

# Preparation Guide

## Level K Module 3

### Environments

**Materials:** This section lists the quantity of each material necessary for the lesson. Lesson materials may be from a *PhD Science® TEKS Edition* materials kit or they may be school supplied. In addition to the listed materials, teachers should have access to the following common classroom items: sticky notes, chart paper, pencils, a whiteboard, and markers. This section also lists items in the current lesson that are reused in future lessons. Note that items found in a typical elementary classroom (e.g., glue, tape, scissors) are not listed for reuse.

**Resources:** This section lists module resources (from Appendix A 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, PhD Projected. A symbol (🖥️) identifies resources that appear in PhD Projected. The Teacher Resource Pack provides additional supports and directions for some investigations as well as Spanish support resources with alternatives for Spanish-speaking students. The Teacher Resource Pack is available at <https://greatminds.org/resources>.

**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.





## Advance Materials 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
18	1–3 days†	Examine Classroom Trash Activity	Collect and store the trash and recycling generated by the class for 1–3 days. Remove dangerous or unsanitary materials.
20	1 week†	Engineering Challenge	Begin to collect toilet paper tubes and the six kinds of paper needed for Engineering Challenge demonstrations and activities—printer paper, newspaper, card stock, tissue paper, construction paper, and paper bag paper. Consider needs in view of paper supplied in the kit. The collected paper may be used or new. Avoid glossy paper and dyed paper.

# Lesson Preparation





## Lesson 1

<b>Materials</b>	<b>Kit Items</b> None	<b>School Supplied Items</b> None
<b>Resources</b>	<input type="checkbox"/> Lesson 1 Resource A: Gopher Tortoise Photograph  <input type="checkbox"/> Lesson 1 Resource B: North America Map  <input type="checkbox"/> Lesson 1 Resource C: Gopher Tortoise Data 	
<b>Preparation</b>	<input type="checkbox"/> Cue gopher tortoise environment video: <a href="http://phdsci.link/1785">http://phdsci.link/1785</a> . 	




## Lesson 2

<b>Materials</b>	<b>Kit Items</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Class anchor model components                             <ul style="list-style-type: none"> <li>○ Board (1)</li> <li>○ Florida mouse stickers (2)</li> <li>○ Gopher tortoise stickers (2)</li> <li>○ Indigo snake stickers (2)</li> <li>○ Longleaf pine stickers (5)</li> <li>○ Red-cockaded woodpecker stickers (2)</li> <li>○ Wiregrass stickers (6)</li> </ul> </li> </ul>	<b>School Supplied Items</b> None
<b>Resources</b>	<input type="checkbox"/> Lesson 1 Resource C: Gopher Tortoise Data  <input type="checkbox"/> Lesson 2 Resource: Anchor Model Progression Reference	
<b>Preparation</b>	<input type="checkbox"/> For guidance on the progression of the student anchor model and class anchor model, review the anchor model progression reference. (See Lesson 2 Resource.) <input type="checkbox"/> If not using the Module 3 kit, refer to the sample images in the anchor model progression reference to draw the anchor model. (See Lesson 2 Resource.)	



## Lesson 3

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Clay, modeling, nonhardening (0.25 lb) <input type="checkbox"/> Paper umbrellas (54)  <b>Module 1 Kit</b> <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1)	<b>School Supplied Items</b> <input type="checkbox"/> Paper, printer, 8.5" × 11" (12 sheets)
	<b>Item Reuse</b> <input type="checkbox"/> Lesson 4 requires 36 of the paper umbrellas, 1 of the student forest models with trees close together, and 1 of the student forest models with trees far apart.	
<b>Resources</b>	<input type="checkbox"/> Lesson 1 Resource B: North America Map  <input type="checkbox"/> Lesson 3 Resource A: Wiregrass Photograph  <input type="checkbox"/> Lesson 3 Resource B: Forest Overhead View Drawings  <input type="checkbox"/> Lesson 3 Resource C: Forest Model Classroom Procedures	
<b>Preparation</b>	<input type="checkbox"/> Cue forest flyover video: <a href="http://phdsci.link/1800">http://phdsci.link/1800</a> .  <input type="checkbox"/> Gather materials for forest models. (See Lesson 3 Resource C.) Prepare one 1" diameter ball of modeling clay for each student pair modeling trees close together. Prepare one 0.5" diameter ball of modeling clay for each student pair modeling trees far apart.	



