

Preparation Guide

Level 1 Module 2

Light with Spotlight Lessons on Weather

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.

Preparation: This section identifies preparation teachers should complete before the lesson, including resources teachers should gather or cue. This section has two subsections:

- **Resources:** This subsection 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.
- **Setup:** This subsection lists media teachers must cue before the lesson, activities that require setup, and 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. This subsection also describes advance preparation for upcoming lessons. For example, if teachers need to prepare one day in advance for an activity in Lesson 11, an advance preparation note appears in the Setup subsection 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 Set	Time in Advance	Investigation	Description
10	1–2 days	Compare Shadows	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 Lessons 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 of day when a student’s shadow would appear similar in size but in a significantly different place on the ground. Consider tracing a stationary object’s shadow with chalk during each visit or taking photographs to keep track of both observations

Spotlight Lessons on Weather



Lesson Set	Time in Advance	Investigation	Description
7–8	Plan to complete Lessons 7 and 8 on two different days	Observe Ice Cream After Heating and Observe Ice Cream After Cooling	At the end of Lesson 7, place the melted ice cream samples back in the freezer. At the beginning of Lesson 8, retrieve the refrozen ice cream samples from the freezer.

Light Lesson Materials and Preparation


Lesson 1

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

Lesson 2

Materials	Kit Items None	School Supplied Items
Preparation	Module 1 Kit	<input type="checkbox"/> Pocket chart (1) <input type="checkbox"/> Tape, clear (partial roll)
	<input type="checkbox"/> Sentence strips (2)	
Preparation	Resources	
	<input type="checkbox"/> Lesson 2 Resource A: Shadows of Soccer Players Photographs  <input type="checkbox"/> Lesson 2 Resource B: Sunlight, Flashlight, and Glow Sticks Photographs  <input type="checkbox"/> Lesson 2 Resource C: Light Source Cards	
Preparation	Setup	
	<input type="checkbox"/> Turn on several light sources in the classroom. Prepare to cover windows and doors to block sunlight during the lesson. <input type="checkbox"/> Prepare light source cards. (See Lesson 2 Resource C.)	


Lesson 3

Materials	Kit Items <input type="checkbox"/> Knowledge Deck™ poster, Wayang (1)	School Supplied Items <input type="checkbox"/> Tape, clear (partial roll)
Preparation	Resources <input type="checkbox"/> Lesson 3 Resource: Wayang Cards	
	Setup <input type="checkbox"/> Prepare wayang cards. (See Lesson 3 Resource.) <input type="checkbox"/> Cue wayang audience side video and wayang puppeteer side video: http://phdsci.link/1585 and http://phdsci.link/1586 . 	
	Item Reuse <input type="checkbox"/> Lesson 9 requires the Wayang Knowledge Deck poster. <input type="checkbox"/> Lesson 16 requires the prepared wayang cards.	

Lesson 4

Materials	Kit Items <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)	School Supplied Items <input type="checkbox"/> Paper, construction, black, 9" × 12" (16 sheets) <input type="checkbox"/> Pencil, sharp (1) <input type="checkbox"/> Precision knife (1) <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <input type="checkbox"/> Tape, masking (partial roll)
Preparation	Resources <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)	
	Setup <input type="checkbox"/> Prepare and test bedroom models A and B. (See Lesson 4 Resource A.)	
	Item Reuse <input type="checkbox"/> Lesson 5 requires the precision knife, sharp pencil, and the prepared bedroom model A's. <input type="checkbox"/> Lesson 6 requires the prepared bedroom models A and B.	


Lesson 5

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <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>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Paper, construction, black, 9" × 12" (8 sheets) <input type="checkbox"/> Pencil, sharp (1) <input type="checkbox"/> Precision knife (1) <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Sweatshirts or other thick cloths (4, optional) <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's from Lesson 4 (4) 	
Preparation	<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>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare and test basement models. (See Lesson 5 Resource B.) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 6 requires the prepared basement models and bedroom model A's. <input type="checkbox"/> Lesson 16 requires the precision knife. 	








