

Preparation Guide

Level 3 Module 1

Earth Changes 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

An activity in this module requires advance preparation. A version of this list appears in the Module Overview of the Teacher Edition. The expanded version in this guide identifies all lesson sets 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
3	3-4 days	Soil Column Observation	Prepare soil column. (See Lesson 3 Resource A.)
3	1–2 days†	Local Land Sample Observation	Give each student a resealable plastic bag. Ask students to collect and bring to school a land sample from an area close to home, an area near the school, or another approved area nearby. Collect extra local land samples to share with students who do not bring samples.

Earth Changes Lesson Materials and Preparation


Lesson 1

Materials	Kit Items <input type="checkbox"/> Globe, inflatable (1)	School Supplied Items <input type="checkbox"/> Stickers, small (2)
Preparation 	Resources <input type="checkbox"/> Lesson 1 Resource A: Surtsey Photographs  <input type="checkbox"/> Lesson 1 Resource B: Surtsey Photographs by Year 	
	Setup <input type="checkbox"/> Inflate the inflatable globe. <input type="checkbox"/> Identify a nearby outdoor location where students can describe the features of their local area.	
Advance Preparation for Lesson 3 3-4 Days Before: Prepare soil column. (See Lesson 3 Resource A.) 1-2 Days Before: Give each student a resealable plastic bag. Ask students to collect and bring to school a land sample from an area close to home, an area near the school, or another approved area nearby. Collect extra local land samples to share with students who do not bring samples.		


Lesson 2

Materials	Kit Items None	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 1 Resource B: Surtsey Photographs by Year  <input type="checkbox"/> <i>An Island Grows</i> (Schaefer and Felstead 2006) <input type="checkbox"/> <i>Life on Surtsey: Iceland's Upstart Island</i> (Burns 2017)	
	Setup <input type="checkbox"/> Access Google Earth™ mapping service: http://phdsci.link/1310 .  <input type="checkbox"/> Access Surtsey three-dimensional interactive model from the Icelandic Institute of Natural History: http://phdsci.link/1584 . 	



Lesson 3

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Clay, natural (3 tbsp) <input type="checkbox"/> Gravel (3 tbsp) <input type="checkbox"/> Jars with lids, clear plastic, 4 oz (19) <input type="checkbox"/> Magnifiers, handheld, plastic (24) <input type="checkbox"/> Rock samples, basalt, gneiss, granite, pumice, sandstone, tuff (3 each type) <input type="checkbox"/> Safety goggles (24) <input type="checkbox"/> Sifting screens, plastic (6) <input type="checkbox"/> Silt (3 tbsp) <input type="checkbox"/> Sand, coarse (3 tbsp) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bags, resealable plastic, 1 qt (40) <input type="checkbox"/> Dish soap (1 tsp) <input type="checkbox"/> Local land samples brought by students (at least 7) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Plates, paper, 10" (50) <input type="checkbox"/> Tape (partial roll) <input type="checkbox"/> Topsoil (3 tbsp) <input type="checkbox"/> Water (access)
<p>Preparation</p>	<p>Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 3 Resource A: Soil Column Setup Instructions <input type="checkbox"/> Lesson 3 Resource B: Common Land Samples Setup Instructions <input type="checkbox"/> Lesson 3 Resource C: "Diggin' Dirt" <input type="checkbox"/> Lesson 3 Resource D: "Sand, Silt, and Clay" (<i>CLICK</i>® Magazine 2009)  <input type="checkbox"/> <i>Life on Surtsey</i> <p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare materials for common land samples observation. (See Lesson 3 Resource B.) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 4 requires 1 of the local land samples, the handheld magnifiers, 38 of the paper plates, and the prepared rock samples. If the local land sample has been sifted, pour all the components back into the plastic bag. 	




