




Preparation Guide


Level K Module 3

LIGHT

with Spotlight Lessons on the Sky

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.



Light | Advance Preparation

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



Lesson	Time in Advance	Investigation	Description
4	1 Day†	Observe Bedroom Models	Prepare and test bedroom models A and B.
5	1 Day†	Observe Basement Models	Prepare and test basement models.
10	1–2 Days	Observe Shadows	Identify a large outdoor area that provides space with direct sunlight and shade for student activity.
16	1 Day†	Observe Wayang Screen Models	Prepare wayang screen models.
17	1 Day†	Test Materials by Observing Light	Prepare material swatches.
18	1 Day	Science Challenge	Prepare the screens and wayang show models.

Light | Lesson Preparation




Lesson 1

Materials	<p>Kit Items None</p> <p>School-Supplied Items None</p>
Resources	<p><input type="checkbox"/> Lesson 1 Resource A: Soccer Ball Photographs </p> <p><input type="checkbox"/> Lesson 1 Resource B: Full-Size Soccer Ball Photographs </p>
Preparation	<p><input type="checkbox"/> For student exploration during Lesson 1, identify a large outdoor area that provides space with direct sunlight and shade (e.g., playground, sports field, school lawn).</p>

Lesson 2

Materials	<p>Kit Items None</p> <p>Module 1 Kit <input type="checkbox"/> Sentence strips (3)</p> <p>School-Supplied Items <input type="checkbox"/> Pocket chart (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll)</p> <p>Prepared Items from Previous Lessons <input type="checkbox"/> Properties of objects and materials chart from Module 2 Life</p> <p>Item Reuse <input type="checkbox"/> Lesson 17 requires the properties of objects and materials chart.</p>
Resources	<p><input type="checkbox"/> Lesson 2 Resource A: Shadows of Soccer Players Photographs </p> <p><input type="checkbox"/> Lesson 2 Resource B: Sunlight, Flashlight, and Glow Sticks Photographs </p> <p><input type="checkbox"/> Lesson 2 Resource C: Light Source Cards</p>
Preparation	<p><input type="checkbox"/> Turn on several light sources in the classroom. Prepare to cover windows and doors to block sunlight during the lesson.</p> <p><input type="checkbox"/> Prepare light source cards. (See Lesson 2 Resource C.)</p>


Lesson 3

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck™ poster, Wayang (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Glue or tape <input type="checkbox"/> Scissors (1) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 9 requires the Wayang Knowledge Deck poster. <input type="checkbox"/> Lesson 16 requires the prepared wayang cards.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 3 Resource: Wayang Cards
<p>Preparation</p> 	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare wayang cards. (See Lesson 3 Resource.) <input type="checkbox"/> Cue wayang audience side video (http://phdsci.link/1585)  and wayang puppeteer side video (http://phdsci.link/1586).  <p>Advance Preparation for Lesson 4</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 Day Before: Prepare and test bedroom models A and B. (See Lesson 4 Resource A.)

Lesson 4

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knife, precision (1) <input type="checkbox"/> Paper, construction, black, 11" × 17" (16 sheets) <input type="checkbox"/> Penlights with batteries (8) <input type="checkbox"/> Photo boxes with lids, black, 12" × 7" × 4" (8) <input type="checkbox"/> Tape, electrical, black (partial roll) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ruler (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pencil, sharp (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <input type="checkbox"/> Tape, masking (partial roll) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 5 requires the electrical tape, precision knife, ruler, sharp pencil, and a prepared bedroom model A. <input type="checkbox"/> Lesson 6 requires the prepared bedroom model Bs.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 4 Resource A: Bedroom Model Setup Instructions <input type="checkbox"/> Lesson 4 Resource B: Bedroom Object Photographs <input type="checkbox"/> <i>Blackout</i> (Rocco 2011)
<p>Preparation</p>	<p>None</p>



Lesson 5

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knife, precision (1) <input type="checkbox"/> Paper, construction, black, 11" × 17" (8 sheets) <input type="checkbox"/> Penlights with batteries (4) <input type="checkbox"/> Photo boxes with lids, black, 12" × 7" × 4" (4) <input type="checkbox"/> Tape, electrical, black (partial roll) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ruler (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pencil, sharp (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Sweatshirts or other large, thick pieces of cloth to wrap boxes and act as a light barrier (4, if necessary) <input type="checkbox"/> Tape, clear (partial roll) <input type="checkbox"/> Tape, masking (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bedroom model A from Lesson 4 (1) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 5 requires the ruler. <input type="checkbox"/> Lesson 6 requires 1 prepared basement model and 1 prepared bedroom model A. <input type="checkbox"/> Lesson 16 requires the precision knife.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 5 Resource A: Basement Image  <input type="checkbox"/> Lesson 5 Resource B: Basement Model Setup Instructions <input type="checkbox"/> Lesson 5 Resource C: Basement Object Photographs
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare and test basement models. (See Lesson 5 Resource B.)