## Lesson 4

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Clay, modeling, nonhardening (0.25 lb)</li> <li><input type="checkbox"/> Flashlights with batteries</li> <li><input type="checkbox"/> Paper umbrellas (36)</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>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Student forest models with trees close together and trees far apart from Lesson 3 (1 of each)</li> </ul>	
	<p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 5 requires the student forest models.</li> </ul>	
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 3 Resource A: Wiregrass Photograph </li> <li><input type="checkbox"/> Lesson 3 Resource C: Forest Model Classroom Procedures</li> <li><input type="checkbox"/> Lesson 4 Resource A: Bean Plant Photograph </li> <li><input type="checkbox"/> Lesson 4 Resource B: Shadow Photograph </li> <li><input type="checkbox"/> Lesson 4 Resource C: Grid Paper Shadow Photograph</li> <li><input type="checkbox"/> Lesson 4 Resource D: Wiregrass Grid Paper</li> </ul>	
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Gather materials for sunlit forest models. (See Lesson 3 Resource C.) Prepare one 1" diameter ball of modeling clay for each group. Prepare to distribute a copy of Lesson 4 Resource D to each group.</li> </ul>	


### Lesson 5

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Class anchor model components <ul style="list-style-type: none"> <li>○ Sun sticker (1)</li> <li>○ Wiregrass stickers (2)</li> </ul> <b>Module 1 Kit</b> <input type="checkbox"/> Sentence strips (3)	<b>School Supplied Items</b> <input type="checkbox"/> Pocket chart (1)
	<b>Prepared Items from Previous Lessons</b> <input type="checkbox"/> Student forest models with trees close together and trees far apart from Lesson 3 (1 of each)	
<b>Resources</b>	<input type="checkbox"/> Lesson 5 Resource: Forest Floor Photographs 	
<b>Preparation</b>	<input type="checkbox"/> Cue forest flyover video: <a href="http://phdsci.link/1800">http://phdsci.link/1800</a> . 	


### Lesson 6

<b>Materials</b>	<b>Kit Items</b> None	<b>School Supplied Items</b> <input type="checkbox"/> Scissors (1)
	<b>Item Reuse</b> <input type="checkbox"/> Lesson 8 requires the prepared forest dangers class chart.	
<b>Resources</b>	<input type="checkbox"/> Lesson 1 Resource A: Gopher Tortoise Photograph  <input type="checkbox"/> Lesson 6 Resource: Gopher Tortoise Figures 	
<b>Preparation</b>	<input type="checkbox"/> Prepare gopher tortoise figures. (See Lesson 6 Resource.)	



## Lesson 7

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Student anchor model components <ul style="list-style-type: none"> <li>○ Boards (12)</li> <li>○ Gopher tortoise stickers (12)</li> <li>○ Longleaf pine stickers (36)</li> <li>○ Sun stickers (12)</li> <li>○ Wiregrass stickers (96)</li> </ul>	<b>School Supplied Items</b> <input type="checkbox"/> Markers, dry erase, black (12) <input type="checkbox"/> Paper towels (12 sheets)
	<b>Module 1 Kit</b> <input type="checkbox"/> Sentence strips (2)	
	<b>Item Reuse</b> <input type="checkbox"/> Lesson 8 requires the student anchor models.	
<b>Resources</b>	None	
<b>Preparation</b>	<input type="checkbox"/> Cue gopher tortoise environment video from Lesson 1 and gopher tortoise shelter video: <a href="http://phdsci.link/1785">http://phdsci.link/1785</a> and <a href="http://phdsci.link/1803">http://phdsci.link/1803</a> . 	




