

Preparation Guide

Level 5 Module 1

Earth Features with Spotlight Lessons on Matter

Materials: This section lists the quantity of each material necessary for the lesson. Lesson materials may be from a *PhD Science*® 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	Time in Advance	Investigation	Description
6	7 days	Plant Station	Prepare plaster of Paris and plant seeds for investigation. (See Lesson 6 Resource A.)
6	2 days [†]	Ice Station	Prepare plaster of Paris and balloons for investigation. (See Lesson 6 Resource A.)
6	1 day	Plant Station	Prepare control for plant investigation. (See Lesson 6 Resource A.)
8	1 day [†]	Create Stream Table Bin	Create stream table bins by drilling one hole in a corner of each plastic bin. The diameter of the hole depends on the

			rubber stopper diameter. The rubber stopper should fit snugly in the hole, preventing water flow.
8	1 day	Stream Table Landscapes	Prepare materials for stream table landscapes.
9	1 day	Wind and Water Investigations	Prepare materials for wind and water erosion investigations. Make or obtain ice cubes for water investigation.
23	1 day†	Stream Table Dam Investigation	Prepare materials for dam investigation. (See Lesson 23 Resource A.)
25	1 day†	Read About Energy Sources	Secure hard copy versions of the texts listed in Lesson 25 Resource or open a free Epic School educator account (http://phdsci.link/1007) to access digital versions of the texts.

Earth Features Lesson Materials and Preparation



Lesson 1

Materials	Kit Items	School Supplied Items
	None	None
Preparation 	Resources <input type="checkbox"/> Lesson 1 Resource A: John Wesley Powell Information  <input type="checkbox"/> Lesson 1 Resource B: Powell’s 1871 Expedition Team Photographs  <input type="checkbox"/> Lesson 1 Resource C: <i>The Chasm of the Colorado</i>  <input type="checkbox"/> Lesson 1 Resource D: Present-Day Grand Canyon Photographs 	
	Setup None	
	Advance Preparation for Lesson 6 1 Week Before: Start preparation for Plant Station. (See Lesson 6 Resource A.)	



Lesson 2

No materials or preparation required.



Lesson 3

Materials	Kit Items <input type="checkbox"/> Clay, modeling, 40 g each color (5 colors) <input type="checkbox"/> Sheet protectors, heavy duty (12)	School Supplied Items <input type="checkbox"/> Craft sticks or toothpicks (30, optional) <input type="checkbox"/> Markers, dry erase, 6 colors (12 each color) <input type="checkbox"/> Objects, small (e.g., cones, ferns, shells, sticks) (24) <input type="checkbox"/> Plastic wrap (1 roll) or airtight containers (5)
	Preparation	Resources <input type="checkbox"/> Lesson 1 Resource D: Present-Day Grand Canyon Photographs—Figure 5  <input type="checkbox"/> Lesson 3 Resource A: Grand Canyon Fossil Guide <input type="checkbox"/> Lesson 3 Resource B: Grand Canyon Layers—Additional information for Teachers
	Setup <input type="checkbox"/> Cue “Over the Rim, Into the Canyon” (NPS 2009) video: http://phdsci.link/1000 .  <input type="checkbox"/> Prepare to distribute a copy of Figure 5 in Lesson 1 Resource D to each student pair.	
	Item Reuse <input type="checkbox"/> Lesson 4 requires 1 airtight container or plastic wrap, the annotated rock layer photograph, and the clay rock layers created by students.	


