input type="checkbox"/> Scissors (1)</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 2 Resource A: Class Living Things Chart Setup Instructions</li> <li><input type="checkbox"/> Lesson 2 Resource B: Body Part Cards</li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare class living things chart. (See Lesson 2 Resource A.)</li> <li><input type="checkbox"/> Prepare body part cards. (See Lesson 2 Resource B.)</li> </ul>



## Lesson 3

<b>Materials</b>	<p><b>Kit Items</b> None</p> <p><b>School-Supplied Items</b> None</p>
<b>Resources</b>	<input type="checkbox"/> Lesson 3 Resource: Leaf Drawing 
<b>Preparation</b> 	<p>None</p> <p><b>Advance Preparation for Lesson 4</b></p> <p><input type="checkbox"/> <b>1 Day Before:</b> Prepare crayfish and tanks. (See Lesson 4 Resource A.) Temporarily remove the aquarium shelter from each tank before introducing crayfish to students for observation.</p>



## Lesson 4

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Plastic eggs (2)</li> <li><input type="checkbox"/> Sequin ribbon (2 ft)</li> <li><input type="checkbox"/> Toothpicks, pointed (100)</li> </ul> <p><b>Crayfish Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Airline tubing (8 ft)</li> <li><input type="checkbox"/> Air pumps (2)</li> <li><input type="checkbox"/> Antisiphon valves (2)</li> <li><input type="checkbox"/> Aquarium shelters (2)</li> <li><input type="checkbox"/> Bacteria starter (4 oz)</li> <li><input type="checkbox"/> Crayfish, small, live (2)</li> <li><input type="checkbox"/> Fish food tablets (1.69 oz)</li> <li><input type="checkbox"/> Fish net (1)</li> <li><input type="checkbox"/> Gravel (5 lb)</li> <li><input type="checkbox"/> Gravel vacuum (1)</li> <li><input type="checkbox"/> Pipette, disposable (1, optional)</li> <li><input type="checkbox"/> Scrubbing pad (1)</li> <li><input type="checkbox"/> Sponge filters (2)</li> <li><input type="checkbox"/> Tanks, plastic, 3–4 gal (2)</li> <li><input type="checkbox"/> Thermometers, adhesive (2)</li> <li><input type="checkbox"/> Water conditioner (4 oz)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> <li><input type="checkbox"/> Sentence strip (1)</li> </ul>
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## Lesson 4 *continued*

<b>Materials</b>	<p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bucket, plastic, 10 qt (1)</li> <li><input type="checkbox"/> Clay, modeling, nonhardening (1 lb)</li> <li><input type="checkbox"/> Measuring cup, 1 L (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Computers or tablets with internet access (2)</li> <li><input type="checkbox"/> Pencil, sharpened (1)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Tape (partial roll)</li> <li><input type="checkbox"/> Water (access)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 5 requires the Quills, Shell, and Scales Station models.</li> <li><input type="checkbox"/> Lesson 6 requires the prepared crayfish tanks.</li> <li><input type="checkbox"/> Lesson 7 requires 1 fish food tablet.</li> <li><input type="checkbox"/> Lesson 16 requires the computers or tablets with internet access.</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 4 Resource A: Using Crayfish in the Classroom</li> <li><input type="checkbox"/> Lesson 4 Resource B: Animal Body Part Stations Setup Instructions</li> <li><input type="checkbox"/> Lesson 4 Resource C: Animal Body Part Stations Procedure Sheets and Photographs </li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Cue heron video (<a href="http://phdsci.link/1456">http://phdsci.link/1456</a>), minnow video (<a href="http://phdsci.link/1457">http://phdsci.link/1457</a>), and porcupine video (<a href="http://phdsci.link/1458">http://phdsci.link/1458</a>). </li> <li><input type="checkbox"/> (Optional) Cue crayfish video (<a href="http://phdsci.link/1507">http://phdsci.link/1507</a>).</li> </ul>


## Lesson 5

<b>Materials</b>	<p><b>Kit Items</b></p> <p>None</p> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pencils (24)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Quills, Shell, and Scales Station models from Lesson 4 (6)</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 4 Resource C: Animal Body Part Stations Procedure Sheets and Photographs </li> <li><input type="checkbox"/> Lesson 5 Resource: Painted Turtle Photograph </li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use materials from the Quills, Shell, and Scales Station to set up the protective animal body part stations before Lesson 5. Each model in the Quills, Shell, and Scales Station will form one of the protective animal body part stations: Porcupine Quills Station, Mussel Shell Station, and Minnow Scales Station. For most class sizes, set up two of each station.</li> </ul>

## Lesson 6



<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Knowledge Deck™ cards, Crayfish Body Parts (24)</li> <li><input type="checkbox"/> Knowledge Deck poster, Crayfish Body Parts (1)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sentence strip (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pencils (24)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Crayfish tanks from Lesson 4 (2)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 7 requires 1 prepared crayfish tank.</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 6 Resource: Porcupine Puzzle</li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare porcupine puzzles. (See Lesson 6 Resource.)</li> </ul>