## Lesson 8

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Student anchor model components <ul style="list-style-type: none"> <li>○ Florida mouse stickers (12)</li> <li>○ Indigo snake stickers (12)</li> </ul>	<b>School Supplied Items</b> <input type="checkbox"/> Markers, dry erase, black (12) <input type="checkbox"/> Paper towels (12 sheets)
	<b>Prepared Items from Previous Lessons</b> <input type="checkbox"/> Student anchor models from Lesson 7 (12)	
	<b>Item Reuse</b> <input type="checkbox"/> Lesson 11 requires the student anchor models.	
<b>Resources</b>	<input type="checkbox"/> <i>At Home with the Gopher Tortoise: The Story of a Keystone Species</i> (Dunphy and Rothman 2010)	
<b>Preparation</b>	<input type="checkbox"/> Cue other animals in gopher tortoise burrow video: <a href="http://phdsci.link/1830">http://phdsci.link/1830</a> . 	

## Lesson 9




<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Class anchor model component, burrow sticker (1)  <b>Module 1 Kit</b> <input type="checkbox"/> Sentence strip (1)	<b>School Supplied Items</b> <input type="checkbox"/> Paper towel (1 sheet)
<b>Resources</b>	<input type="checkbox"/> Lesson 1 Resource C: Gopher Tortoise Data  <input type="checkbox"/> <i>At Home with the Gopher Tortoise: The Story of a Keystone Species</i> (Dunphy and Rothman 2010)	
<b>Preparation</b>	<input type="checkbox"/> Cue gopher tortoise environment video from Lesson 1: <a href="http://phdsci.link/1785">http://phdsci.link/1785</a> . 	

## Lesson 10



<b>Materials</b>	<b>Kit Items</b> None	<b>School Supplied Items</b> None
<b>Resources</b>	<input type="checkbox"/> Lesson 10 Resource A: Garden Photographs  <input type="checkbox"/> Lesson 10 Resource B: Sunflower Plant and Lettuce Plant Photographs  <input type="checkbox"/> Lesson 10 Resource C: Conceptual Checkpoint 	
<b>Preparation</b>	<input type="checkbox"/> Prepare to distribute a color copy of Lesson 10 Resource C to each student.	





## Lesson 11

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Knowledge Deck™ cards, Disappearing Longleaf Pine Forests (24) <input type="checkbox"/> Knowledge Deck poster, Disappearing Longleaf Pine Forests (1) <input type="checkbox"/> Magnifiers, handheld, plastic (12) <input type="checkbox"/> Student anchor model component, city building stickers (12)	<b>School Supplied Items</b> <input type="checkbox"/> Markers, dry erase, black (12) <input type="checkbox"/> Paper towels (12 sheets) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll)
	<b>Prepared Items from Previous Lessons</b> <input type="checkbox"/> Student anchor models from Lesson 8 (12)	
	<b>Item Reuse</b> <input type="checkbox"/> Lesson 12 requires the student anchor models. <input type="checkbox"/> Lesson 14 requires the prepared plant and animal cards. <input type="checkbox"/> Lesson 18 requires the Disappearing Longleaf Pine Forests Knowledge Deck poster.	
<b>Resources</b>	<input type="checkbox"/> Lesson 11 Resource A: USS <i>Constitution</i> Engraving  <input type="checkbox"/> Lesson 11 Resource B: Tallahassee Photographs  <input type="checkbox"/> Lesson 11 Resource C: Plant and Animal Cards 	
<b>Preparation</b>	<input type="checkbox"/> Prepare plant and animal cards. (See Lesson 11 Resource C.)	