Lesson 4

Materials	Kit Items <input type="checkbox"/> Clay, modeling, 40 g (1 color)	School Supplied Items <input type="checkbox"/> Newspaper (5 sheets, optional) <input type="checkbox"/> Plastic wrap (1 roll) or airtight container (1)
	Prepared Items from Previous Lessons <input type="checkbox"/> Clay rock layers from Lesson 3 (5) <input type="checkbox"/> Annotated rock layer photograph from Lesson 3	
Preparation 	Resources <input type="checkbox"/> Lesson 3 Resource A: Grand Canyon Fossil Guide <input type="checkbox"/> Lesson 4 Resource: Layered Cake Photograph 	
	Setup <input type="checkbox"/> Roll out 1 roll or brick of modeling clay to create Rock Layer F.	
	Item Reuse <input type="checkbox"/> Lesson 6 requires the prepared clay model of rock layers.	
Advance Preparation for Lesson 6 2 Days Before: Start preparation for Ice Station. (See Lesson 6 Resource A.)		




Lesson 5

Materials	Kit Items None	School Supplied Items None
Preparation 	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 5 Resource: Conceptual Checkpoint Diagram  <input type="checkbox"/> <i>Grand Canyon</i> by Jason Chin (2017) 	
	Setup None	
	Advance Preparation for Lesson 6 1 Day Before: Prepare control for plant investigation. (See Lesson 6 Resource A.)	



Lesson 6

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Lima bean seeds (18) <input type="checkbox"/> Magnifier, handheld, plastic (1) <input type="checkbox"/> Plaster of Paris (4 lb) <input type="checkbox"/> Safety goggles (24) <input type="checkbox"/> Shaving cream (7 oz) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Balloons (8) <input type="checkbox"/> Cups, clear plastic, 9 oz (14) <input type="checkbox"/> Knife, plastic (1) <input type="checkbox"/> Paper towels (2 sheets) <input type="checkbox"/> Pipettes, disposable (2) <input type="checkbox"/> Plates, paper (9) <input type="checkbox"/> Rock, small (1) <input type="checkbox"/> Straws, paper or plastic (24) <input type="checkbox"/> Sugar cubes (18) <input type="checkbox"/> Water (2 L)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Clay model of rock layers from Lesson 4 	
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 1 Resource D: Present-Day Grand Canyon Photographs—Figure 4  <input type="checkbox"/> Lesson 6 Resource A: Material Interaction Stations Setup Instructions <input type="checkbox"/> Lesson 6 Resource B: Material Interaction Stations Procedure Sheets <input type="checkbox"/> <i>Grand Canyon</i> by Jason Chin (2017) 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Set up Material Interaction Stations. (See Lesson 6 Resource A.) 	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 8 requires the plastic cup from the water station. <input type="checkbox"/> Lesson 22 requires the modeling clay from the prepared clay model of rock layers. 	

Lesson 7

Materials	Kit Items None	School Supplied Items None
Preparation 	Resources <input type="checkbox"/> Lesson 1 Resource D: Present-Day Grand Canyon Photographs—Figure 4  <input type="checkbox"/> Lesson 7 Resource: Rocks with Holes Photograph 	
	Setup None	
	Advance Preparation for Lesson 8 1 Day Before: Create stream table bins by drilling one hole in a corner of each plastic bin. The diameter of the hole depends on the rubber stopper diameter. The rubber stopper should fit snugly in the hole, preventing water flow. 1 Day Before: Prepare materials for stream table landscape.	

Lesson 8

Materials	Kit Items <input type="checkbox"/> Bins, clear plastic, 20" × 12" × 6" (6) <input type="checkbox"/> Gloves, disposable (24 pairs) <input type="checkbox"/> Hook and loop fastener (partial roll) <input type="checkbox"/> Rubber stoppers, size #00 (6) <input type="checkbox"/> Safety goggles (24)	School Supplied Items <input type="checkbox"/> Cups, clear plastic, 9 oz (6) <input type="checkbox"/> Drill with $\frac{1}{4}$ " drill bit (1) <input type="checkbox"/> Natural materials (e.g., leaves, grass, pebbles, sticks) (about 1 gallon, optional) <input type="checkbox"/> Sand (12 cups) <input type="checkbox"/> Soil (48 cups)
Preparation 	Resources <input type="checkbox"/> Lesson 1 Resource D: Present-Day Grand Canyon Photographs—Figure 4 	
	Setup <input type="checkbox"/> Prepare materials for investigations and determine how students will retrieve materials. Either line up all materials by item on a counter for students to access when needed or gather each group’s set of materials beforehand.	
	Item Reuse <input type="checkbox"/> Lesson 9 requires the plastic cups, hook and loop fastener, and prepared stream tables.	
	Advance Preparation for Lesson 9 1 Day Before: Prepare materials for wind and water erosion investigations. Make or obtain 1 ice cube for each group for water investigation.	