## Lesson 7




<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Fish food tablet (1)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sticky note arrows (24)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Tape (partial roll)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Crayfish tank from Lesson 4 (1)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 18 requires 1 prepared crayfish tank.</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 7 Resource A: Feeding Relationship Stations Procedure Sheet and Photographs </li> <li><input type="checkbox"/> Lesson 7 Resource B: Pond Food Chain Cards</li> <li><input type="checkbox"/> Lesson 7 Resource C: Extension: Field and Forest Food Chain Cards</li> <li><input type="checkbox"/> Lesson 7 Resource D: Barnum Pond Food Chain Cards</li> <li><input type="checkbox"/> <i>Over and Under the Pond</i> (Messner and Neal 2017)</li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Set up feeding relationship stations. (See Lesson 7 Resource A.)</li> <li><input type="checkbox"/> Prepare one set of pond food chain cards. (See Lesson 7 Resource B.)</li> <li><input type="checkbox"/> Prepare to distribute Barnum Pond food chain cards. (See Lesson 7 Resource D.)</li> </ul> <p><b>Advance Preparation for Lesson 8</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>1 Day Before:</b> Cut plant roots in Cup B. (See Lesson 8 Resource A.)</li> <li><input type="checkbox"/> <b>1 Day Before:</b> Prepare plant models. (See Lesson 8 Resource B.)</li> </ul>



## Lesson 8






<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cups, plastic, 9 oz (3)</li> <li><input type="checkbox"/> Food coloring, blue (1 oz)</li> <li><input type="checkbox"/> Gravel (2 cups)</li> <li><input type="checkbox"/> Grow lamp, two-headed (1)</li> <li><input type="checkbox"/> Pipettes, disposable (6)</li> <li><input type="checkbox"/> Plate, paper, large (1)</li> <li><input type="checkbox"/> Radish seed packet (<math>\frac{1}{2}</math>)</li> <li><input type="checkbox"/> Straws, clear, 1 cm diameter (3)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ruler, metric (1)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cups, clear plastic, 3.5 oz (18)</li> <li><input type="checkbox"/> Flashlights with batteries (6)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Paper towels, white, absorbent (6 sheets)</li> <li><input type="checkbox"/> Potting soil (2 cups)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Water (access)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 20 requires the two-headed grow lamp and radish seed packet.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 8 Resource A: Radish Plant Preparation Instructions</li> <li><input type="checkbox"/> Lesson 8 Resource B: Plant Model Setup Instructions and Classroom Procedure</li> <li><input type="checkbox"/> Lesson 8 Resource C: Plant Model Template</li> <li><input type="checkbox"/> Lesson 8 Resource D: Plants in the Ground Photographs </li> <li><input type="checkbox"/> Lesson 8 Resource E: Cattail Plants Photograph </li> </ul>
<p><b>Preparation</b></p>	<p>None</p>

## Lesson 9





<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Acorns, artificial with seeds (5)</li> <li><input type="checkbox"/> Jars with lids, clear plastic, 8 oz (4)</li> <li><input type="checkbox"/> Nutcracker or pliers (1)</li> <li><input type="checkbox"/> Wood pieces with bark (4)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sentence strips (2)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnifiers, plastic, handheld (12)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gloves, protective (1 pair for teacher, optional)</li> <li><input type="checkbox"/> Prickly stems (4)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Tape (partial roll)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 11 requires the handheld magnifiers.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 9 Resource A: Plant Body Part Photographs </li> <li><input type="checkbox"/> Lesson 9 Resource B: Acorn Demonstration Instructions</li> <li><input type="checkbox"/> Lesson 9 Resource C: Protective Plant Body Part Stations Setup Instructions</li> <li><input type="checkbox"/> Lesson 9 Resource D: Animal Body Part Photographs </li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Set up protective plant body part stations. (See Lesson 9 Resource C.)</li> <li><input type="checkbox"/> Cue moose eating water lilies video (<a href="http://phdsci.link/1455">http://phdsci.link/1455</a>). </li> </ul>







## Lesson 10

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Craft sticks, jumbo (24)</li> <li><input type="checkbox"/> Toothpicks, pointed (24)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Erasers, wedge, medium (24)</li> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sticky note arrows (24)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Crayons (24)</li> <li><input type="checkbox"/> Index cards (12, optional)</li> <li><input type="checkbox"/> Pencils, unsharpened (24)</li> <li><input type="checkbox"/> Scissors (1, optional)</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 10 Resource A: Yellowjacket Photographs </li> <li><input type="checkbox"/> Lesson 10 Resource B: Yellowjacket Body Parts Illustration </li> <li><input type="checkbox"/> Lesson 10 Resource C: Female Yellowjacket Photographs </li> <li><input type="checkbox"/> Lesson 10 Resource D: Conceptual Checkpoint </li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Cue yellowjacket video (<a href="http://phdsci.link/1459">http://phdsci.link/1459</a>). </li> <li><input type="checkbox"/> Prepare a set of stinger modeling materials for each student. If not using sticky note arrows, cut out arrow shapes from index cards.</li> <li><input type="checkbox"/> Prepare to distribute a copy of Lesson 10 Resource D to each student.</li> </ul>