Lesson 4

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Sandpaper, 3" × 3" (19) <input type="checkbox"/> Jar with lid, clear plastic, 4 oz (1) <input type="checkbox"/> Magnifiers, handheld, plastic (24) <input type="checkbox"/> Safety goggles (24) <input type="checkbox"/> Sentence strips (4) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Local land sample from Lesson 3 (1) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Plates, paper, 10" (37) <input type="checkbox"/> Pocket chart (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Sugar cubes (2)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Rock samples from Lesson 3 (18) 	
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 4 Resource A: Devils Tower National Monument Photograph  <input type="checkbox"/> Lesson 4 Resource B: Rock Tests Demonstration Setup Instructions 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Prepare materials for rock tests demonstration. (See Lesson 4 Resource B.) <input type="checkbox"/> Prepare materials for rock tests. Use scissors to cut the sandpaper sheets into three 3" squares per group. 	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 20 requires 1 of the paper plates. 	




Lesson 5

Materials	Kit Items None	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Glue stick (1) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Scissors (1)
	Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 5 Resource A: National Parks and Lands Poster Setup Instructions <input type="checkbox"/> Lesson 5 Resource B: Elevation Diagram 
Setup <ul style="list-style-type: none"> <input type="checkbox"/> Load map of Grand Teton National Park in Google Earth™ mapping service: http://phdsci.link/1310.  <input type="checkbox"/> Prepare national parks and lands posters. (See Lesson 5 Resource A.) 		



Lesson 6

Materials	Kit Items <input type="checkbox"/> Globe, inflatable (1, optional) <input type="checkbox"/> Sentence strips (2)	School Supplied Items <input type="checkbox"/> Crayons, brown, green, orange, red (24 each color)
Preparation	Resources <input type="checkbox"/> Lesson 6 Resource A: Map of US National Parks and Lands  <input type="checkbox"/> Lesson 6 Resource B: Landform Maps of North America  <input type="checkbox"/> Lesson 6 Resource C: Landforms of North America Map <input type="checkbox"/> Lesson 6 Resource D: Landform Maps of Earth’s Continents 	
	Setup None	
	Item Reuse <input type="checkbox"/> Lesson 8 requires the red crayons.	


Lesson 7

Materials	Kit Items <input type="checkbox"/> Rock sample, tuff (1, optional)	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 1 Resource B: Surtsey Photographs by Year  <input type="checkbox"/> Lesson 7 Resource A: Surtsey Diagram A  <input type="checkbox"/> Lesson 7 Resource B: Conceptual Checkpoint 	
	Setup <input type="checkbox"/> Prepare to distribute a color copy of Lesson 7 Resource B to each student.	


Lesson 8

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Bin, clear plastic, 34" × 16" × 6" (1) <input type="checkbox"/> Bins, clear plastic, 6 qt (6) <input type="checkbox"/> Bucket, plastic, 10 qt (1) <input type="checkbox"/> Building blocks, plastic, blue, red (46 each color) <input type="checkbox"/> Globe, inflatable (1, optional) <input type="checkbox"/> Gravel (3 cups) <input type="checkbox"/> Hook and loop fastener, 1" strips (3) <input type="checkbox"/> Knife, putty (1) <input type="checkbox"/> Safety goggles (24) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Crayons, red, blue (24 each color) <input type="checkbox"/> Cups, paper, 8 oz (14) <input type="checkbox"/> Newspaper (6 sheets) <input type="checkbox"/> Pencil, sharpened (1) <input type="checkbox"/> Potting soil (12 cups) <input type="checkbox"/> Sand, fine (8½ cups) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Stickers, small (10, optional) <input type="checkbox"/> Water (access)
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 6 Resource A: Map of US National Parks and Lands <input type="checkbox"/> Lesson 8 Resource A: Olympic National Park Shoreline Photograph  <input type="checkbox"/> Lesson 8 Resource B: Wave Model Demonstration Setup Instructions and Procedure <input type="checkbox"/> Lesson 8 Resource C: Water Investigation Setup Instructions <input type="checkbox"/> Lesson 8 Resource D: Rain Model and River Model Procedure Sheets 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Cue Olympic National Park waves video: http://phdsci.link/1591.  <input type="checkbox"/> Prepare materials for wave model demonstration. (See Lesson 8 Resource B.) <input type="checkbox"/> Prepare materials for water investigation. (See Lesson 8 Resources C and D.) 	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 10 requires the 6 qt clear plastic bins. <input type="checkbox"/> Lesson 14 requires 16 of the plastic building blocks and the putty knife. Save 24 plastic building blocks for Lesson 20. <input type="checkbox"/> Lesson 19 requires the sharpened pencil. 	