Lesson 9

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Hook and loop fastener (partial roll) <input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6) <input type="checkbox"/> Safety goggles (24) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cups, clear plastic, 9 oz (12) <input type="checkbox"/> Grass, 1 qt bags (6) <input type="checkbox"/> Ice cubes (6) <input type="checkbox"/> Pebbles (12 cups) <input type="checkbox"/> Rocks, large (12 cups) <input type="checkbox"/> Straws, paper or plastic (24) <input type="checkbox"/> Water (about 12 L)
	<p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Plastic cups, hook and loop fastener from Lesson 8 <input type="checkbox"/> Stream tables from Lesson 8 (6) 	
Preparation	<p>Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 9 Resource: Gravity Investigation Photographs <input type="checkbox"/> 	
	<p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> For each group, create 1 cup with 7 to 8 small holes and 1 cup with 1 hole. <input type="checkbox"/> Prepare materials for investigations and determine how students will retrieve materials. Either line up all materials by item on a counter for students to access when needed or gather each group's set of materials beforehand. 	
	<p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 10 requires the aluminum pans, grass, pebbles, rocks, prepared cups with 1 hole, and prepared stream tables. Remove as much of the student investigation materials as possible from the stream tables while leaving the soil mixture. 	



Lesson 10

Materials	Kit Items <input type="checkbox"/> Hook and loop fastener (partial roll) <input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6)	School Supplied Items <input type="checkbox"/> Cups, clear plastic, 9 oz (12) <input type="checkbox"/> Grass, 1 qt bags (6) <input type="checkbox"/> Pebbles (12 cups) <input type="checkbox"/> Rocks, large (12 cups)
	Prepared Items from Previous Lessons <input type="checkbox"/> Stream tables from Lesson 8 (6) <input type="checkbox"/> Cups with 1 hole from Lesson 9 (6)	
Preparation	Resources <input type="checkbox"/> Module 1 Lesson 8 and 9 Investigation Support in online Teacher Resource Pack	
	Setup <input type="checkbox"/> Prepare materials for investigations and determine how students will retrieve materials. Either line up all materials by item on a counter for students to access when needed or gather each group's set of materials beforehand. <input type="checkbox"/> For each group, create 1 cup with 2 holes and 1 cup with 3 holes.	
	Item Reuse <input type="checkbox"/> Lesson 13 requires the aluminum pans, grass, pebbles, rocks, prepared cups with 1 hole, 2 holes, and 3 holes, and the prepared stream tables. Remove as much of the student investigation materials as possible from the stream tables while leaving the soil mixture.	


Lesson 11

Materials	Kit Items None	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 11 Resource A: Colorado River Map and Photographs  <input type="checkbox"/> Lesson 11 Resource B: Conceptual Checkpoint Photographs 	
	Setup None	

Lesson 12

Materials	Kit Items None	School Supplied Items None
Preparation	Resources	
	<input type="checkbox"/> Lesson 12 Resource A: Engineering Design Process (optional) <input type="checkbox"/> Lesson 12 Resource B: Blank Engineering Design Process Chart (optional)  <input type="checkbox"/> Lesson 12 Resource C: Engineering Challenge Scenario  <input type="checkbox"/> <i>Who Were the Wright Brothers?</i> by James Buckley Jr. (2014)	
	Setup None	