## Lesson 11

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Brads (6)</li> <li><input type="checkbox"/> Hook and loop fastener (18 cm)</li> <li><input type="checkbox"/> Screws (6)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ruler, metric (1)</li> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnifiers, plastic, handheld (12)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Scissors (1)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 13 requires the hook and loop fastener.</li> <li><input type="checkbox"/> Lesson 23 requires the handheld magnifiers.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 11 Resource A: Da Vinci Drawing </li> <li><input type="checkbox"/> Lesson 11 Resource B: Red Kite Photograph </li> <li><input type="checkbox"/> Lesson 11 Resource C: Dog with Burr Photograph </li> <li><input type="checkbox"/> Lesson 11 Resource D: Burr Photograph </li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare to distribute a color copy of Lesson 11 Resource C to each group.</li> <li><input type="checkbox"/> Prepare to distribute a color copy of Lesson 11 Resource D to each group.</li> <li><input type="checkbox"/> Prepare a piece of hook and loop fastener for each group. Press both sides of the fastener together and then pull them apart. Repeat this several times so the hooks become more visible. Then cut the hook and loop fastener into 3-cm pieces.</li> </ul>


## Lesson 12

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carbon copy paper, 8.5" × 11" (1 sheet)</li> <li><input type="checkbox"/> Clipboard (1)</li> <li><input type="checkbox"/> Fork, plastic (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnet (1, optional)</li> <li><input type="checkbox"/> Paper, 11" × 17" or larger (6 sheets)</li> <li><input type="checkbox"/> Paper, printer, 8.5" × 11" (1 sheet)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 13 requires the prepared class problem and solution chart and protective body parts chart.</li> <li><input type="checkbox"/> Lesson 14 requires the clipboard and plastic fork.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 9 Resource A: Plant Body Part Photographs </li> <li><input type="checkbox"/> Lesson 12 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 12 Resource B: Engineering Design Process Visual </li> <li><input type="checkbox"/> Lesson 12 Resource C: Scientists at a Pond Photograph </li> <li><input type="checkbox"/> Lesson 12 Resource D: Dormant Bramble Plant Photograph </li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare to demonstrate the Engineering Challenge testing procedure. Place a sheet of carbon copy paper shiny side down on top of a sheet of printer paper. Clip the carbon copy paper and printer paper onto the clipboard. During the lesson, use the plastic fork to demonstrate the testing procedure.</li> </ul>



## Lesson 13

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aluminum foil (1 roll)</li> <li><input type="checkbox"/> Bags, resealable plastic, sandwich (24)</li> <li><input type="checkbox"/> Cardboard, thin, 8.5" × 11" (24 sheets)</li> <li><input type="checkbox"/> Cellophane (24 ft)</li> <li><input type="checkbox"/> Craft foam, 9" × 12" (24 sheets)</li> <li><input type="checkbox"/> Craft sticks, jumbo (60)</li> <li><input type="checkbox"/> Egg cartons, cardboard (12)</li> <li><input type="checkbox"/> Paper, wax (24 ft)</li> <li><input type="checkbox"/> Plates, paper, small (24)</li> <li><input type="checkbox"/> Sequins (600)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Chenille stems (90)</li> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Paper, tissue, 9" × 12" (24 sheets)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Glue sticks (6)</li> <li><input type="checkbox"/> Folders, manila (12)</li> <li><input type="checkbox"/> Magnet (1, optional)</li> <li><input type="checkbox"/> Paper clips (30)</li> <li><input type="checkbox"/> Paper, construction, 9" × 12" (30 sheets)</li> <li><input type="checkbox"/> Paper, printer, 8.5" × 11" (24 sheets)</li> <li><input type="checkbox"/> Scissors, blunt tip (6)</li> <li><input type="checkbox"/> Tape (6 rolls)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Hook and loop fastener from Lesson 11 (1)</li> <li><input type="checkbox"/> Class problem and solution chart started in Lesson 12</li> <li><input type="checkbox"/> Class protective body parts chart started in Lesson 12</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 14 requires the prepared class problem and solution chart and the prepared Engineering Challenge materials and building tools.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 12 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 12 Resource B: Engineering Design Process Visual </li> <li><input type="checkbox"/> Lesson 13 Resource: Protective Body Part Photographs</li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare materials for the Engineering Challenge and determine how students will retrieve them. Either line up all the materials by item on a counter or table for students to access when needed or gather each group's set of materials in a box or bag beforehand for easy distribution and cleanup.</li> <li><input type="checkbox"/> Prepare to distribute a color copy of Lesson 13 Resource to each group.</li> </ul>


## Lesson 14

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carbon copy paper, 8.5" × 11" (18 sheets)</li> <li><input type="checkbox"/> Clipboard (1)</li> <li><input type="checkbox"/> Forks, plastic (8)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnet (1, optional)</li> <li><input type="checkbox"/> Paper, printer, 8.5" × 11" (18 sheets)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Class problem and solution chart started in Lesson 12</li> <li><input type="checkbox"/> Engineering Challenge materials and building tools from Lesson 13 (6 sets)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 15 requires the clipboard, 2 of the plastic forks, and the prepared Engineering Challenge materials and building tools.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 12 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 12 Resource B: Engineering Design Process Visual </li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare materials for the Engineering Challenge and determine how students will retrieve them. Either line up all the materials by item on a counter or table for students to access when needed or gather each group's set of materials in a box or bag beforehand for easy distribution and cleanup.</li> <li><input type="checkbox"/> Prepare the Student Testing Station by placing a clipboard, a plastic fork, sheets of carbon copy paper, and sheets of printer paper at a designated table or desk.</li> </ul>