## Lesson 12

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Student anchor model components <ul style="list-style-type: none"> <li>○ Florida mouse stickers (12)</li> <li>○ Gopher tortoise stickers (12)</li> <li>○ Indigo snake stickers (12)</li> <li>○ Longleaf pine stickers (108)</li> <li>○ Red-cockaded woodpecker stickers (12)</li> <li>○ Wiregrass stickers (60)</li> </ul>	<b>School Supplied Items</b> <input type="checkbox"/> Markers, dry erase, black (12) <input type="checkbox"/> Paper towels (12 sheets)
	<b>Prepared Items from Previous Lessons</b> <input type="checkbox"/> Student anchor models from Lesson 11 (12)	
	<b>Item Reuse</b> <input type="checkbox"/> Lesson 15 requires the student anchor models.	
<b>Resources</b>	<input type="checkbox"/> Lesson 5 Resource: Forest Floor Photographs  <input type="checkbox"/> Lesson 12 Resource: Farm Photographs 	
<b>Preparation</b>	None	



### Lesson 13

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Class anchor model component, longleaf pine stickers (4)	<b>School Supplied Items</b> <input type="checkbox"/> Marker, dry erase, black (1)
	<b>Module 1 Kit</b> <input type="checkbox"/> Sentence strips (2)	
<b>Resources</b>	<input type="checkbox"/> Lesson 13 Resource A: Longleaf Pine Forest Maps  <input type="checkbox"/> Lesson 13 Resource B: Forest Model Photographs 	
<b>Preparation</b>	None	



### Lesson 14

<b>Materials</b>	<b>Kit Items</b> None	<b>School Supplied Items</b> <input type="checkbox"/> Tape (partial roll)
	<b>Prepared Items from Previous Lessons</b>	
	<input type="checkbox"/> Plant and animal cards from Lesson 11 (1 set) 	
	<b>Item Reuse</b>	
	<input type="checkbox"/> Lesson 15 requires the prepared class fire effects chart.	
<b>Resources</b>	<input type="checkbox"/> Lesson 14 Resource: Fire Time-Lapse Photographs 	
<b>Preparation</b>	<input type="checkbox"/> Cue prescribed fire video: <a href="http://phdsci.link/1838">http://phdsci.link/1838</a> . 	



## Lesson 15

<b>Materials</b>	<b>Kit Items</b>	<b>School Supplied Items</b>
	<ul style="list-style-type: none"> <li><input type="checkbox"/> Student anchor model components                             <ul style="list-style-type: none"> <li>○ Florida mouse stickers (12)</li> <li>○ Gopher tortoise stickers (12)</li> <li>○ Indigo snake stickers (12)</li> <li>○ Longleaf pine stickers (108)</li> <li>○ Red-cockaded woodpecker stickers (12)</li> <li>○ Sun stickers (12)</li> <li>○ Wiregrass stickers (96)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Markers, dry erase, black (12)</li> <li><input type="checkbox"/> Paper towels (12 sheets)</li> </ul>
	<b>Prepared Items from Previous Lessons</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Class fire effects chart from Lesson 14 (1)</li> <li><input type="checkbox"/> Student anchor models from Lesson 14 (12)</li> </ul>	
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 15 Resource A: Forest Environment Photographs </li> <li><input type="checkbox"/> Lesson 15 Resource B: Longleaf Pine Forest Storyboard Drawings</li> <li><input type="checkbox"/> <i>At Home with the Gopher Tortoise: The Story of a Keystone Species</i> (Dunphy and Rothman 2010)</li> </ul>	
<b>Preparation</b> 	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare longleaf pine forest storyboard drawings. (See Lesson 15 Resource B.)</li> </ul>	
	<b>Advance Preparation for Lesson 18</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>1–3 Days Before:</b> Collect and store the trash and recycling generated by the class for 1–3 days. Remove dangerous or unsanitary materials. Fill the small trash can with a variety of the collected trash and recyclable materials (e.g., paper, plastic, and metal items).</li> </ul>	
	<b>Advance Preparation for Lesson 20</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>1 Week Before:</b> Begin to collect toilet paper tubes and the six kinds of paper needed for Engineering Challenge demonstrations and activities—printer paper, newspaper, card stock, tissue paper, construction paper, and paper bag paper. Consider needs in view of paper supplied in the kit. The collected paper may be used or new. Avoid glossy paper and dyed paper.</li> </ul>	