Lesson 9

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Sentence strips (4) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Glue stick (1) <input type="checkbox"/> Scissors (1)
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 9 Resource A: Landslide Photograph  <input type="checkbox"/> Lesson 9 Resource B: Landslide Solution Poster Setup Instructions 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Prepare landslide solution posters. (See Lesson 9 Resource B.) 	




Lesson 10

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Balloon pump, handheld (1) <input type="checkbox"/> Bins, clear plastic, 6 qt (6) <input type="checkbox"/> Gravel (2 cups) <input type="checkbox"/> Paintbrush, medium (1) <input type="checkbox"/> Rock sample, limestone (1) <input type="checkbox"/> Shower caps, clear plastic (6) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Drill with $\frac{3}{8}$" bit (1) <input type="checkbox"/> Markers, dry erase, 2 colors (1 each color) <input type="checkbox"/> Sand, fine (2 cups) <input type="checkbox"/> Small objects (e.g., rocks or shells) (6) <input type="checkbox"/> Topsoil (2 cups)
	Preparation	
	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 10 Resource A: Great Sphinx of Giza Photographs  <input type="checkbox"/> Lesson 10 Resource B: Wind Investigation Setup Instructions <input type="checkbox"/> Lesson 10 Resource C: Wind Model Procedure Sheet <input type="checkbox"/> <i>World Traveler: The Sphinx</i> (Schmidt and O'Halloran 2018) (1 for teacher, 1 per student pair) 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Prepare materials for wind investigation. (See Lesson 10 Resources B and C.) 	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 11 requires the balloon pump, paintbrush, and prepared wind models with procedure sheets. <input type="checkbox"/> Lesson 14 requires the 6 qt clear plastic bins. <input type="checkbox"/> Lesson 20 requires the limestone rock sample. 	




Lesson 11

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Balloon pumps, handheld (6) <input type="checkbox"/> Paintbrushes, medium (6) <input type="checkbox"/> Safety goggles (24) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Markers, dry erase, 2 colors (6 each color)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Wind models with procedure sheets from Lesson 10 (6) 	
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 10 Resource A: Great Sphinx of Giza Photographs  <input type="checkbox"/> <i>The Sphinx</i> (1 for teacher) 	
	Setup <p>None</p>	





Lesson 12

Materials	Kit Items <input type="checkbox"/> Sentence strips (3)	School Supplied Items <input type="checkbox"/> Equity sticks (class set)
Preparation	Resources <input type="checkbox"/> Lesson 12 Resource A: Effects of Wind Changing Land Photographs  <input type="checkbox"/> Lesson 12 Resource B: Solutions to Wind Problems Photographs 	
	Setup <input type="checkbox"/> Cue time-lapse dust storm video: http://phdsci.link/1597 .  <input type="checkbox"/> Prepare 4 color copies of each photograph in Lesson 12 Resource A.	



Lesson 13

Materials	Kit Items None	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 13 Resource A: Conceptual Checkpoint  <input type="checkbox"/> Lesson 13 Resource B: Surtsey Diagram B  <input type="checkbox"/> <i>Life on Surtsey</i>	
	Setup <input type="checkbox"/> Prepare to distribute a color copy of Lesson 13 Resource A to each student. <input type="checkbox"/> Cue clip from “Surtsey, the Birth of an Island” (wocomODOCS 2016): http://phdsci.link/1599 . 	