## Lesson 15

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carbon copy paper, 8.5" × 11" (12 sheets)</li> <li><input type="checkbox"/> Clipboard (1)</li> <li><input type="checkbox"/> Forks, plastic (2)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnet (1, optional)</li> <li><input type="checkbox"/> Paper, printer, 8.5" × 11" (12 sheets)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Engineering Challenge materials and building tools from Lesson 14 (6 sets)</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 12 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 12 Resource B: Engineering Design Process Visual </li> </ul>
<p><b>Preparation</b></p> 	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare materials for the Engineering Challenge and determine how students will retrieve them. Either line up all the materials by item on a counter or table for students to access when needed or gather each group's set of materials in a box or bag beforehand for easy distribution and cleanup.</li> <li><input type="checkbox"/> Prepare the Student Testing Station by placing a clipboard, a plastic fork, sheets of carbon copy paper, and sheets of printer paper at a designated table or desk.</li> </ul> <p><b>Advance Preparation for Lesson 20</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>5 Days Before:</b> Prepare radish plants and two cardboard boxes with an opening on top for the light investigation. (See Lesson 20 Resource B.)</li> </ul>


## Lesson 16

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <p>None</p> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnet (1, optional)</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 12 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 12 Resource B: Engineering Design Process Visual </li> </ul>
<p><b>Preparation</b></p>	<p>None</p>





## Lesson 17

<b>Materials</b>	<b>Kit Items</b> None  <b>Module 1 Kit</b> <input type="checkbox"/> Sentence strips (3)  <b>School-Supplied Items</b> <input type="checkbox"/> Computers or tablets with internet access (6)
<b>Resources</b>	None
<b>Preparation</b>	<input type="checkbox"/> Cue heron video ( <a href="http://phdsci.link/1460">http://phdsci.link/1460</a> ).  <input type="checkbox"/> Cue goldfish video ( <a href="http://phdsci.link/2537">http://phdsci.link/2537</a> ), monkey video ( <a href="http://phdsci.link/1765">http://phdsci.link/1765</a> ), and hippopotamus video ( <a href="http://phdsci.link/1463">http://phdsci.link/1463</a> ) for video stations. If possible, cue each video on two computers or tablets. 


## Lesson 18

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Knowledge Deck cards, Crayfish Sensing Body Parts (24) <input type="checkbox"/> Knowledge Deck poster, Crayfish Sensing Body Parts (1)  <b>School-Supplied Items</b> <input type="checkbox"/> Paper, printer, 8.5" x 11" (4 sheets) <input type="checkbox"/> Tape (partial roll)  <b>Prepared Items from Previous Lessons</b> <input type="checkbox"/> Crayfish tank from Lesson 4 (1)
<b>Resources</b>	None
<b>Preparation</b>	<input type="checkbox"/> Cue goldfish video ( <a href="http://phdsci.link/2537">http://phdsci.link/2537</a> ), monkey video ( <a href="http://phdsci.link/1765">http://phdsci.link/1765</a> ), and hippopotamus video ( <a href="http://phdsci.link/1463">http://phdsci.link/1463</a> ).  <input type="checkbox"/> (Optional) Cue crayfish video ( <a href="http://phdsci.link/1507">http://phdsci.link/1507</a> ). <input type="checkbox"/> (Optional) Cue crayfish sensing video ( <a href="http://phdsci.link/1508">http://phdsci.link/1508</a> ).

## Lesson 19




<b>Materials</b>	<p><b>Kit Items</b> None</p> <p><b>Module 1 Kit</b> <input type="checkbox"/> Sentence strip (1)</p> <p><b>School-Supplied Items</b> None</p>
<b>Resources</b>	<p><input type="checkbox"/> Lesson 19 Resource A: Vervet Monkey Photographs </p> <p><input type="checkbox"/> Lesson 19 Resource B: Predator Photographs </p> <p><input type="checkbox"/> Lesson 19 Resource C: Beaver Communication Photograph and Text </p>
<b>Preparation</b>	<p><input type="checkbox"/> Cue crossing guard video (<a href="http://phdsci.link/1464">http://phdsci.link/1464</a>), “Vervet Monkey’s Escape Plans” (BBC 2014) video (<a href="http://phdsci.link/1465">http://phdsci.link/1465</a>), and beaver video (<a href="http://phdsci.link/1466">http://phdsci.link/1466</a>). </p>

## Lesson 20






<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Boxes, cardboard, 8" × 8" × 8", unassembled (7)</li> <li><input type="checkbox"/> Cups, plastic, 9 oz (8)</li> <li><input type="checkbox"/> Grow lamp, two-headed (1)</li> <li><input type="checkbox"/> Radish seed packet (<math>\frac{1}{2}</math>)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Potting soil (9 cups)</li> <li><input type="checkbox"/> Tape (partial roll)</li> <li><input type="checkbox"/> Water (access)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 21 requires the prepared light investigation boxes with radish plants.</li> <li><input type="checkbox"/> Lesson 24 requires the prepared radish plants.</li> </ul>
<b>Resources</b>	<p><input type="checkbox"/> Lesson 20 Resource A: Plants Next to Window Photograph </p> <p><input type="checkbox"/> Lesson 20 Resource B: Light Investigation Preparation Instructions</p>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare a color copy of the photograph in Lesson 20 Resource A.</li> <li><input type="checkbox"/> Set up students’ cardboard boxes for the light investigation. Assemble a box for each group. Leave one side of each box open. Secure the closed sides with tape as necessary. If time permits and students are able, consider allowing the class to help assemble the boxes.</li> </ul>