Lesson 6

Materials	Kit Items None	School Supplied Items None
	Module 1 Kit <input type="checkbox"/> Flashlights with batteries (4) <input type="checkbox"/> Sentence strip (1)	
	Prepared Items from Previous Lessons <input type="checkbox"/> Basement model from Lesson 5 (4) <input type="checkbox"/> Bedroom model A's from Lesson 4 (4) <input type="checkbox"/> Bedroom model B's from Lesson 4 (4)	
Preparation	Resources <input type="checkbox"/> <i>Blackout</i>	
	Setup <input type="checkbox"/> Ensure the class has access to an outdoor-facing window with window coverings (e.g., curtains, shades, blinds).	
	Item Reuse <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.	

Lesson 7

Materials	Kit Items <input type="checkbox"/> Sticky note arrows (30)	School Supplied Items None
	Module 1 Kit <input type="checkbox"/> Sentence strip (1)	
Preparation	Resources <input type="checkbox"/> <i>Blackout</i> (1 for teacher, 1 per group)	
	Setup <input type="checkbox"/> Cue fireflies at night video and single firefly video: http://phdsci.link/1595 and http://phdsci.link/1596 . 	


Lesson 8

Materials	Kit Items	School Supplied Items
	None	None
	<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>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cue cave entrance video, Waitomo caves video, and glowworm video: http://phdsci.link/1600, http://phdsci.link/1601, and 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 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 Lessons 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 of day when a student’s shadow would appear similar in size but in a significantly different place on the ground. Consider tracing a stationary object’s shadow with chalk during each visit or taking photographs to keep track of both observations.</p>	

Lesson 9

Materials	Kit Items	School Supplied Items
	<ul style="list-style-type: none"> <input type="checkbox"/> Binder rings (24) <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"/> Magnifiers, handheld, plastic (6) <input type="checkbox"/> Sentence strip (1) 	None
Preparation	<p>Resources</p> <p>None</p>	
	<p>Setup</p> <p>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. 	


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)
Preparation	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> (1 per group)	
	Setup <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)	School Supplied Items <input type="checkbox"/> Tape, clear (partial roll)
	Module 1 Kit <input type="checkbox"/> Sentence strip (1)	
Preparation	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>	
	Setup <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.)	
	Item Reuse <input type="checkbox"/> Lesson 13 requires the penlights.	



Lesson 12

Materials	Kit Items <input type="checkbox"/> Knowledge Deck poster, Wayang (1)	School Supplied Items Chalk, same color (12 sticks)
Preparation	Resources None	
	Setup <input type="checkbox"/> Cue wayang puppeteer video: http://phdsci.link/1603 . 	
	Item Reuse <input type="checkbox"/> Lesson 16 requires the Wayang Knowledge Deck poster.	




Lesson 13

Materials	Kit Items <input type="checkbox"/> Chenille stem, 12" (1) <input type="checkbox"/> Clothespins, wooden, 3" (6) <input type="checkbox"/> Penlights with batteries (6)	School Supplied Items <input type="checkbox"/> Chalk, different color than Lesson 12 (12 sticks) <input type="checkbox"/> Paper, printer, 8.5" x 11" (6 sheets) <input type="checkbox"/> Scissors (1)
Preparation	Resources <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	
	Setup <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.)	
	Item Reuse <input type="checkbox"/> Lesson 14 requires penlights.	


Lesson 14

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boxes, cardboard, 8" × 5" × 3" (6) <input type="checkbox"/> Mirrors, plastic, 4" × 6" (6) <input type="checkbox"/> Penlights with batteries (12) <input type="checkbox"/> Photo boxes, black, 12" × 7" × 4" (2) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strip (1) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cardboard, 6" × 7" (12) <input type="checkbox"/> Desks (6) <input type="checkbox"/> Paper, construction, black, 9" × 12" (8 sheets) <input type="checkbox"/> Ruler (1) <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) 	
Preparation	<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>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare town models. (See Lesson 14 Resource B.) <input type="checkbox"/> Prepare stations for the light and mirror activity. Place six desks around the room, each pushed against a wall. Tape one penlight pointing away from the wall to each desk, and place a sticky note on the wall behind each penlight. Before the lesson, test each station to confirm that it is possible to use a mirror to redirect light from the penlight onto the sticky note. <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. 	