Lesson 14

<p>Materials</p>	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bins with lids, clear plastic, 6 qt (8) <input type="checkbox"/> Building blocks, plastic (16) <input type="checkbox"/> Knife, putty (1) <input type="checkbox"/> Rubber stoppers, size #00 (6) <input type="checkbox"/> Straw, 1 cm diameter, 2" pieces (8) <input type="checkbox"/> String, 4" pieces (8) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Marker, dry erase (1) <input type="checkbox"/> Marker, permanent (1) <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Sand, fine (20 cups) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll) <input type="checkbox"/> Water (access)
<p>Preparation</p>	<p>Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource A: Engineering Challenge Rubric <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual  <input type="checkbox"/> Lesson 14 Resource C: Montauk Point Lighthouse Photographs  <input type="checkbox"/> Lesson 14 Resource D: Shoreline Model Setup Instructions <input type="checkbox"/> Lesson 14 Resource E: Shoreline Protection System Cards <input type="checkbox"/> Lesson 14 Resource F: Bulkhead Photograph  <input type="checkbox"/> Lesson 14 Resource G: Tree Data <input type="checkbox"/> <i>The Crayon Man: The True Story of the Invention of Crayola Crayons</i> (Biebow and Salerno 2019) <p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cue "Saving the Montauk Lighthouse" (PBS 2016) video: http://phdsci.link/1604.  <input type="checkbox"/> Prepare shoreline models. (See Lesson 14 Resource D.) <input type="checkbox"/> Prepare shoreline protection system cards. (See Lesson 14 Resource E.) <input type="checkbox"/> Cue preparation of concrete video: http://phdsci.link/1791. <input type="checkbox"/> Prepare to distribute a tree data set to each group. (See Lesson 14 Resource G.) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 15 requires the putty knife and the prepared shoreline models. Students will not use the lighthouses with the models in Lesson 15, but save the lighthouses for Lesson 16. <input type="checkbox"/> Lesson 16 requires the plastic building blocks. 	



Lesson 15

Materials	<p>Kit Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cheesecloth (9 sq ft) <input type="checkbox"/> Chenille stems (120) <input type="checkbox"/> Knives, putty (8) <input type="checkbox"/> Moss, Spanish (4 cups) <input type="checkbox"/> Safety goggles (24) <input type="checkbox"/> Twigs, 6" (80) 	<p>School Supplied Items</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boxes or bags (8) <input type="checkbox"/> Markers, dry erase (8) <input type="checkbox"/> Rocks, 1"–2" (160) <input type="checkbox"/> Ruler (1) <input type="checkbox"/> Scissors, blunt tip (8) <input type="checkbox"/> Toothpicks (400) <input type="checkbox"/> Water (access)
	<p>Prepared Items from Previous Lessons</p> <ul style="list-style-type: none"> <input type="checkbox"/> Shoreline models from Lesson 14 without lighthouses (8) 	
Preparation	<p>Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual  <input type="checkbox"/> Lesson 15 Resource A: Bulkhead Diagram  <input type="checkbox"/> Lesson 15 Resource B: Engineering Challenge Test Materials Preparation Instructions <input type="checkbox"/> Lesson 15 Resource C: Natural Resources Photographs 	
	<p>Setup</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare Engineering Challenge test materials. (See Lesson 15 Resource B.) <p>Item Reuse</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 16 requires the putty knives, the prepared Engineering Challenge test materials, and the prepared shoreline models. 	


Lesson 16

Materials	Kit Items <input type="checkbox"/> Building blocks, plastic (16) <input type="checkbox"/> Knives, putty (8) <input type="checkbox"/> Safety goggles (24)	School Supplied Items <input type="checkbox"/> Markers, dry erase (8) <input type="checkbox"/> Water (access)
	Prepared Items from Previous Lessons <input type="checkbox"/> Engineering Challenge test materials from Lesson 15 (8 sets) <input type="checkbox"/> Shoreline models from Lesson 14 with lighthouses (8)	
Preparation	Resources <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual 	
	Setup None	
	Item Reuse <input type="checkbox"/> Lesson 17 requires the shoreline protection systems created by students. <input type="checkbox"/> Lesson 20 requires the plastic building blocks.	