## Lesson 21

<p><b>Materials</b></p>	<p><b>Kit Items</b> None</p> <p><b>Module 1 Kit</b> <input type="checkbox"/> Sentence strip (1)</p> <p><b>School-Supplied Items</b> <input type="checkbox"/> Water (access)</p> <p><b>Prepared Items from Previous Lessons</b> <input type="checkbox"/> Light investigation boxes with radish plants from Lesson 20 (7)</p> <p><b>Item Reuse</b> <input type="checkbox"/> Lesson 24 requires the prepared radish plants.</p>
<p><b>Resources</b></p>	<p><input type="checkbox"/> Lesson 21 Resource A: Plant Responses to Light Photographs </p> <p><input type="checkbox"/> Lesson 21 Resource B: Calla Lily Photograph </p>
<p><b>Preparation</b></p>	<p><input type="checkbox"/> Prepare a color copy of each photograph in Lesson 21 Resource A. During the lesson, post the photographs in different areas of the classroom.</p> <p><input type="checkbox"/> Cue mimosa plant video (<a href="http://phdsci.link/1468">http://phdsci.link/1468</a>). </p>



## Lesson 22

<p><b>Materials</b></p>	<p><b>Kit Items</b> None</p> <p><b>School-Supplied Items</b> <input type="checkbox"/> Glue stick (24) <input type="checkbox"/> Scissors (1)</p>
<p><b>Resources</b></p>	<p><input type="checkbox"/> Lesson 22 Resource A: Pika Photographs </p> <p><input type="checkbox"/> Lesson 22 Resource B: Moss Photographs </p> <p><input type="checkbox"/> Lesson 22 Resource C: Moss Diagram </p> <p><input type="checkbox"/> Lesson 22 Resource D: Conceptual Checkpoint </p> <p><input type="checkbox"/> Lesson 22 Resource E: Living Things Cards</p>
<p><b>Preparation</b></p>	<p><input type="checkbox"/> Cue pika video (<a href="http://phdsci.link/2546">http://phdsci.link/2546</a>). </p> <p><input type="checkbox"/> Prepare to distribute a copy of Lesson 22 Resource D to each student.</p> <p><input type="checkbox"/> Prepare living things cards. (See Lesson 22 Resource E.)</p>



## Lesson 23

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sheet protectors, clear, 8.5" x 11" (30)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnifiers, plastic, handheld (12)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Markers, dry erase (24)</li> <li><input type="checkbox"/> Paper towels (6 sheets)</li> <li><input type="checkbox"/> Scissors (1)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 24 requires the handheld magnifiers.</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 23 Resource A: Radish and Mimosa Plant Photographs </li> <li><input type="checkbox"/> Lesson 23 Resource B: Same Kind Cards </li> <li><input type="checkbox"/> Lesson 23 Resource C: Mystery Animal Photograph </li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare same kind cards. (See Lesson 23 Resource B.)</li> </ul>



## Lesson 24

<b>Materials</b>	<p><b>Kit Items</b></p> <p>None</p> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sentence strips (2)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnifiers, plastic, handheld (12)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Glue stick (1)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Tape (partial roll)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cups with radish plants from Lesson 20 (6)</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 24 Resource A: Mother Fox and Offspring Photograph </li> <li><input type="checkbox"/> Lesson 24 Resource B: Parent and Offspring Posters Setup Instructions </li> <li><input type="checkbox"/> Lesson 24 Resource C: Plant Parent Cards</li> <li><input type="checkbox"/> Lesson 24 Resource D: Plant Parent Photographs</li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare parent and offspring posters. (See Lesson 24 Resource B.)</li> <li><input type="checkbox"/> Prepare plant parent cards. (See Lesson 24 Resource C.)</li> <li><input type="checkbox"/> Identify three corners or areas of the classroom to use for a modified Question Corners routine. Prepare a color copy of each photograph in Lesson 24 Resource D. Post one photograph in each corner.</li> </ul>



## Lesson 25

<p><b>Materials</b></p>	<p><b>Kit Items</b> None</p> <p><b>Module 1 Kit</b> <input type="checkbox"/> Sentence strip (1)</p> <p><b>School-Supplied Items</b> <input type="checkbox"/> Glue sticks (24) <input type="checkbox"/> Scissors (1)</p>
<p><b>Resources</b></p>	<p><input type="checkbox"/> Lesson 25 Resource A: Offspring Photograph </p> <p><input type="checkbox"/> Lesson 25 Resource B: Osprey Sequence Cards</p> <p><input type="checkbox"/> Lesson 25 Resource C: Pond Animal Life Cycle Models </p> <p><input type="checkbox"/> Lesson 25 Resource D: Trout and Moose Life Cycle Cards</p>
<p><b>Preparation</b></p>	<p><input type="checkbox"/> Prepare osprey sequence cards. (See Lesson 25 Resource B.)</p> <p><input type="checkbox"/> Prepare trout and moose life cycle cards. (See Lesson 25 Resource D.)</p>





## Lesson 26

<p><b>Materials</b></p>	<p><b>Kit Items</b> None</p> <p><b>School-Supplied Items</b> <input type="checkbox"/> Chart paper (6 sheets) <input type="checkbox"/> Glue or tape <input type="checkbox"/> Scissors (1)</p>
<p><b>Resources</b></p>	<p><input type="checkbox"/> Lesson 26 Resource A: Robin Offspring Photograph </p> <p><input type="checkbox"/> Lesson 26 Resource B: Parent and Offspring Storyboards </p>
<p><b>Preparation</b></p>	<p><input type="checkbox"/> Prepare parent and offspring storyboards. (See Lesson 26 Resource B.)</p> <p><input type="checkbox"/> Prepare a sheet of chart paper for each group. Create two columns on each sheet. Title one column Parents Help and the other column Parents Do Not Help.</p>