### Lesson 16

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Class anchor model components             <ul style="list-style-type: none"> <li>○ Burrow sticker (1)</li> <li>○ Fire sticker (1)</li> <li>○ Florida mouse sticker (1)</li> <li>○ Gopher tortoise sticker (1)</li> <li>○ Indigo snake sticker (1)</li> <li>○ Wiregrass stickers (5)</li> </ul> </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"/> Paper towel (1 sheet)</li> <li><input type="checkbox"/> Pencils, brown, green, orange (24 sets)</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 13 Resource A: Longleaf Pine Forest Maps </li> <li><input type="checkbox"/> Lesson 16 Resource: Planting Longleaf Pines Photographs </li> </ul>	
<b>Preparation</b>	None	


### Lesson 17

<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 17 Resource A: Different Kinds of Gardens Photographs </li> <li><input type="checkbox"/> Lesson 17 Resource B: Conceptual Checkpoint </li> <li><input type="checkbox"/> Lesson 17 Resource C: Yard Photographs with Student Comments</li> </ul>	
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare to distribute a color copy of Lesson 17 Resource B to each student.</li> </ul>	



### Lesson 18

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Knowledge Deck posters             <ul style="list-style-type: none"> <li>○ Disappearing Longleaf Pine Forests (1)</li> <li>○ The Problem with Trash (1)</li> </ul> </li> </ul>	<p><b>School Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gloves, disposable (1 pair for teacher)</li> <li><input type="checkbox"/> Tarp (1)</li> <li><input type="checkbox"/> Trash can containing trash and recycling (1)</li> </ul>
<b>Item Reuse</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 20 requires the Problem with Trash Knowledge Deck poster.</li> </ul>	
<b>Resources</b>	None	
<b>Preparation</b>	None	




## Lesson 19

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Knowledge Deck cards, The Problem with Trash (24)	<b>School Supplied Items</b> <input type="checkbox"/> Recycling bin or cardboard box (1)
<b>Resources</b>	<input type="checkbox"/> Lesson 19 Resource A: Instructions for Making a Primary Balance <input type="checkbox"/> Lesson 19 Resource B: Objects Made from Recycled Materials Photographs	
<b>Preparation</b>	<input type="checkbox"/> Cue recycling video: <a href="http://phdsci.link/1887">http://phdsci.link/1887</a> . 	


## Lesson 20

<b>Materials</b>	<b>Kit Items</b> <input type="checkbox"/> Knowledge Deck poster, The Problem with Trash (1) <input type="checkbox"/> Sunflower seed packet (1 seed)	<b>School Supplied Items</b> <input type="checkbox"/> Magnet (1, optional) <input type="checkbox"/> Paper for Engineering Challenge, 8.5" × 11" <ul style="list-style-type: none"> <li><input type="checkbox"/> Card stock (56 sheets)</li> <li><input type="checkbox"/> Construction paper (56 sheets)</li> <li><input type="checkbox"/> Newspaper (57 sheets)</li> <li><input type="checkbox"/> Paper bag paper (56 sheets)</li> <li><input type="checkbox"/> Printer paper (83 sheets)</li> <li><input type="checkbox"/> Tissue paper (56 sheets)</li> </ul> <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Seed-starting potting mix with sphagnum peat moss (0.5 cups) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Water (3 oz)
	<b>Item Reuse</b> <input type="checkbox"/> Lesson 21 requires the prepared class problem and solution chart.	
<b>Resources</b>	<input type="checkbox"/> Lesson 20 Resource A: Engineering Challenge Rubric <input type="checkbox"/> Lesson 20 Resource B: Sunflower Storyboard  <input type="checkbox"/> Lesson 20 Resource C: Engineering Design Process Visual  <input type="checkbox"/> Lesson 20 Resource D: Paper Preparation Instructions	
<b>Preparation</b>	<input type="checkbox"/> Prepare paper. (See Lesson 20 Resource D.)	