Lesson 17

Materials	Kit Items None	School Supplied Items None
	Prepared Items from Previous Lessons <input type="checkbox"/> Shoreline protection systems from Lesson 16 (8)	
Preparation	Resources <input type="checkbox"/> Lesson 14 Resource B: Engineering Design Process Visual 	
	Setup <input type="checkbox"/> Cue “Saving the Montauk Lighthouse” video: http://phdsci.link/1604 . 	

Lesson 18

Materials	Kit Items <input type="checkbox"/> Clothespins (6) <input type="checkbox"/> String (6 ft)	School Supplied Items <input type="checkbox"/> Paper, 11" × 17" (6 sheets) <input type="checkbox"/> Pencil, unused, unsharpened (1) <input type="checkbox"/> Pencil, used, short, sharpened (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll) <input type="checkbox"/> Tape measure (1)
	Preparation	
	Resources <input type="checkbox"/> Lesson 18 Resource A: Mount St. Helens Photographs  <input type="checkbox"/> Lesson 18 Resource B: Earth Event Cards <input type="checkbox"/> Lesson 18 Resource C: Earth Event Photographs	
	Setup <input type="checkbox"/> Prepare Earth event cards. (See Lesson 18 Resource B.) <input type="checkbox"/> Prepare Earth event photographs. (See Lesson 18 Resource C.) <input type="checkbox"/> Prepare materials for the Earth event display. Measure and cut a 6 ft piece of string. Hang the string horizontally across an area of the classroom at a height students can reach.	
	Item Reuse <input type="checkbox"/> Lesson 19 requires the sharpened and unsharpened pencils, the prepared Earth event display, and the Earth event card order sheets created by students. <input type="checkbox"/> Lesson 20 requires the tape measure.	

Lesson 19

Materials	Kit Items None	School Supplied Items <input type="checkbox"/> Pencil, unused, sharpened (1) <input type="checkbox"/> Pencil, unused, unsharpened (1) <input type="checkbox"/> Pencil, used, short, sharpened (1) <input type="checkbox"/> Tape (partial roll, optional)
	Prepared Items from Previous Lessons <input type="checkbox"/> Earth event display from Lesson 18 (1) <input type="checkbox"/> Earth event card order sheets from Lesson 18 (6)	
Preparation	Resources <input type="checkbox"/> Lesson 19 Resource: Earth Event Texts	
	Setup <input type="checkbox"/> Prepare Earth event texts. (See Lesson 19 Resource.)	
	Item Reuse <input type="checkbox"/> Lesson 20 requires the prepared Earth event display.	


Lesson 20

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Building blocks, plastic (24) <input type="checkbox"/> Rock sample, limestone (1) <input type="checkbox"/> Sandpaper, 3" × 3" (1) <input type="checkbox"/> Sentence strips (4) <input type="checkbox"/> String (7 m) 	School Supplied Items <ul style="list-style-type: none"> <input type="checkbox"/> Plate, paper, 10" (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Tape (partial roll) <input type="checkbox"/> Tape measure (1)
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Earth event display from Lesson 19 (1) 	
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> <i>The Sphinx</i> (1 for teacher, 1 per student pair) 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Choose a large, open area (e.g., hallway, gym, playground) at least 7 m long to take students to during the lesson. <input type="checkbox"/> Prepare materials for the time span model by cutting string to create 1 cm, 10 cm, and 6.43 m pieces. <input type="checkbox"/> Prepare for the changes to limestone demonstration by cutting a 3" square from the sandpaper sheet. 	
	Item Reuse <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 21 requires the prepared Earth event display. 	