## Lesson 27

<b>Materials</b>	<p><b>Kit Items</b> None</p> <p><b>Module 1 Kit</b> <input type="checkbox"/> Sentence strip (1)</p> <p><b>School-Supplied Items</b> <input type="checkbox"/> Scissors (1)</p>
<b>Resources</b>	<input type="checkbox"/> Lesson 25 Resource C: Pond Animal Life Cycle Models (optional) <input type="checkbox"/> Lesson 27 Resource: Parent and Offspring Behaviors Storyboards 
<b>Preparation</b>	<input type="checkbox"/> Cue robin video ( <a href="http://phdsci.link/1469">http://phdsci.link/1469</a> ).  <input type="checkbox"/> Prepare parent and offspring behaviors storyboards. (See Lesson 27 Resource.)


## Lesson 28

<b>Materials</b>	<p><b>Kit Items</b> None</p> <p><b>School-Supplied Items</b> <input type="checkbox"/> Scissors (1)</p>
<b>Resources</b>	<input type="checkbox"/> Lesson 28 Resource A: Parent and Offspring Cards  <input type="checkbox"/> Lesson 28 Resource B: Response Cards <input type="checkbox"/> Lesson 28 Resource C: Conceptual Checkpoint Part A  <input type="checkbox"/> Lesson 28 Resource D: Conceptual Checkpoint Part B 
<b>Preparation</b>	<input type="checkbox"/> Prepare parent and offspring cards. (See Lesson 28 Resource A.) <input type="checkbox"/> Prepare response cards. (See Lesson 28 Resource B.) <input type="checkbox"/> Prepare to distribute a copy of Lesson 28 Resource C to each student. <input type="checkbox"/> Cue swan video (pijnacker01 2016) ( <a href="http://phdsci.link/1525">http://phdsci.link/1525</a> ).  <input type="checkbox"/> Prepare to distribute a copy of Lesson 28 Resource D to each student.



## Lesson 29

<b>Materials</b>	<p><b>Kit Items</b> None</p> <p><b>School-Supplied Items</b> <input type="checkbox"/> Scissors (1)</p>
<b>Resources</b>	<input type="checkbox"/> Lesson 1 Resource A: Pond Environment Photograph  <input type="checkbox"/> Lesson 29 Resource: Key Term Cards
<b>Preparation</b>	<input type="checkbox"/> Prepare key term cards. (See Lesson 29 Resource.)

## Lesson 30

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Knowledge Deck cards, Koala and Eucalyptus (24)</li> <li><input type="checkbox"/> Knowledge Deck poster, Koala and Eucalyptus (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Glue sticks (24)</li> <li><input type="checkbox"/> Scissors (1)</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 30 Resource: Sense and Response Cards</li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Cue koala video (<a href="http://phdsci.link/2562">http://phdsci.link/2562</a>). </li> <li><input type="checkbox"/> Prepare sense and response cards. (See Lesson 30 Resource.)</li> <li><input type="checkbox"/> Prepare to distribute a copy of the End-of-Module Assessment to each student.</li> </ul>

## Lesson 31

<b>Materials</b>	<p><b>Kit Items</b></p> <p>None</p> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Scissors (1)</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 31 Resource: Recurring Themes and Concepts Card </li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Cue koala video (<a href="http://phdsci.link/2562">http://phdsci.link/2562</a>). </li> <li><input type="checkbox"/> Score End-of-Module Assessment and write individual feedback.</li> <li><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.</li> <li><input type="checkbox"/> Prepare Recurring Themes and Concepts card. (See Lesson 31 Resource.)</li> </ul>





## Earth Materials | Advance Preparation

Some 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
2	2–3 days†	Investigate Soil Sample Parts	Spread 5 cups of topsoil in a plastic bin to dry.
2	3–4 days†	Investigate Soil Sample Parts	Prepare materials for local soil sample observation.
4	1 day†	Make Paint	If the class is not using the Module 3 kit, obtain 12 small rocks that students can easily hold.

# Earth Materials | Lesson Preparation

## Lesson 1


<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Clay pots, painted (6)</li> <li><input type="checkbox"/> Clay pots, unpainted (6)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>School-Supplied Items</b></p> <p>None</p> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 3 requires 1 unpainted clay pot.</li> <li><input type="checkbox"/> Save all the unpainted clay pots for Lesson 6.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 1 Resource A: Casas Grandes Photograph </li> <li><input type="checkbox"/> Lesson 1 Resource B: Casas Grandes Pottery Photographs </li> <li><input type="checkbox"/> Lesson 1 Resource C: Mata Ortiz Pottery Photographs </li> <li><input type="checkbox"/> <i>The Pot That Juan Built</i> (Andrews-Goebel and Diaz 2002)</li> </ul>
<p><b>Preparation</b></p> 	<ul style="list-style-type: none"> <li><input type="checkbox"/> Add a sticky note to page 24 of <i>The Pot That Juan Built</i> next to the photograph of Juan Quezada.</li> </ul> <p><b>Advance Preparation for Lesson 2</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>2–3 Days Before:</b> Spread 5 cups of topsoil in a plastic bin to dry.</li> <li><input type="checkbox"/> <b>3–4 Days Before:</b> Prepare materials for local soil sample observation. (See Lesson 2 Resource F.)</li> </ul>