Lesson 13

Materials	Kit Items	School Supplied Items
	<input type="checkbox"/> Ball bearing catches (6) <input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6)	<input type="checkbox"/> Grass, 1 qt bags (6) <input type="checkbox"/> Pebbles (12 cups) <input type="checkbox"/> Rocks, large (12 cups) <input type="checkbox"/> Water (about 12 L)
	Prepared Items from Previous Lessons	
	<input type="checkbox"/> Stream tables from Lesson 8 (6) <input type="checkbox"/> Cups with 1 hole, 2 holes, and 3 holes from Lesson 10 (6 sets)	
Preparation	Resources	
	<input type="checkbox"/> Lesson 12 Resource A: Engineering Design Process (optional) <input type="checkbox"/> Lesson 12 Resource C: Engineering Challenge Scenario 	
	Setup None	
	Item Reuse	
	<input type="checkbox"/> Lesson 14 requires the prepared Engineering Challenge materials.	

Lesson 14

Materials	Kit Items None	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Supplies students bring from home (e.g., plastic or paper plates; cardboard boxes; paper towel rolls; string; straws; plastic, polystyrene, or paper cups; wooden skewers; masking tape; craft sticks; building blocks; clay) <input type="checkbox"/> Water (about 12 L)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Engineering Challenge materials from Lesson 13 	
Preparation	Resources None	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Prepare classroom materials for the Engineering Challenge and determine how students will retrieve materials. Either line up all materials by item on a counter for students to access when needed or gather each group’s set of materials beforehand. 	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 15 requires the prototypes created by students and the remaining Engineering Challenge materials. 	

Lesson 15

Materials	Kit Items None	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Supplies students bring from home (e.g., plastic or paper plates; cardboard boxes; paper towel rolls; string; straws; plastic, polystyrene, or paper cups; wooden skewers; masking tape; craft sticks; building blocks; clay) <input type="checkbox"/> Water (about 12 L)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Prototypes from Lesson 14 (6) <input type="checkbox"/> Remaining Engineering Challenge materials from Lesson 13 	
Preparation	Resources None	
	Setup None	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 requires the prototypes created by students and the remaining Engineering Challenge materials. 	




Lesson 16

Materials	Kit Items None	School Supplied Items <input type="checkbox"/> Supplies students bring from home (e.g., plastic or paper plates; cardboard boxes; paper towel rolls; string; straws; plastic, polystyrene, or paper cups; wooden skewers; masking tape; craft sticks; building blocks; clay) <input type="checkbox"/> Water (about 12 L)
	Prepared Items from Previous Lessons <input type="checkbox"/> Prepared prototypes from Lesson 15 (6) <input type="checkbox"/> Remaining Engineering Challenge materials from Lesson 13	
Preparation	Resources None	
	Setup None	
	Item Reuse <input type="checkbox"/> Lesson 17 requires the prototypes created by students.	



Lesson 17

Materials	Kit Items None	School Supplied Items <input type="checkbox"/> Paper, half sheets, or sticky notes (24) <input type="checkbox"/> Water (about 12 L)
	Prepared Items from Previous Lessons <input type="checkbox"/> Prepared prototypes from Lesson 16 (6)	
Preparation	Resources None	
	Setup None	
	Item Reuse <input type="checkbox"/> Lesson 21 requires the aluminum pans and prepared stream tables. Disassemble students' prototypes. Remove as much of the Engineering Challenge materials as possible from the stream tables while leaving the soil mixture.	




Lesson 18

Materials	Kit Items <input type="checkbox"/> Safety goggles (24)	School Supplied Items <input type="checkbox"/> Bags, resealable plastic, snack (24) <input type="checkbox"/> Bowl, mixing, large (1) <input type="checkbox"/> Flour, all purpose (4 cups) <input type="checkbox"/> Gravel (3 cups) <input type="checkbox"/> Plates, disposable (12) <input type="checkbox"/> Spoon, mixing (optional, 1) <input type="checkbox"/> Table salt (1 cup) <input type="checkbox"/> Paper, half sheets, or sticky notes (24) <input type="checkbox"/> Water (about 12 L)
	Preparation Resources <input type="checkbox"/> Lesson 18 Resource A: River Sediment Photograph  <input type="checkbox"/> Lesson 18 Resource B: Sedimentary Rocks Photographs  <input type="checkbox"/> Lesson 18 Resource C: Sedimentary Rock Formation Investigation Setup Instructions <input type="checkbox"/> Lesson 18 Resource D: Grand Canyon Layers Photograph  <input type="checkbox"/> <i>Grand Canyon</i> (Chin 2017)	
	Setup <input type="checkbox"/> Prepare materials for sedimentary rock formation investigation. (See Lesson 18 Resource C.)	