## Lesson 21

<b>Materials</b>	<b>Kit Items</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pan, aluminum, 13" × 9" × 2" (1)</li> <li><input type="checkbox"/> Spray bottle, 8 oz (1)</li> </ul>	<b>School Supplied Items</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Magnet (1, optional)</li> <li><input type="checkbox"/> Metal can, unopened, 6 oz (1)</li> <li><input type="checkbox"/> Ruler (1)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Tape (partial roll)</li> <li><input type="checkbox"/> Toilet paper tubes (13)</li> <li><input type="checkbox"/> Water (8 oz)</li> </ul>
	<b>Prepared Items from Previous Lessons</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Class problem and solution chart from Lesson 20 (1)</li> <li><input type="checkbox"/> Paper for Engineering Challenge from Lesson 20 <ul style="list-style-type: none"> <li><input type="checkbox"/> Card stock, 8.5" × 11" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Construction paper, 8.5" × 11" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Newspaper, 8.5" × 11" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Newspaper, 4" × 11" (1 sheet)</li> <li><input type="checkbox"/> Paper bag paper, 8.5" × 11" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Printer paper, 8.5" × 11" (13 sheets plus scraps)</li> <li><input type="checkbox"/> Tissue paper, 8.5" × 11" (12 sheets plus scraps)</li> </ul> </li> </ul>	
	<b>Item Reuse</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 22 requires the aluminum pan, spray bottle, and prepared Yes and No sorting cards.</li> <li><input type="checkbox"/> Lesson 23 requires the metal can and prepared class problem and solution chart.</li> </ul>	
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 20 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 20 Resource C: Engineering Design Process Visual </li> <li><input type="checkbox"/> Lesson 21 Resource A: Flower Pot Photographs </li> <li><input type="checkbox"/> Lesson 21 Resource B: Flower Pot Creation Classroom Procedure</li> <li><input type="checkbox"/> Lesson 21 Resource C: Paper Testing Classroom Procedures</li> <li><input type="checkbox"/> Lesson 21 Resource D: Yes and No Sorting Cards</li> <li><input type="checkbox"/> Lesson 21 Resource E: New Engineering Design Process Visual </li> </ul>	
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> If not done in advance, prepare paper. (See Lesson 20 Resource D.)</li> <li><input type="checkbox"/> Prepare Yes and No sorting cards. (See Lesson 21 Resource D.)</li> </ul>	

## Lesson 22



<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6)</li> <li><input type="checkbox"/> Spray bottles, 8 oz (12)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6)</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"/> Magnet (1, optional)</li> <li><input type="checkbox"/> Ruler (1)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Water (96 oz)</li> <li><input type="checkbox"/> Weights of 25 g (12)</li> </ul>
	<p><b>Prepared Items from Previous Lessons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Paper for Engineering Challenge from Lesson 21                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Card stock, 8.5" × 5.5" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Construction paper, 8.5" × 5.5" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Newspaper, 8.5" × 5.5" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Paper bag paper, 8.5" × 5.5" (12 sheets plus scraps)</li> <li><input type="checkbox"/> Printer paper, 8.5" × 5.5" (13 sheets plus scraps)</li> <li><input type="checkbox"/> Tissue paper, 8.5" × 5.5" (12 sheets plus scraps)</li> </ul> </li> <li><input type="checkbox"/> Yes and No sorting cards from Lesson 21 (12 sets)</li> </ul>	
	<p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 23 requires the aluminum pans and spray bottles.</li> </ul>	
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 20 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 21 Resource C: Paper Testing Classroom Procedures</li> <li><input type="checkbox"/> Lesson 21 Resource E: New Engineering Design Process Visual </li> </ul>	
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> If not done in advance, prepare paper. (See Lesson 20 Resource D.)</li> </ul>	