## Lesson 2




<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bags, resealable plastic, snack (28)</li> <li><input type="checkbox"/> Bowls, paper, 12 oz (7)</li> <li><input type="checkbox"/> Clay, natural, powdered (7 tbsp)</li> <li><input type="checkbox"/> Dish soap (6 tsp)</li> <li><input type="checkbox"/> Measuring spoon, tbsp (1)</li> <li><input type="checkbox"/> Moss, long fiber (1½ cups)</li> <li><input type="checkbox"/> Plates, paper, 10" (12)</li> <li><input type="checkbox"/> Sand, coarse (1½ cups)</li> <li><input type="checkbox"/> Sifting screens, plastic (6)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bin, clear plastic, 6 qt (1)</li> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Jars with lids, clear plastic, 4 oz (6)</li> <li><input type="checkbox"/> Magnifiers, handheld, plastic (12)</li> <li><input type="checkbox"/> Spoons, plastic (6)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Local soil sample (12 oz)</li> <li><input type="checkbox"/> Marker, permanent (1)</li> <li><input type="checkbox"/> Tape (partial roll)</li> <li><input type="checkbox"/> Topsoil (5 cups)</li> <li><input type="checkbox"/> Water (12 oz)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 3 requires the sifted soil mixture and the measuring spoon.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 2 Resource A: Clay Photographs </li> <li><input type="checkbox"/> Lesson 2 Resource B: Soil Scientist Profile: Mary Baltz </li> <li><input type="checkbox"/> Lesson 2 Resource C: Soil Sample Setup Instructions</li> <li><input type="checkbox"/> Lesson 2 Resource D: Soil Sample Parts Setup Instructions</li> <li><input type="checkbox"/> Lesson 2 Resource E: Magnified Parts of Soil Photographs </li> <li><input type="checkbox"/> Lesson 2 Resource F: Local Soil Sample Setup Instructions</li> <li><input type="checkbox"/> <i>The Pot That Juan Built</i> (Andrews-Goebel and Diaz 2002)</li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare materials for soil sample observations and sifted soil mixture. (See Lesson 2 Resource C.)</li> <li><input type="checkbox"/> Prepare materials for soil sample parts comparison. (See Lesson 2 Resource D.)</li> </ul>




## Lesson 3

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bag, resealable plastic, snack (1)</li> <li><input type="checkbox"/> Bowls, paper, 12 oz (3)</li> <li><input type="checkbox"/> Clay, modeling, air-drying (2 lb)</li> <li><input type="checkbox"/> Clay, natural, powdered (1 tbsp)</li> <li><input type="checkbox"/> Clay pot, unpainted (1)</li> <li><input type="checkbox"/> Cup, clear plastic, 9 oz (1)</li> <li><input type="checkbox"/> Measuring spoon, tbsp (1)</li> <li><input type="checkbox"/> Moss, long-fiber (1 tbsp)</li> <li><input type="checkbox"/> Pipette, disposable (1)</li> <li><input type="checkbox"/> Plates, paper, 10" (24)</li> <li><input type="checkbox"/> Sand, coarse (1 tbsp)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Spoon, plastic (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pencils (24)</li> <li><input type="checkbox"/> Water (access)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sifted soil mixture from Lesson 2</li> <li><input type="checkbox"/> Unpainted clay pot from Lesson 1 (1)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 4 requires the prepared student pots on paper plates.</li> <li><input type="checkbox"/> Lesson 6 requires the unpainted clay pot.</li> <li><input type="checkbox"/> Lesson 7 requires the measuring spoon.</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 3 Resource: Clay Demonstration Setup Instructions</li> <li><input type="checkbox"/> <i>The Pot That Juan Built</i> (Andrews-Goebel and Diaz 2002)</li> </ul>
<p><b>Preparation</b></p> 	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare materials for clay demonstration. (See Lesson 3 Resource.)</li> <li><input type="checkbox"/> Prepare materials for pottery-making activity. Shape air-drying modeling clay into 1" balls. Make enough modeling clay balls for each student to receive 1. Place each clay ball on a separate paper plate. Prepare the clay balls on the day of the lesson to allow students to work with the clay before it dries.</li> </ul> <p><b>Advance Preparation for Lesson 4</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>1 Day Before:</b> If the class is not using the Module 3 kit, obtain 12 small rocks of a size that students can firmly hold while they scrape sidewalk chalk.</li> </ul>


## Lesson 4

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bowls, paper, 12 oz (12)</li> <li><input type="checkbox"/> Cups, clear plastic, 9 oz (6)</li> <li><input type="checkbox"/> Hematite rock sample (1)</li> <li><input type="checkbox"/> Paintbrushes (24)</li> <li><input type="checkbox"/> Pipettes, disposable (12)</li> <li><input type="checkbox"/> Rocks, small (12)</li> <li><input type="checkbox"/> Sidewalk chalk, 2 colors (6 of each)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Paper towels (12 sheets)</li> <li><input type="checkbox"/> Water (access)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Student pots on paper plates from Lesson 3 (24)</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 1 Resource C: Mata Ortiz Pottery Photographs </li> <li><input type="checkbox"/> Lesson 4 Resource A: Painting Mata Ortiz Pottery Photograph </li> <li><input type="checkbox"/> Lesson 4 Resource B: Making Paint Setup Instructions</li> <li><input type="checkbox"/> Lesson 4 Resource C: Metate Photograph </li> <li><input type="checkbox"/> <i>The Pot That Juan Built</i> (Andrews-Goebel and Diaz 2002)</li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare materials for paint-making activity. (See Lesson 4 Resource B.)</li> <li><input type="checkbox"/> Add a sticky note to page 26 of <i>The Pot That Juan Built</i> next to the photograph of the metate.</li> </ul>