Lesson 21

Materials	Kit Items <ul style="list-style-type: none"> <input type="checkbox"/> Knowledge Deck™ cards, Yardangs (24) <input type="checkbox"/> Knowledge Deck poster, Yardangs (1) 	School Supplied Items None
	Prepared Items from Previous Lessons <ul style="list-style-type: none"> <input type="checkbox"/> Earth event display from Lesson 19 (1) 	
Preparation	Resources <ul style="list-style-type: none"> <input type="checkbox"/> Lesson 21 Resource: Conceptual Checkpoint 	
	Setup <ul style="list-style-type: none"> <input type="checkbox"/> Prepare to distribute a color copy of Lesson 21 Resource to each student. 	

Lesson 22

Materials	Kit Items None	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 1 Resource B: Surtsey Photographs by Year  <input type="checkbox"/> Lesson 22 Resource: Key Term Cards <input type="checkbox"/> <i>An Island Grows</i>	
	Setup <input type="checkbox"/> Prepare key term cards. (See Lesson 22 Resource.)	

Lesson 23

Materials	Kit Items <input type="checkbox"/> Knowledge Deck cards, The Twelve Apostles (24) <input type="checkbox"/> Knowledge Deck poster, The Twelve Apostles (1)	School Supplied Items None
Preparation	Resources None	
	Setup None	
	Item Reuse <input type="checkbox"/> Lesson 24 requires the Twelve Apostles Knowledge Deck poster.	

Lesson 24

Materials	Kit Items <input type="checkbox"/> Knowledge Deck poster, The Twelve Apostles (1)	School Supplied Items None
Preparation	Resources <input type="checkbox"/> Lesson 24 Resource: Stability and Change Card	
	Setup <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 Stability and Change card. (See Lesson 24 Resource.) <input type="checkbox"/> Select student work products that show evidence of links between phenomena, ideas, concepts, and practices in science and engineering, and display them in different areas of the classroom. Student work products may include the anchor model, other class charts, selected Science Logbook pages, and Engineering Challenge designs.	

Matter Lesson Materials and Preparation

Lesson 1

Materials	Kit Items	School Supplied Items
	<input type="checkbox"/> Bin with lid, clear plastic, 6qt (1) <input type="checkbox"/> Scale, digital, $\pm 1\text{g}$ (1)	<input type="checkbox"/> Butter knife, metal (1) <input type="checkbox"/> Dime (1) <input type="checkbox"/> Index card, 3"x5" (1) <input type="checkbox"/> Paper clip, metal (1) <input type="checkbox"/> Paper towels (1 roll) <input type="checkbox"/> Penny (1) <input type="checkbox"/> Ruler, plastic (1) <input type="checkbox"/> Scissors (1) <input type="checkbox"/> Teaspoon, metal (1) <input type="checkbox"/> Teaspoon, plastic (1) <input type="checkbox"/> Water (3 qt)
Preparation	Resources	
	None	
	Setup	
	<input type="checkbox"/> Prepare for additional properties demonstration by filling a 6 qt clear container with 3 qt water.	

Lesson 2

Materials	Kit Items	School Supplied Items
	<input type="checkbox"/> Jars with lids, clear plastic, 4 oz (7) <input type="checkbox"/> Marbles (6) <input type="checkbox"/> Washers, steel (6)	<input type="checkbox"/> Three different small objects (e.g., erasers, buttons, blocks) (at least 2 of each kind)
Preparation	Resources	
	None	
	Setup	
	<input type="checkbox"/> Cue beach video: http://phdsci.link/1748 . <input type="checkbox"/> Prepare for mixtures demonstration by placing 6 marbles and 6 washers in a clear plastic jar. <input type="checkbox"/> Prepare to distribute objects for the mixture activity. Plan to provide half the groups with two different kinds of classroom objects and the other half with three different kinds of classroom objects. Ensure that each group's objects fit in the clear plastic jar.	