Lesson 6

Materials	<p>Kit Items None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Flashlights with batteries (4) <input type="checkbox"/> Sentence strip (1) <p>School-Supplied Items None</p> <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bedroom model A from Lesson 4 (1) <input type="checkbox"/> Bedroom model B from Lesson 4 (4) <input type="checkbox"/> Basement model from Lesson 5 (1) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 11 requires 6 of the black photo box lids and the penlights. <input type="checkbox"/> Lesson 14 requires the 4 prepared black photo boxes used for the basement models. Disassemble the basement models by gently removing the photographs of objects.
Resources	<input type="checkbox"/> <i>Blackout</i> (Rocco 2011)
Preparation	None

Lesson 7

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sticky note arrows (30) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strip (1) <p>School-Supplied Items None</p>
Resources	<input type="checkbox"/> <i>Blackout</i> (Rocco 2011)
Preparation	<input type="checkbox"/> Cue fireflies at night video (http://phdsci.link/1595)  and single firefly video (http://phdsci.link/1596). 


Lesson 8

<p>Materials</p>	<p>Kit Items None</p> <p>School-Supplied Items None</p>
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 Resource A: Waitomo Caves Photograph  <input type="checkbox"/> Lesson 8 Resource B: Waitomo Caves Glowworms Photograph  <input type="checkbox"/> Lesson 8 Resource C: Glowworm Photograph  <input type="checkbox"/> Lesson 8 Resource D: Conceptual Checkpoint  <input type="checkbox"/> Lesson 8 Resource E: Cave Wall Photograph 
<p>Preparation</p> 	<ul style="list-style-type: none"> <input type="checkbox"/> Cue <ul style="list-style-type: none"> <input type="radio"/> cave entrance video (http://phdsci.link/1600),  <input type="radio"/> Waitomo caves video (http://phdsci.link/1601),  and <input type="radio"/> glowworm video (http://phdsci.link/1602).  <input type="checkbox"/> Prepare to distribute a copy of Lesson 8 Resource D to each student. <p>Advance Preparation for Lesson 10, 12, and 13</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1–2 Days Before: Identify a large outdoor area that provides space with direct sunlight and shade for student activity during the Lesson 10 Launch, the Lesson 12 Learn, and the Lesson 13 Launch. If possible, select an area with a surface that allows for chalk drawing during Lesson 12 and 13 (e.g., playground). Visit the area in midmorning (around 10:00 a.m.) and in midafternoon (around 2:00 p.m.) to identify two times a day when a student’s shadow would appear similar in size but in a significantly different place on the ground. Consider tracking a stationary object’s shadow with chalk during each visit or taking photographs to keep track of both observations.

Lesson 9

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck cards, Wayang (24) <input type="checkbox"/> Knowledge Deck poster, Wayang (1) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strip (1) <p>Module 2 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Magnifiers, handheld, plastic (6) <p>School-Supplied Items None</p> <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 12 requires the Wayang Knowledge Deck poster. <input type="checkbox"/> Lesson 20 requires the Wayang Knowledge Deck cards.
<p>Resources</p>	<p>None</p>
<p>Preparation</p>	<p>None</p>


Lesson 10

Materials	Kit Items <input type="checkbox"/> Sticky note arrows (72) School-Supplied Items <input type="checkbox"/> Paper clips (24, optional) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll)
Resources	<input type="checkbox"/> Lesson 10 Resource A: Shadow Photographs  <input type="checkbox"/> Lesson 10 Resource B: Class Shadows Chart Setup Instructions <input type="checkbox"/> <i>Blackout</i> (Rocco 2011)
Preparation	<input type="checkbox"/> Use paper clips or sticky notes to mark the following pages in each group's copy of <i>Blackout</i> : 16, 20, 22 to 23, and 24. <input type="checkbox"/> Prepare class shadows chart. (See Lesson 10 Resource B.)