Lesson 19

Materials	Kit Items None	School Supplied Items None
	Preparation Resources <input type="checkbox"/> Lesson 19 Resource A: Canyons around the World Photographs  <input type="checkbox"/> Lesson 19 Resource B: World Relief Maps 	
	Setup None	





Lesson 20

Materials	Kit Items None	School Supplied Items None
Preparation	Resources	
	<input type="checkbox"/> Lesson 1 Resource D: Present-Day Grand Canyon Photographs—Figure 2  <input type="checkbox"/> Lesson 19 Resource B: World Relief Map <input type="checkbox"/> Lesson 20 Resource A: Earth’s Features Photographs  <input type="checkbox"/> Lesson 20 Resource B: Earthquake and Volcano Maps 	
	Setup None	




Lesson 21

Materials	Kit Items None	School Supplied Items None
	Prepared Items from Previous Lessons	
	<input type="checkbox"/> Stream tables from Lesson 8 (6)	
Preparation	Resources	
	<input type="checkbox"/> Lesson 21 Resource: Conceptual Checkpoint Map  <input type="checkbox"/> <i>Grand Canyon</i> by Jason Chin (2017)	
	Setup None	
	Item Reuse Lesson 22 requires the aluminum pans, plastic cups, and prepared stream tables.	



Lesson 22

Materials	Kit Items <input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6)	School Supplied Items <input type="checkbox"/> Cups, clear plastic, 9 oz (6) <input type="checkbox"/> Sand (optional, 6 cups) <input type="checkbox"/> Soil (optional, 6 cups) <input type="checkbox"/> Water (8 L)
	Prepared Items from Previous Lessons <input type="checkbox"/> Aluminum pans, plastic cups, and stream tables from Lesson 8 (6)	
Preparation 	Resources <input type="checkbox"/> Lesson 22 Resource A: Theodore Roosevelt Dam Photograph  <input type="checkbox"/> Lesson 22 Resource B: Pre-1903 Colorado River System Map  <input type="checkbox"/> Lesson 22 Resource C: Model the Colorado River Setup Instructions	
	Setup <input type="checkbox"/> Cue beaver dam video: http://phdsci.link/1002 . 	
Advance Preparation for Lesson 23 1 Day Before: Prepare plastic dams for dam investigation. (See Lesson 23 Resource A.)		

Lesson 23

Materials	Kit Items <input type="checkbox"/> Clay, modeling (240 g) <input type="checkbox"/> Cutting boards, plastic, 6" × 4" (6) <input type="checkbox"/> Pans, aluminum, 13" × 9" × 2" (6)	School Supplied Items <input type="checkbox"/> Cups, clear plastic, 9 oz (6) <input type="checkbox"/> Hole punch, single hole (1) <input type="checkbox"/> Scissors, (1) <input type="checkbox"/> Water (12 L)
	Prepared Items from Previous Lessons <input type="checkbox"/> Stream tables from Lesson 8 (6)	
Preparation	Resources <input type="checkbox"/> Lesson 23 Resource A: Effects of a Dam on a River Investigation Setup Instructions  <input type="checkbox"/> Lesson 23 Resource B: Dam Gates Photograph  <input type="checkbox"/> Lesson 23 Resource C: Present-Day Colorado River System Map 	
	Setup Prepare plastic dams for dam investigation. (See Lesson 23 Resource A.)	