## Lesson 23


<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6)</li> <li><input type="checkbox"/> Spray bottles, 8 oz (12)</li> </ul> <p><b>Module 1 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (7)</li> <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"/> Cups, paper, 12 oz (25)</li> <li><input type="checkbox"/> Magnet or sticky note (1)</li> <li><input type="checkbox"/> Metal cans, unopened, 6 oz (12)</li> <li><input type="checkbox"/> Ruler (1)</li> <li><input type="checkbox"/> Seed-starting potting mix with sphagnum peat moss (13 cups)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Spoons (13)</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"/> Class problem and solution chart from Lesson 21 (1)</li> <li><input type="checkbox"/> Paper for Engineering Challenge from Lesson 20                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Card stock, 4" × 11" (36 sheets)</li> <li><input type="checkbox"/> Construction paper, 4" × 11" (36 sheets)</li> <li><input type="checkbox"/> Newspaper, 4" × 11" (37 sheets)</li> <li><input type="checkbox"/> Paper bag paper, 4" × 11" (36 sheets)</li> <li><input type="checkbox"/> Printer paper, 4" × 11" (36 sheets)</li> <li><input type="checkbox"/> Tissue paper, 4" × 11" (36 sheets)</li> </ul> </li> </ul>	
	<p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 24 requires the prepared flower pot creation and testing materials and the prepared class problem and solution chart.</li> </ul>	
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 20 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 21 Resource B: Flower Pot Creation Classroom Procedure</li> <li><input type="checkbox"/> Lesson 21 Resource E: New Engineering Design Process Visual </li> <li><input type="checkbox"/> Lesson 23 Resource: Flower Pot Testing Setup Instructions and Classroom Procedure</li> </ul>	
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> If not done in advance, prepare paper. (See Lesson 20 Resource D.)</li> <li><input type="checkbox"/> Prepare cups of seed-starting potting mix with sphagnum peat moss and cups of water for flower pot testing. (See Lesson 23 Resource.)</li> </ul>	



## Lesson 24

<b>Materials</b>	<p><b>Kit Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sunflower seed packet (12 seeds, optional)</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>Module 2 Kit</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Grow lamp, two headed (1, optional)</li> </ul>	<p><b>School Supplied Items</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ruler (1)</li> <li><input type="checkbox"/> Scissors (1)</li> <li><input type="checkbox"/> Seed-starting potting mix with sphagnum peat moss (12 cups)</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"/> Class problem and solution chart from Lesson 21 (1)</li> <li><input type="checkbox"/> Flower pot creation and testing materials from Lesson 23 (12 sets)</li> <li><input type="checkbox"/> Paper for Engineering Challenge from Lesson 20                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Card stock, 4" × 11" (36 sheets plus scraps)</li> <li><input type="checkbox"/> Construction paper, 4" × 11" (36 sheets plus scraps)</li> <li><input type="checkbox"/> Newspaper, 4" × 11" (36 sheets plus scraps)</li> <li><input type="checkbox"/> Paper bag paper, 4" × 11" (36 sheets plus scraps)</li> <li><input type="checkbox"/> Printer paper, 4" × 11" (36 sheets plus scraps)</li> <li><input type="checkbox"/> Tissue paper, 4" × 11" (36 sheets plus scraps)</li> </ul> </li> </ul>	
	<p><b>Item Reuse</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 25 requires at least 1 of the flower pots created by students.</li> </ul>	
<b>Resources</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lesson 20 Resource A: Engineering Challenge Rubric</li> <li><input type="checkbox"/> Lesson 20 Resource B: Sunflower Storyboard </li> <li><input type="checkbox"/> Lesson 21 Resource E: New Engineering Design Process Visual </li> <li><input type="checkbox"/> Lesson 23 Resource: Flower Pot Testing Setup Instructions and Classroom Procedure</li> </ul>	
<b>Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> If not done in advance, prepare paper. (See Lesson 20 Resource D.)</li> <li><input type="checkbox"/> Prepare cups of seed-starting potting mix with sphagnum peat moss and cups of water for flower pot testing. (See Lesson 23 Resource.)</li> </ul>	