Lesson 11

Materials	Kit Items <input type="checkbox"/> Cat figurines (6) <input type="checkbox"/> Craft sticks, wax, 6" (8) <input type="checkbox"/> Penlights with batteries (6) <input type="checkbox"/> Photo box lids (6) Module 1 Kit <input type="checkbox"/> Sentence strips (2) School-Supplied Items <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) Item Reuse <input type="checkbox"/> Lesson 13 requires the penlights.
Resources	<input type="checkbox"/> Lesson 11 Resource A: Order of Parts Stations Setup Instructions <input type="checkbox"/> Lesson 11 Resource B: Order of Parts Procedure Sheets <input type="checkbox"/> <i>Blackout</i> (Rocco 2011)
Preparation	<input type="checkbox"/> Prepare the teacher's copy of <i>Blackout</i> for the Lesson 11 Launch. Create six small circles with wax craft sticks. On page 16, place a circle around each of the following: the candle, the father's hands, and the shadow on the kitchen wall. On pages 22 and 23, place a circle around each of the following: the flashlight in the mother's hand, the cat, and the shadow on the water tower. Then create two larger circles with wax craft sticks, and place them around the three smaller circles on each page or page spread. <input type="checkbox"/> Set up order of parts stations. (See Lesson 11 Resource A.)



Lesson 12

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Chalk in 1 color (12) <input type="checkbox"/> Knowledge Deck poster, Wayang (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Paper, printer, 8.5" × 11" (12 sheets), or student whiteboards (12) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 requires the Wayang Knowledge Deck poster.
Resources	None
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Cue wayang puppeteer video (http://phdsci.link/1603). 





Lesson 13

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Chalk in 1 color different from Lesson 12 (12) <input type="checkbox"/> Chenille stem, 12" (1) <input type="checkbox"/> Penlights with batteries (6) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Clothespins, wooden, 3" (6) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Paper, printer, 8.5" × 11" (6 sheets) <input type="checkbox"/> Scissors (1) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 17 requires 1 of the clothespins.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 13 Resource A: Morning and Afternoon Shadow Photographs <input type="checkbox"/> Lesson 13 Resource B: Sun Photographs  <input type="checkbox"/> Lesson 13 Resource C: Outdoor Shadow Model Setup Instructions and Classroom Procedure
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute a copy of Lesson 13 Resource B to each group. <input type="checkbox"/> Prepare and test outdoor shadow models. (See Lesson 13 Resource C.)



Lesson 14

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boxes, cardboard, 8" × 5" × 3" (6) <input type="checkbox"/> Cardboard, 6" × 7" (12) <input type="checkbox"/> Paper, construction, black, 11" × 17" (4 sheets) <input type="checkbox"/> Mirrors, plastic, 4" × 6" (6) <input type="checkbox"/> Penlights with batteries (12) <input type="checkbox"/> Photo boxes with lids, black, 12" × 7" × 4" (2) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Sentence strip (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Desks (6) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Black photo boxes from Lesson 5 (4) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 15 requires the plastic mirrors and prepared town models. <input type="checkbox"/> Lesson 16 requires 6 of the penlights and the ruler.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource A: Summer and Winter in Rjukan Photographs  <input type="checkbox"/> Lesson 14 Resource B: Town Model Setup Instructions <input type="checkbox"/> Lesson 14 Resource C: Center of Town in Rjukan Photograph 
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare town models. (See Lesson 14 Resource B.) <input type="checkbox"/> Prepare desks for the light and mirror activity. Place six desks around the room, each pushed against a wall. Tape one penlight to each desk so the penlight points away from the wall. Place a sticky note on the wall behind each penlight. Before the lesson, test each setup to confirm that it is possible to use a mirror to redirect light from the penlight onto the sticky note.

Lesson 15

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mirrors, plastic, 4" × 6" (6) <p>School-Supplied Items</p> <p>None</p> <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Town models from Lesson 14 (6) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Disassemble the town models by gently removing all items from the black photo boxes. Save the cardboard boxes and black photo boxes. <input type="checkbox"/> Lesson 16 requires the cardboard boxes. <input type="checkbox"/> Lesson 18 requires the prepared black photo boxes. <input type="checkbox"/> Lesson 20 requires 1 of the plastic mirrors.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource C: Center of Town in Rjukan Photograph  <input type="checkbox"/> Lesson 15 Resource A: Town Model Illustration  <input type="checkbox"/> Lesson 15 Resource B: Cave Photograph 
<p>Preparation</p> 	<p>None</p> <p>Advance Preparation for Lesson 16</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 Day Before: Prepare wayang screen models. (See Lesson 16 Resource B.)