Lesson 24

Materials	Kit Items	School Supplied Items
	None	None
Preparation 	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 24 Resource A: Additional Theodore Roosevelt Dam Photographs  <input type="checkbox"/> Lesson 24 Resource B: Excerpts from “The Hoover Dam: Controlling Water in the West” (Adapted) <input type="checkbox"/> Lesson 24 Resource C: “The Hoover Dam: Controlling Water in the West” (Adapted) 	
	Setup None	
	Advance Preparation for Lesson 25 1 Day Before: Secure texts. (See Lesson 24 Resource.) Alternatively, open a free Epic School educator account to access digital versions of the texts (http://phdsci.link/1007).	

Lesson 25

Materials	Kit Items	School Supplied Items
	None	<input type="checkbox"/> Index cards, 3” x 5” (48)
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 25 Resource: Excerpts for Jigsaw Reading 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Secure texts (see Lesson 25 Resource) or open free educator account to access Epic! digital texts (http://phdsci.link/1007). 	

Lesson 26

No materials or preparation required.

Lesson 27

No materials or preparation required.

Lesson 28

Materials	Kit Items None	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 28 Resource: Content Standards	
	Setup <input type="checkbox"/> Score End-of-Module Assessments and write individual feedback. <input type="checkbox"/> Select End-of-Module Assessment responses to share with students. <input type="checkbox"/> Prepare visual for student connections between module learning and content standards. (See Lesson 28 Resource.)	

Matter Lesson Materials and Preparation

Lesson 1

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Ball, rubber, 1" (1) <input type="checkbox"/> Bins, clear plastic, 6 qt (1) <input type="checkbox"/> Clay, modeling, nonhardening, blue (1/2 lb) <input type="checkbox"/> Graduated cylinder, 100 mL (1) <input type="checkbox"/> Magnet, bar (1) <input type="checkbox"/> Scale, digital, ± 0.1 g (1) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Ruler, metric (1) <input type="checkbox"/> Water (3 qt)
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 1 Resource: Rock Collection Photograph 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Prepare a 6 qt clear plastic bin by filling it with water for measurement tool discussion and density discussion. <input type="checkbox"/> Prepare one 1" ball of nonhardening modeling clay for use in the density discussion and properties of objects and materials discussion. <input type="checkbox"/> Prepare one 4" long × 1" wide × 1" high block of nonhardening modeling clay for properties of objects and materials discussion. 	

Lesson 2

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Ball, rubber, 1" (1) <input type="checkbox"/> Bins, clear plastic, 6 qt (1) <input type="checkbox"/> Bottle caps, plastic, white (6) <input type="checkbox"/> Clay, modeling, nonhardening, blue from Lesson 1 <input type="checkbox"/> Keys, brass <input type="checkbox"/> Jars with lid, clear plastic, 4 oz (2) <input type="checkbox"/> Magnets, bar (6) <input type="checkbox"/> Magnifiers, handheld, plastic (6) <input type="checkbox"/> Pony beads, blue (2 fl oz) <input type="checkbox"/> Safety goggles (24) <input type="checkbox"/> Scale, digital, ± 0.1 g (1) <input type="checkbox"/> Washers, steel (6) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Birthday candles (6) <input type="checkbox"/> Crayons, blue (6) <input type="checkbox"/> Cups, clear plastic, 4 oz (6) <input type="checkbox"/> Dish soap, liquid, blue (2 fl oz) <input type="checkbox"/> Paper towels, partial roll <input type="checkbox"/> Rulers, metric (6) <input type="checkbox"/> Teaspoon, plastic (6) <input type="checkbox"/> Water (3 qt)
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 2 Resource: Observe and measure Properties of Matter Procedure Sheet 	

	<p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare one clear plastic jar with blue liquid dish soap and one clear plastic jar with blue beads for states of matter discussion. <input type="checkbox"/> Prepare objects for observation. Roll nonhardening modeling clay into 1" balls. <input type="checkbox"/> Prepare to distribute a copy of Lesson 2 Resource to each group. <input type="checkbox"/> Prepare 6 qt clear plastic bins by filling each halfway with water for observing and measuring matter investigation.
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Lesson 3