Lesson 15

Materials	Kit Items <input type="checkbox"/> Mirrors, plastic, 4" × 6" (6)	School Supplied Items None
	Prepared Items from Previous Lessons <input type="checkbox"/> Town models from Lesson 14 (6)	
Preparation	Resources <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 	
	Setup None	
	Item Reuse <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 21 requires 1 of the plastic mirrors.	

Lesson 16

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Boxes, cardboard, 8" × 5" × 3" (6) <input type="checkbox"/> Knowledge Deck poster, Wayang (1) <input type="checkbox"/> Penlights with batteries (6) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Paper, printer, 8.5" × 11" (2 sheets) <input type="checkbox"/> Precision knife (1) <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, packing, clear, 2" wide (1 roll)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Wayang cards from Lesson 3 (6 sets) 	
Preparation	Resources <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 	
	Setup <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.) 	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 17 requires the penlights. <input type="checkbox"/> Lesson 18 requires the precision knife. <input type="checkbox"/> Lesson 19 requires the Wayang Knowledge Deck poster. 	

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"/> 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"/> Parchment paper, 3" × 3" (7) <input type="checkbox"/> Penlights with batteries (6) <input type="checkbox"/> Tape, electrical, black (partial roll) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strip (1) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cardboard, 3" × 3" (7) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Paper towels, white (7 sheets) <input type="checkbox"/> Rubber band (1) <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll) <input type="checkbox"/> Wax paper (1 roll)
	<p>Preparation</p>	<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>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare material swatches. (See Lesson 17 Resource A.) <input type="checkbox"/> Set up light meter. (See Lesson 17 Resource B.) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 18 requires the penlights and permanent marker. <input type="checkbox"/> Lesson 20 requires the prepared class materials chart. 		





Lesson 18

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Penlights with batteries (6) <input type="checkbox"/> Paper, tracing, 8.5" × 4" (6) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Aluminum foil (partial roll) <input type="checkbox"/> Bags, clear plastic, 1 gal (3) <input type="checkbox"/> Cardboard, 3" × 3" (6) <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"/> Paper, tissue, white, 8.5" × 4" (6 sheets) <input type="checkbox"/> Pencil, sharp (1) <input type="checkbox"/> Precision knife (1) <input type="checkbox"/> Ruler (1) <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) 	
Preparation	<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>Setup</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. 	
	<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. 	


Lesson 19

Materials	Kit Items <input type="checkbox"/> Knowledge Deck poster, Wayang (1)	School Supplied Items <input type="checkbox"/> Paper, scrap (24 pieces)
	Prepared Items from Previous Lessons <input type="checkbox"/> Screens from Lesson 18 (6 each material) <input type="checkbox"/> Wayang show models from Lesson 18 (6)	
Preparation	Resources <input type="checkbox"/> Lesson 16 Resource A: Science Challenge Rubric <input type="checkbox"/> Lesson 18 Resource B: Light Meter Data Sheet	
	Setup None	
	Item Reuse <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.	

Lesson 20

Materials	Kit Items <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) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Colander (1, optional) <input type="checkbox"/> Hole punch, single (1) <input type="checkbox"/> Scissors (1)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Class materials chart from Lesson 17 (1) 	
Preparation	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  	
	Setup <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. Item Reuse <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. 	