Lesson 16

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boxes, cardboard, 8" × 5" × 3" (6) <input type="checkbox"/> Knife, precision (1) <input type="checkbox"/> Knowledge Deck poster, Wayang (1) <input type="checkbox"/> Penlights with batteries (6) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ruler (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Paper, printer, 8.5" × 11" (2 sheets) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, packing, clear, 2" wide (1 roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Wayang cards from Lesson 3 (6 sets) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 17 requires the penlights and the ruler. <input type="checkbox"/> Lesson 18 requires the precision knife. <input type="checkbox"/> Lesson 19 requires the Wayang Knowledge Deck poster.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 Resource A: Science Challenge Rubric <input type="checkbox"/> Lesson 16 Resource B: Wayang Screen Model Setup Instructions
<p>Preparation</p> 	<ul style="list-style-type: none"> <input type="checkbox"/> Cue wayang audience side video (http://phdsci.link/1585).  <input type="checkbox"/> Prepare wayang screen models. (See Lesson 16 Resource B.) <p>Advance Preparation for Lesson 17</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 Day Before: Prepare material swatches. (See Lesson 17 Resource A.)

Lesson 17

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Acetate sheets, transparent, 3" × 3" (7) <input type="checkbox"/> Cardboard, 3" × 3" (7) <input type="checkbox"/> Cellophane, clear, 3" × 3" (7) <input type="checkbox"/> Clothespin, 3" (1) <input type="checkbox"/> Finger flashlight, white (1) <input type="checkbox"/> Leather, 3" × 3" (7) <input type="checkbox"/> Light meter (1) <input type="checkbox"/> Paper, parchment, 3" × 3" (7) <input type="checkbox"/> Paper, wax, 3" × 3" (7) <input type="checkbox"/> Penlights with batteries (6) <input type="checkbox"/> Rubber band (1) <input type="checkbox"/> Tape, electrical, black (partial roll) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Sentence strip (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Paper towels, white (7 sheets) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Properties of objects and materials chart started in Lesson 2 <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 18 requires the penlights, permanent marker, and ruler. <input type="checkbox"/> Lesson 20 requires the prepared class materials chart.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 Resource A: Science Challenge Rubric <input type="checkbox"/> Lesson 17 Resource A: Material Swatch Preparation Instructions <input type="checkbox"/> Lesson 17 Resource B: Light Meter Setup Instructions and Additional Information
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Set up light meter. (See Lesson 17 Resource B.)





Lesson 18

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Aluminum foil (partial roll) <input type="checkbox"/> Cardboard, 3" × 3" (6) <input type="checkbox"/> Knife, precision (1) <input type="checkbox"/> Paper, tissue, white, 8.5" × 4" (6 sheets) <input type="checkbox"/> Paper, tracing, 8.5" × 4" (6) <input type="checkbox"/> Penlights with batteries (6) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bags, clear plastic, 1 gal (3) <input type="checkbox"/> Ruler (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Paper clips (6) <input type="checkbox"/> Paper, printer, 8.5" × 11" (3 sheets) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Black photo boxes from Lesson 14 (6) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 19 requires the prepared screens and wayang show models. <input type="checkbox"/> Lesson 20 requires 1 of the penlights. <input type="checkbox"/> Lesson 23 requires the ruler.
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 Resource A: Science Challenge Rubric <input type="checkbox"/> Lesson 18 Resource A: Science Challenge Preparation Instructions <input type="checkbox"/> Lesson 18 Resource B: Light Meter Data Sheet
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare Science Challenge materials. (See Lesson 18 Resource A.) <input type="checkbox"/> Prepare to distribute a copy of Lesson 18 Resource B to each group.