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Safety goggles (24) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepared sets of objects from Lesson 2 (6 sets)
Preparation	<p>Resources</p> <p>None</p>	
	<p>Setup</p> <p>None</p>	

Lesson 4

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Erasers (12) <input type="checkbox"/> Gravel (½ cup) <input type="checkbox"/> Paper clips (12) <input type="checkbox"/> Safety goggles (24) <input type="checkbox"/> Sand (1 cup) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cups, clear plastic, 9 oz (37) <input type="checkbox"/> Cups, clear plastic, 12 oz (10) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Paper towels, partial roll (1) <input type="checkbox"/> Spoons, plastic (35) <input type="checkbox"/> Table salt (¾ cup) <input type="checkbox"/> Vegetable oil (⅔ cup) <input type="checkbox"/> Waste containers (5) <input type="checkbox"/> Water (⅔ cup)
Preparation	<p>Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 4 Resource A: Exploring Mixtures Stations Setup Instructions <input type="checkbox"/> Lesson 4 Resource B: Exploring Mixtures Procedure Sheet 	
	<p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare stations for the exploring mixtures investigation (See Lesson 4 Resource A). 	

Lesson 5

Materials	Kit Items <input type="checkbox"/> Safety goggles (24) <input type="checkbox"/> Sand (1/2 cup)	School Supplied Items <input type="checkbox"/> Cups, clear plastic, 9 oz (35) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Paper towels, partial roll (1) <input type="checkbox"/> Spoons, plastic (18) <input type="checkbox"/> Table salt (2 tsp) <input type="checkbox"/> Water access
	Preparation	
Preparation	Resources <input type="checkbox"/> Lesson 5 Resource: Identify Solutions Investigation Setup Instructions	
	Setup <input type="checkbox"/> Prepare salt and salt water samples for the demonstration. Add 1 tsp of salt to an empty cup and 1 tsp of salt to a plastic cup filled approximately halfway with water. Stir the salt and water mixture until the salt completely dissolves. <input type="checkbox"/> Prepare samples for the identify solutions investigation. (See Lesson 5 Resource.)	

Lesson 6

Materials	Kit Items <input type="checkbox"/> Gravel (5 tsp) <input type="checkbox"/> Lemon juice concentrate (15 tsp) <input type="checkbox"/> Safety goggles (24)	School Supplied Items <input type="checkbox"/> Baking soda (5 tsp) <input type="checkbox"/> Cups, clear plastic, 9 oz (60) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Paper towels, partial roll (1) <input type="checkbox"/> Rubber bands (30) <input type="checkbox"/> Spoons, plastic (60) <input type="checkbox"/> Sugar, brown (5 tsp) <input type="checkbox"/> Vegetable oil (15 tsp) <input type="checkbox"/> Waste containers (5) <input type="checkbox"/> Water access
	Preparation	
Preparation	Resources <input type="checkbox"/> Lesson 6 Resource A: Which Materials Are Soluble Investigation Setup Instructions <input type="checkbox"/> Lesson 6 Resource B: Investigate Which Materials Are Soluble Procedure Sheet	
	Setup <input type="checkbox"/> Prepare stations for the which materials are soluble investigation. (See Lesson 6 Resource A.)	

Works Cited

Buckley, James, Jr. 2014. *Who Were the Wright Brothers?* New York: Grosset & Dunlap.

Chin, Jason. 2017. *Grand Canyon*. New York: Roaring Brook Press. [All references to *Grand Canyon* are from this source.]

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National Park Service (NPS). 2009. "Over the Rim, Into the Canyon." NPS.gov: Grand Canyon National Park, video, 0:58. <https://www.nps.gov/media/video/view.htm?id=C2A43648-155D-451F-6722A3EAFE93E679>.

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