Lesson 21

Materials	Kit Items <input type="checkbox"/> Mirror, plastic, 4" × 6" (1) <input type="checkbox"/> Penlight with batteries (1)	School Supplied Items <input type="checkbox"/> Book (1) <input type="checkbox"/> Hole punch, single (1) <input type="checkbox"/> Sheet protector (1) <input type="checkbox"/> Tape, clear (partial roll)
	Prepared Items from Previous Lessons <input type="checkbox"/> Printer paper screen from Lesson 18 (1) <input type="checkbox"/> Wayang show model from Lesson 18 (1)	
Preparation	Resources <input type="checkbox"/> Lesson 21 Resource A: Modified Wayang Show Model Setup Instructions <input type="checkbox"/> Lesson 21 Resource B: Conceptual Checkpoint Part B 	
	Setup <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.	
	Item Reuse <input type="checkbox"/> Lesson 23 requires the penlight.	



Lesson 22

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

Lesson 23


Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Acetate sheet, transparent, 8.5" × 11" (1) <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"/> Penlight with batteries (1) <input type="checkbox"/> Tape, electrical, black (partial roll) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Aluminum foil, 1" × 3" (3) <input type="checkbox"/> Paper, construction, black, 9" × 12" (1 sheet) <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape, clear (partial roll)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Class materials chart from Lesson 17 (1) <input type="checkbox"/> Aluminum foil screen from Lesson 18 (1) 	
Preparation	Resources <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 	
	Setup <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.) 	

Lesson 24



Materials	Kit Items None	School Supplied Items None
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 24 Resource: Systems Card  	
	Setup <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 Systems card. (See Lesson 24 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 anchor model, class charts, selected Science Logbook pages, and Science Challenge designs. 	

Weather Lesson Materials and Preparation

Lesson 1

Materials	Kit Items <input type="checkbox"/> Bottles, squeeze, plastic (12) Module 1 Kit <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1)	School Supplied Items <input type="checkbox"/> Bags, resealable plastic, 1 qt (24) <input type="checkbox"/> Crayons, light colored (24) <input type="checkbox"/> Facial tissues (12 sheets) <input type="checkbox"/> Paper, printer, 8.5" x 11" (6 sheets) <input type="checkbox"/> Pencils (12) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Toilet paper tubes (12) or paper towel tubes (4)
	Preparation	Resources None Setup <input type="checkbox"/> Cue family blowing bubbles, flag moving in wind, and dandelion seeds dispersing in wind videos: http://phdsci.link/1885 , http://phdsci.link/1510 , and http://phdsci.link/1886 .  <input type="checkbox"/> Prepare the paper balls and tubes. Cut each sheet of printer paper in half and crumple each half sheet into a ball. If using paper towel tubes, cut tubes into thirds.



Lesson 2

Materials	Kit Items <input type="checkbox"/> Clothespins, wooden, 3" (6) <input type="checkbox"/> Fan, table (1)	School Supplied Items <input type="checkbox"/> Flagging tape, 1" wide ($4\frac{1}{2}$ ft) <input type="checkbox"/> Rulers (6) <input type="checkbox"/> Scissors (1)
	Preparation	Resources <input type="checkbox"/> Lesson 2 Resource A: Child in Field Photograph  <input type="checkbox"/> Lesson 2 Resource B: Wind Observation Tool Instructions <input type="checkbox"/> Lesson 2 Resource C: Cloud Cover Cards Setup <input type="checkbox"/> Cue child in a field video: http://phdsci.link/1888 .  <input type="checkbox"/> Prepare wind observation tools. Use one tool for demonstration in Lesson 2. Determine the optimal data collecting distance between the tool and the fan prior to the lesson. (See Lesson 2 Resource B.) <input type="checkbox"/> Prepare cloud cover cards. (See Lesson 2 Resource C.) Item Reuse <input type="checkbox"/> Lesson 3 requires the wind observation tools.




Lesson 3

Materials	Kit Items <input type="checkbox"/> Thermometer, Fahrenheit, plastic back (12) Module 1 Kit <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1)	School Supplied Items <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Stapler (1) <input type="checkbox"/> Tape, packing, clear, 2" wide (1 roll) or laminating machine (1)
	Prepared Items from Previous Lessons <input type="checkbox"/> Wind observation tools from Lesson 2 (6)	
Preparation	Resources <input type="checkbox"/> Lesson 3 Resource: Thermometer Setup Instructions	
	Setup <input type="checkbox"/> Prepare thermometers. (See Lesson 3 Resource.)	
	Item Reuse <input type="checkbox"/> Lesson 7 requires the prepared thermometers.	