Lesson 19

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck poster, Wayang (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Paper, scrap (24 pieces) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Screens from Lesson 18 (6 each material) <input type="checkbox"/> Wayang show models from Lesson 18 (6) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 20 requires the Wayang Knowledge Deck poster. <input type="checkbox"/> Lesson 21 requires 1 prepared printer paper screen and wayang show model. <input type="checkbox"/> Lesson 23 requires the prepared aluminum foil screen.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 Resource A: Science Challenge Rubric
Preparation	None

Lesson 20

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck cards, Wayang (24) <input type="checkbox"/> Knowledge Deck poster, Wayang (1) <input type="checkbox"/> Leather, 3" × 3" (1) <input type="checkbox"/> Penlight with batteries (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Hole punch, single (1) <input type="checkbox"/> Scissors (1) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Class materials chart from Lesson 17 <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 21 requires the hole punch and penlight. <input type="checkbox"/> Lesson 22 requires the Wayang Knowledge Deck poster. <input type="checkbox"/> Lesson 23 requires the prepared class materials chart.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 20 Resource A: Tree of Life Photograph  <input type="checkbox"/> Lesson 20 Resource B: Metal Colander Photograph  <input type="checkbox"/> Lesson 20 Resource C: Conceptual Checkpoint Part A 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Cue puppeteer making puppet video (http://phdsci.link/1609).  <input type="checkbox"/> Prepare to distribute a copy of Lesson 20 Resource C to each student. <input type="checkbox"/> Cut out a 3" × 3" leather square for Conceptual Checkpoint Part A. Use a hole punch to make two holes in the leather square.



Lesson 21

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mirror, plastic, 4" × 6" (1) <input type="checkbox"/> Penlight with batteries (1) <input type="checkbox"/> Sheet protector (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Book (1) <input type="checkbox"/> Hole punch, single (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Printer paper screen from Lesson 18 (1) <input type="checkbox"/> Wayang show model from Lesson 18 (1) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 23 requires the penlight.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 21 Resource A: Modified Wayang Show Model Setup Instructions <input type="checkbox"/> Lesson 21 Resource B: Conceptual Checkpoint Part B 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare modified wayang show model. (See Lesson 21 Resource A.) <input type="checkbox"/> Prepare to distribute a copy of Lesson 21 Resource B to each student.


Lesson 22

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck poster, Wayang (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Scissors (1)
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 22 Resource: Key Term Cards
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare key term cards. (See Lesson 22 Resource.)

Lesson 23

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Acetate sheet, transparent, 8.5" × 11" (1) <input type="checkbox"/> Aluminum foil, 1" × 3" (3) <input type="checkbox"/> Craft sticks, wax, 6" (7) <input type="checkbox"/> Knowledge Deck cards, Lighthouse (24) <input type="checkbox"/> Knowledge Deck poster, Lighthouse (1) <input type="checkbox"/> Paper, construction, black, 9" × 12" (1 sheet) <input type="checkbox"/> Penlight with batteries (1) <input type="checkbox"/> Tape, electrical, black (partial roll) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ruler (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Class materials chart from Lesson 17 <input type="checkbox"/> Aluminum foil screen from Lesson 18 (1)
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 23 Resource A: Ocean Photograph  <input type="checkbox"/> Lesson 23 Resource B: Lighthouse Model Setup Instructions
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Cue lighthouse video (http://phdsci.link/1612).  <input type="checkbox"/> Prepare lighthouse model. (See Lesson 23 Resource B.) <input type="checkbox"/> Prepare to distribute a copy of the End-of-Module Assessment to each student.

Lesson 24

<p>Materials</p>	<p>Kit Items</p> <p>None</p> <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Scissors (1)
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 24 Resource: Recurring Themes and Concepts Cards
<p>Preparation</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Cue lighthouse video (http://phdsci.link/1612).  <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 Recurring Themes and Concepts cards. (See Lesson 24 Resource.)




Sky | Advance Preparation

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



Lesson	Time in Advance	Investigation	Description
6	1–2 days before†	Analyze Monthly Temperature and Weather Data	Gather monthly temperature card sorts and monthly weather logs compiled by the class throughout the year. Obtain and record missing weather data for the school year. Or if using the sample data from Lubbock, Texas, prepare the Sample Monthly Temperature Card Sorts (Lesson 6 Resource B) and Sample Monthly Weather Logs (Lesson 6 Resource C).
7	1–2 days before†	Monthly Weather Posters	Gather monthly weather posters compiled by the class throughout the year. Obtain and record missing weather data for the school year. Or prepare alternative weather posters from Lubbock, Texas (Lesson 7 Resource A).

Sky | Lesson Preparation



Lesson 1

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bat, stuffed (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Computers or tablets (6) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 3 requires the computers or tablets.
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 1 Resource A: Bat Photographs  <input type="checkbox"/> Lesson 1 Resource B: Bat Facts <input type="checkbox"/> Lesson 1 Resource C: Bat Observation Stations Setup Instructions
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Cue people watching bats video (http://phdsci.link/2507).  <input type="checkbox"/> Prepare bat observation stations. (See Lesson 1 Resource C.) <input type="checkbox"/> Cue bat observation video 1 (http://phdsci.link/2508). 