Lesson 3

Materials	Kit Items	School Supplied Items
	<ul style="list-style-type: none"> <input type="checkbox"/> Bins with lids, clear plastic, 6qt, optional (6) <input type="checkbox"/> Clay, modeling, nonhardening, gray (1 lb) <input type="checkbox"/> Containers, clear plastic, rectangular, 6 oz (4) <input type="checkbox"/> Containers, clear plastic, round, 8 oz (4) <input type="checkbox"/> Die (1) <input type="checkbox"/> Jars with lids, clear plastic, 4 oz (5) <input type="checkbox"/> Pony beads, plastic, blue (4 fl oz) <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) 	<ul style="list-style-type: none"> <input type="checkbox"/> Cotton ball (1) <input type="checkbox"/> Orange juice, pulp free (2 fl oz) <input type="checkbox"/> Vegetable oil (2 fl oz) <input type="checkbox"/> Water (2 fl oz)
Preparation	Resources	
	<ul style="list-style-type: none"> <input type="checkbox"/> Lesson 3 Resource: Pouring Stations Setup Instructions 	
	Setup	
	<ul style="list-style-type: none"> <input type="checkbox"/> Cut block of modeling clay into 6 pieces of equal size. <input type="checkbox"/> Set up pouring stations. (See Lesson 3 Resource.) <input type="checkbox"/> Set up pouring demonstration. Fill the clear plastic jar with plastic beads. 	

Lesson 4

Materials	Kit Items	School Supplied Items
	<ul style="list-style-type: none"> <input type="checkbox"/> Jar with lid, clear plastic, 4 oz (1) <input type="checkbox"/> Marble (1) 	<ul style="list-style-type: none"> <input type="checkbox"/> Balloon (1) <input type="checkbox"/> Sticky notes (48) <input type="checkbox"/> Water (access)
Preparation	Resources	
	None	
	Setup	
	<ul style="list-style-type: none"> <input type="checkbox"/> Cue balloon filling video and balancing balloons video: http://phdsci.link/1757 and http://phdsci.link/1834. 	

Lesson 5

Materials	Kit Items	School Supplied Items
	<input type="checkbox"/> Beaker, glass, 250 mL (1) <input type="checkbox"/> Hot plate (1) <input type="checkbox"/> Peppermint oil (10 drops)	<input type="checkbox"/> Plastic wrap, large enough to seal beaker (1 piece) <input type="checkbox"/> Timing device (1)
Preparation	Resources	
	<input type="checkbox"/> Lesson 5 Resource: Gas Demonstration Setup Instructions	
	Setup	
	<input type="checkbox"/> Set up gas demonstration. (See Lesson 5 Resource.) <input type="checkbox"/> Cue ice melting video: http://phdsci.link/1758 .	

Lesson 6

Materials	Kit Items	School Supplied Items
	<input type="checkbox"/> Beaker, glass, 250 mL (1) <input type="checkbox"/> Hot plate (1) <input type="checkbox"/> Safety goggles, student (24) <input type="checkbox"/> Safety goggles, teacher (1) <input type="checkbox"/> Thermometers, plastic black (13) <input type="checkbox"/> Tongs, utility (1)	<input type="checkbox"/> Chart paper (1) <input type="checkbox"/> Cups, clear plastic, 9 oz (12) <input type="checkbox"/> Ice cubes, clear (54) <input type="checkbox"/> Whiteboard, optional (1)
Preparation	Resources	
	None	
	Setup	
	<input type="checkbox"/> Cue melting ice cream video: http://phdsci.link/1755 .	

Lesson 7

Materials	Kit Items	School Supplied Items
	<input type="checkbox"/> Beaker, glass, 250 mL (1) <input type="checkbox"/> Hot plate (1) <input type="checkbox"/> Safety goggles, teacher (1) <input type="checkbox"/> Thermometers, plastic black (1) <input type="checkbox"/> Tongs, utility (1) <input type="checkbox"/> Watch glass (1)	None
Preparation	Resources	
	<input type="checkbox"/> Lesson 7 Resource: Hot Spring Photograph	
	Setup	
	None	

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