## Lesson 5

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aluminum foil, 8" × 11" (1)</li> <li><input type="checkbox"/> Bags, resealable plastic, snack (12)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> <li><input type="checkbox"/> Thermometer, Fahrenheit, plastic-backed (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Hair dryer with high setting (1)</li> <li><input type="checkbox"/> Marker, permanent (1)</li> <li><input type="checkbox"/> Milk chocolate bar, 1.55 oz (1)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Tape (partial roll)</li> <li><input type="checkbox"/> Timer (1)</li> </ul> <p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 6 requires the prepared chocolate samples. (See Lesson 5 Resource B.)</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 5 Resource A: Pottery-Firing Methods Photographs </li> <li><input type="checkbox"/> Lesson 5 Resource B: Heating Chocolate Investigation Setup Instructions and Procedure</li> <li><input type="checkbox"/> <i>The Pot That Juan Built</i> (Andrews-Goebel and Diaz 2002)</li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Add a sticky note to page 26 of <i>The Pot That Juan Built</i> next to the photograph of Juan stacking fuel around the quemador.</li> <li><input type="checkbox"/> Prepare materials for heating chocolate investigation. (See Lesson 5 Resource B.)</li> </ul>




## Lesson 6

<p><b>Materials</b></p>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Clay, modeling, air-drying (1 lb)</li> <li><input type="checkbox"/> Clay pot, unpainted (6)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, student (24)</li> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Scissors (1)</li> </ul> <p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Chocolate samples from Lesson 5</li> </ul>
<p><b>Resources</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 6 Resource: Heating and Cooling Objects Cards</li> </ul>
<p><b>Preparation</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Cue making chocolate video (<a href="http://phdsci.link/2571">http://phdsci.link/2571</a>). </li> <li><input type="checkbox"/> Prepare heating and cooling objects cards. (See Lesson 6 Resource.)</li> <li><input type="checkbox"/> Prepare an unfinished pottery sample for each group shortly before the lesson to ensure that the samples remain unfinished before students observe them. Use air-drying modeling clay to shape a small pot as a sample for each group.</li> </ul>

## Lesson 7

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bags, resealable plastic, snack (49)</li> <li><input type="checkbox"/> Clay, natural, powdered (25 tbsp)</li> <li><input type="checkbox"/> Gravel (13 tbsp)</li> <li><input type="checkbox"/> Measuring spoon, tbsp (1)</li> <li><input type="checkbox"/> Sand, coarse (13 tbsp)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Safety goggles, teacher (1)</li> </ul> <p><b>School-Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Marker, permanent (1)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Tape (partial roll)</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 1 Resource A: Casas Grandes Photograph </li> <li><input type="checkbox"/> Lesson 1 Resource C: Mata Ortiz Pottery Photographs </li> <li><input type="checkbox"/> Lesson 7 Resource A: Term Cards</li> <li><input type="checkbox"/> Lesson 7 Resource B: Adobe Bricks Photograph </li> <li><input type="checkbox"/> Lesson 7 Resource C: Adobe Bricks and Mata Ortiz Pottery Soil Sample Setup Instructions</li> <li><input type="checkbox"/> Lesson 7 Resource D: Adobe Bricks and Pottery Process Charts </li> <li><input type="checkbox"/> Lesson 7 Resource E: Effects of Heating and Cooling on Pottery and Adobe Bricks Charts </li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare term cards. (See Lesson 7 Resource A.)</li> <li><input type="checkbox"/> Prepare materials for adobe brick and Mata Ortiz pottery soil sample observations. (See Lesson 7 Resource C.)</li> <li><input type="checkbox"/> Prepare to distribute a copy of Lesson 7 Resource D and a copy of the End-of-Spotlight Assessment Parts A and B to each student.</li> </ul>

## Lesson 8

<b>Materials</b>	<p><b>Kit Items</b></p> <p>None</p> <p><b>School-Supplied Items</b></p> <p>None</p>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 1 Resource C: Mata Ortiz Pottery Photographs </li> <li><input type="checkbox"/> Lesson 7 Resource B: Adobe Bricks Photograph </li> <li><input type="checkbox"/> Lesson 8 Resource: Recurring Themes and Concepts Card </li> </ul>
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Score an End-of-Spotlight Assessment item for the class debrief, and prepare a sample response for that item to share with students.</li> <li><input type="checkbox"/> Prepare recurring themes and concepts card. (See Lesson 8 Resource.)</li> </ul>

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## Survival | Works Cited

Messner, Kate, and Christopher Silas Neal (illustrator). 2017. *Over and Under the Pond*. San Francisco: Chronicle Books. (All references to *Over and Under the Pond* are from this source.)

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## Earth Materials | Works Cited

Andrews-Goebel, Nancy, and David Diaz. 2002. *The Pot That Juan Built*. New York: Lee & Low Books Inc.