Lesson 2

Materials	<p>Kit Items None</p> <p>Module 1 Kit <input type="checkbox"/> Sentence strips (5)</p> <p>School-Supplied Items <input type="checkbox"/> Pocket chart (1) <input type="checkbox"/> Scissors (1)</p>
Resources	<input type="checkbox"/> Lesson 2 Resource: Sky Cards
Preparation	<input type="checkbox"/> Cue bat observation video 3 (http://phdsci.link/2510).  <input type="checkbox"/> Prepare to distribute sky cards. (See Lesson 2 Resource.) <input type="checkbox"/> Cue bat observation video 2 (http://phdsci.link/2509). 




Lesson 3

Materials	<p>Kit Items None</p> <p>Module 1 Kit <input type="checkbox"/> Sentence strips (6)</p> <p>School-Supplied Items <input type="checkbox"/> Computers or tablets (6)</p>
Resources	<input type="checkbox"/> Lesson 3 Resource A: Sun Photographs  <input type="checkbox"/> Lesson 3 Resource B: Using Videos from a Planetarium Program <input type="checkbox"/> Lesson 3 Resource C: Sky Observation Videos
Preparation	<input type="checkbox"/> Prepare to use videos from Stellarium®, a planetarium program. (See Lesson 3 Resource B.) <input type="checkbox"/> Cue a different sky observation video for each group on a computer or tablet. (See Lesson 3 Resource C.) <input type="checkbox"/> Cue July 13 sky observation video (http://phdsci.link/2511). 


Lesson 4

<p>Materials</p>	<p>Kit Items None</p> <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll)
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 4 Resource: Bridge Evidence Photographs 
<p>Preparation</p> 	<ul style="list-style-type: none"> <input type="checkbox"/> Cue bat observation video 2 (http://phdsci.link/2509).  <input type="checkbox"/> Cue sunset time-lapse video (http://phdsci.link/2512)  and dusk time-lapse video (http://phdsci.link/2513).  <input type="checkbox"/> Prepare bridge evidence photographs. (See Lesson 4 Resource.) <p>Advance Preparation for Lesson 6</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1–2 Days Before: Gather monthly temperature card sorts and monthly weather logs compiled by the class throughout the year. Obtain and record missing weather data for the school year. Or if using the sample data from Lubbock, Texas, prepare the Sample Monthly Temperature Card Sorts (Lesson 6 Resource B) and Sample Monthly Weather Logs (Lesson 6 Resource C).

Lesson 5

<p>Materials</p>	<p>Kit Items None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bags, resealable plastic, clear, 1 qt (12) <input type="checkbox"/> Linking cubes, green (42) <input type="checkbox"/> Linking cubes, orange (78) <input type="checkbox"/> Linking cubes, yellow (246) <input type="checkbox"/> Thermometer, demonstration (1) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Marker, permanent (1)
<p>Resources</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 5 Resource: April and December Weather in Austin
<p>Preparation</p> 	<ul style="list-style-type: none"> <input type="checkbox"/> Cue Congress Avenue Bridge at dusk video 1 (http://phdsci.link/2533)  and Congress Avenue Bridge at dusk video 2 (http://phdsci.link/2535).  <input type="checkbox"/> Prepare to distribute color copies of data from April and December Weather in Austin (Lesson 5 Resource). Half the student pairs will receive the April data, and the other half of the student pairs will receive the December data. <input type="checkbox"/> Prepare bags of linking cubes for student pairs. For half of the student pairs, prepare April bags by placing 12 orange and 18 yellow linking cubes into a resealable plastic bag and labeling the bag <i>April</i>. For the other half of the student pairs, prepare December bags by placing 1 orange, 23 yellow, and 7 green linking cubes into a resealable plastic bag and labeling the bag <i>December</i>. <p>Advance Preparation for Lesson 7</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1–2 Days Before: Gather monthly weather posters compiled by the class throughout the year. Obtain and record missing weather data for the school year. Or prepare alternative weather posters from Lubbock, Texas (Lesson 7 Resource A).