### Lesson 25

<b>Materials</b>	<b>Kit Items</b> None	<b>School Supplied Items</b> None
	<b>Module 1 Kit</b> <input type="checkbox"/> Thermometer, demonstration (1)	
	<b>Prepared Items from Previous Lessons</b> <input type="checkbox"/> Current month’s weather calendar from Module 1 (1) <input type="checkbox"/> Monthly weather posters for the school year from Module 1 (1 per month) <input type="checkbox"/> Student flower pot from Lesson 24 (at least 1)	
<b>Resources</b>	<input type="checkbox"/> Lesson 25 Resource A: Weather Data Suggestions <input type="checkbox"/> Lesson 25 Resource B: New York, NY, 2018–19 Weather Posters (optional) <input type="checkbox"/> Lesson 25 Resource C: Tallahassee, FL, 2018–19 Weather Posters (optional) <input type="checkbox"/> Lesson 25 Resource D: Weather Summary Statements <input type="checkbox"/> Lesson 25 Resource E: Teddy Bear Sunflower Photograph 	
<b>Preparation</b>	<input type="checkbox"/> Gather monthly weather posters for the school year that students started in the Kindergarten Weather Module. Obtain and record missing weather data for the school year. (See Lesson 25 Resource A.) <input type="checkbox"/> Prepare weather summary statements chart. (See Lesson 25 Resource D.) <input type="checkbox"/> Obtain and record missing weather data for the current month’s weather calendar. (See Lesson 25 Resource A.) <input type="checkbox"/> Prepare seasons wall labels. (See Lesson 25 Resource F.)	




### Lesson 26

<b>Materials</b>	<b>Kit Items</b> None	<b>School Supplied Items</b> None
<b>Resources</b>	<input type="checkbox"/> Lesson 26 Resource: Amarillo, Texas, 2017–2018 Weather Data	
<b>Preparation</b>	None	



### Lesson 27

<b>Materials</b>	<b>Kit Items</b> None	<b>School Supplied Items</b> <input type="checkbox"/> Scissors (1)
<b>Resources</b>	<input type="checkbox"/> Lesson 1 Resource A: Gopher Tortoise Photograph <input type="checkbox"/> Lesson 27 Resource: Key Term Cards	
<b>Preparation</b>	<input type="checkbox"/> Prepare key term cards. (See Lesson 27 Resource.)	

## Lesson 28

Materials	Kit Items	School Supplied Items
	None	None
Resources	<input type="checkbox"/> Lesson 28 Resource A: Joshua Tree National Park Sign Photograph  <input type="checkbox"/> Lesson 28 Resource B: Gambel’s Quail Photographs <input type="checkbox"/> Lesson 28 Resource C: Stay on Trail Sign Photograph 	
Preparation	<input type="checkbox"/> Cue Hidden Valley Trail video: <a href="http://phdsci.link/1875">http://phdsci.link/1875</a> . 	

## Lesson 29

Materials	Kit Items	School Supplied Items
	None	<input type="checkbox"/> Scissors (1)
Resources	<input type="checkbox"/> Lesson 29 Resource: Cause and Effect Card 	
Preparation	<input type="checkbox"/> Cue Hidden Valley Trail video ( <a href="http://phdsci.link/1875">http://phdsci.link/1875</a> ).  <input type="checkbox"/> Score End-of-Module Assessment and write individual feedback. <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. <input type="checkbox"/> Prepare Cause and Effect card. (See Lesson 29 Resource.) <input type="checkbox"/> Select student work products that show evidence of concept mastery, and display them in different areas of the classroom. Student work products may include the class anchor model, student anchor models, class charts, selected Science Logbook pages, and Engineering Challenge designs.	

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## Works Cited

Dunphy, Madeleine, and Michael Rothman (illustrator). 2010. *At Home with the Gopher Tortoise: The Story of a Keystone Species*. Berkeley, CA: Web of Life Children's Books. [All references to *At Home with the Gopher Tortoise* are from this source.]

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