Lesson 4

Materials	Kit Items None	School Supplied Items <input type="checkbox"/> Glue stick (1) <input type="checkbox"/> Scissors (1)
Preparation	Resources <input type="checkbox"/> Lesson 4 Resource A: Alamo Photographs  <input type="checkbox"/> Lesson 4 Resource B: 2019 Weather Calendars 	
	Setup <input type="checkbox"/> Prepare to distribute an April, a July, or an October weather calendar from Lesson 4 Resource B to each student pair. Consider using cardstock and laminating for multiple uses. Prepare one set of four calendars for the seasons chart.	


Lesson 5

Materials	Kit Items None	School Supplied Items <input type="checkbox"/> Crayons, blue, green, orange, purple, red and yellow (24 each color)
Preparation	Resources <input type="checkbox"/> Lesson 5 Resource A: Big Bend National Park Photographs  <input type="checkbox"/> Lesson 5 Resource B: Big Bend National Park Temperature Data  <input type="checkbox"/> Lesson 5 Resource C: Big Bend National Park Temperature Data for November 2020 	
	Setup <input type="checkbox"/> Prepare to distribute color copies of Lesson 5 Resource B to each student pair.	




Lesson 6

Materials	Kit Items None	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 5 Resource A: Big Bend National Park Photographs  <input type="checkbox"/> Lesson 6 Resource A: Moon Photographs <input type="checkbox"/> Lesson 6 Resource B: Star Photographs 	
	Setup <input type="checkbox"/> Prepare to distribute a color copy of Lesson 6 Resource A to each student pair. <input type="checkbox"/> Prepare to distribute a color copy of Lesson 6 Resource B to each student pair. <input type="checkbox"/> (Optional) Cue stars in Joshua Tree National Park time-lapse video: http://phdsci.link/1894 .	

Lesson 7

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Foil cupcake liners (13) <input type="checkbox"/> Thermometer, digital probe (1) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Aluminum foil (1 roll, optional) <input type="checkbox"/> Freezer (access) <input type="checkbox"/> Ice cream, vanilla (1 pint) <input type="checkbox"/> Insulated cooler (1, optional) <input type="checkbox"/> Masking tape (1 roll, optional) <input type="checkbox"/> Measuring spoon, $\frac{1}{2}$ tsp (1) <input type="checkbox"/> Measuring spoon, 1 tsp (1) <input type="checkbox"/> Muffin tins (1–2, optional)
	<p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Thermometers from Lesson 3 (12) 	
Preparation	<p>Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 7 Resource A: Ice Cream Heating and Cooling Investigation Setup <input type="checkbox"/> Lesson 7 Resource B: Sunny Day Photograph  	
	<p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Plan to complete Lessons 7 and 8 on two different days. <input type="checkbox"/> Prepare samples for ice cream heating and cooling investigation and demonstration. (See Lesson 7 Resource A.) 	
	<p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 requires the prepared ice cream samples and the digital probe thermometer. Place the melted ice cream samples in the freezer. 	

Lesson 8

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Thermometer, digital probe (1) <p>Module 1 Kit</p> <ul style="list-style-type: none"> <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Freezer (access) <input type="checkbox"/> Insulated cooler (1, optional) <input type="checkbox"/> Muffin tins (1-2, optional)
	<p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Refrozen ice cream samples from Lesson 7 (13) 	
Preparation	<p>Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 Resource A: Hamburger Photographs  <input type="checkbox"/> Lesson 8 Resource B: Candle Photographs  	
	<p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare samples for ice cream heating and cooling investigation and demonstration. (See Lesson 7 Resource A.) <input type="checkbox"/> Cue hamburger, candle melting, and candle cooling videos: http://phdsci.link/1898, http://phdsci.link/1899, and http://phdsci.link/1900.  	

Works Cited

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

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