Lesson 6

Materials	<p>Kit Items None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Sentence strips (2) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Paper, construction, blue, green, orange, purple, red, yellow; 9" × 12" (1 sheet of each color) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Monthly temperature card sorts compiled by the class throughout the year (optional) <input type="checkbox"/> Monthly weather logs compiled by the class throughout the year (optional)
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 6 Resource A: Class Monthly Weather Graph Setup Instructions <input type="checkbox"/> Lesson 6 Resource B: Sample Monthly Temperature Card Sorts <input type="checkbox"/> Lesson 6 Resource C: Sample Monthly Weather Logs <input type="checkbox"/> Lesson 6 Resource D: Congress Avenue Bridge Bat Photograph 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare the class monthly weather graph. (See Lesson 6 Resource A.)



Lesson 7

Materials	<p>Kit Items None</p> <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strips (2) <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Colored pencils or markers, blue, orange, purple, red, yellow (4 sets) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Monthly weather posters compiled by the class throughout the year (optional) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 requires the sets of colored pencils or markers and the prepared Austin seasons chart.
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Lesson 7 *continued*

Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 1 Resource B: Bat Facts <input type="checkbox"/> Lesson 7 Resource A: Lubbock, Texas, Weather Posters  <input type="checkbox"/> Lesson 7 Resource B: Austin Monthly Weather <input type="checkbox"/> Lesson 7 Resource C: Seasons Labels <input type="checkbox"/> Lesson 7 Resource D: Austin Weather Symbols <input type="checkbox"/> Lesson 7 Resource E: Bat Symbols
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare Austin monthly weather data stations. Place the weather data (Lesson 7 Resource B) at each station. Place the March, April, and May tables at Station 1; the June, July, and August tables at Station 2; the September, October, and November tables at Station 3; and the December, January, and February tables at Station 4. Place a set of colored pencils or markers in blue, green, orange, purple, red, and yellow at each station. <input type="checkbox"/> Prepare seasons labels. (See Lesson 7 Resource C.) <input type="checkbox"/> Prepare Austin weather symbols and bat symbols for the Austin seasons chart. (See Lesson 7 Resources D and E.)

Lesson 8

Materials	<p>Kit Items None</p> <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Colored pencils or markers, blue, orange, purple, red, yellow (12 sets) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Austin seasons chart from Lesson 7
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 7 Resource D: Austin Weather Symbols <input type="checkbox"/> Lesson 7 Resource E: Bat Symbols <input type="checkbox"/> Lesson 8 Resource A: Bat Distribution Map  <input type="checkbox"/> Lesson 8 Resource B: Colorado and Mexico Weather Data <input type="checkbox"/> Lesson 8 Resource C: More Bridge Evidence Photographs 
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute copies of Lesson 8 Resource B to each student pair. <input type="checkbox"/> Prepare one additional copy of the Colorado and Mexico weather data (Lesson 8 Resource B). Identify two large areas in the classroom where students can stand to vote for each location, and post the seasonal data sets in the designated areas.

Lesson 9

Materials	<p>Kit Items None</p> <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Glue sticks (24) <input type="checkbox"/> Scissors (1)
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 9 Resource A: Key Terms Cards <input type="checkbox"/> Lesson 9 Resource B: Opossum Photographs  <input type="checkbox"/> Lesson 9 Resource C: Sun and Moon Model <input type="checkbox"/> Lesson 9 Resource D: Sky Models <input type="checkbox"/> End-of-Spotlight Assessment Rubric Part A
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare key term cards. (See Lesson 9 Resource A.) <input type="checkbox"/> Prepare to distribute a copy of the End-of-Spotlight Assessment Part A to each student. <input type="checkbox"/> Prepare sky models. (See Lesson 9 Resource D.)

Lesson 10

Materials	<p>Kit Items None</p> <p>School-Supplied Items None</p>
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> End-of-Spotlight Assessment Rubric Part B
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute a copy of the End-of-Spotlight Assessment Part B to each student.

Lesson 11

Materials	<p>Kit Items None</p> <p>School-Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Scissors (1)
Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 11 Resource: Recurring Themes and Concepts Card
Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Score End-of-Spotlight Assessment, and write individual feedback. <input type="checkbox"/> Select at least one End-of-Spotlight Assessment item for the class to debrief, and prepare a sample response for that item to provide to students. <input type="checkbox"/> Prepare Recurring Themes and Concepts card. (See Lesson 11 Resource.)

Light | Works Cited

Rocco, John. 2011. *Blackout*. New York: Hyperion. [All references to *Blackout* are from this source.]