INTRODUCTION

The Earth and Sun kit contains

- Teacher Toolkit: Earth and Sun
  1 Investigations Guide: Earth and Sun
  1 Teacher Resources: Earth and Sun
- FOSS Science Resources: Earth and Sun
  (class set of student books)
- Permanent equipment for one class of 32 students
- Consumable equipment for three classes of 32 students

FOSS modules use central materials distribution. You organize all the materials for an investigation on a single table called the materials station. As the investigation progresses, one member of each group gets materials as they are needed, and another returns the materials when the investigation is completed. You place items at the station—students do the rest.

Individual photos of each piece of FOSS equipment are available online for printing. For updates to information on materials used in this module and access to the Safety Data Sheets (SDS), go to www.FOSSweb.com. Links to replacement-part lists and customer service are also available on FOSSweb.

NOTE
To see how all of the materials in the module are set up and used, view the teacher preparation video on FOSSweb.

NOTE
Delta Education Customer Service can be reached at 1-800-258-1302.
**KIT INVENTORY List**

**Drawer 1 of 3**

### Print Materials


1. Poster, *Earth’s Atmosphere*

1. Poster, *Earth’s Water*

1. Poster, *The First 30 km of the Atmosphere*

2. Poster, *Moon Calendar*

1. Poster, *Moon phases, 4 sheets/poster*

1. Poster, *Water Cycle*

2. Posters, *FOSS Science Safety and FOSS Outdoor Safety*


### Shared Items

1. Beaker, 1 L
2. Cartboard sheets
3. Containers, 1/2 L
4. Cups, plastic, 250 mL (9 oz.)
5. Cups, plastic, 500 mL (16 oz.)
6. Earth globes, 12 cm diameter
7. Lamp, clip-on, without shade
8. Lightbulb, incandescent, 60-watt
9. Pipettes, thin, plastic, beral-type
10. Pitchers
11. Straws, jumbo
12. Syringes, 50 mL
13. Thermometers, Celsius
14. Transparent tape, roll
15. Zip bags, 1 L

**Drawer 2 of 3**

### Items for Investigation 1

1. AA cells
2. Compasses, magnetic
3. Flashlights
4. Golf tees
5. Protractors
6. Zip bags, 4 L

### Items for Investigation 2

1. Ball, plastic
2. Balls, white, polystyrene
3. Cut-and-stick Moons set, 35/set

* The student books, if included in your purchase, are shipped separately.

**NOTE**

The teacher toolkit is shipped separately. However, there is space in drawer 1 to store your toolkit.

✪ These items might occasionally need replacement.

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The student books, if included in your purchase, are shipped separately.
<table>
<thead>
<tr>
<th>Equipment</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Marking pen, dry-erase</td>
<td></td>
</tr>
<tr>
<td>16 Meter tapes</td>
<td></td>
</tr>
<tr>
<td>16 Solar system cards, 18/set</td>
<td></td>
</tr>
<tr>
<td>50 Straws, short, slim</td>
<td></td>
</tr>
<tr>
<td>1 String, ball</td>
<td></td>
</tr>
</tbody>
</table>

**Items for Investigation 3**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>AAA cells (for digital weather station)</td>
</tr>
<tr>
<td>36</td>
<td>Binder clips, small</td>
</tr>
<tr>
<td>1</td>
<td>Compass with base</td>
</tr>
<tr>
<td>1</td>
<td>Hole punch</td>
</tr>
<tr>
<td>25</td>
<td>Straws, superjumbo 👓</td>
</tr>
<tr>
<td>36</td>
<td>Syringes, 30 mL</td>
</tr>
<tr>
<td>40</td>
<td>Tubes, flexible, 12.5 cm (5”)</td>
</tr>
<tr>
<td>1</td>
<td>Weather station, digital</td>
</tr>
</tbody>
</table>

**Consumable Items**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Chalk, sidewalk</td>
</tr>
<tr>
<td>1</td>
<td>Food coloring, set, 4 colors/set</td>
</tr>
<tr>
<td>100</td>
<td>Index cards, lined</td>
</tr>
<tr>
<td>2</td>
<td>Rock salt, containers, 454 g (1 lb.)/container</td>
</tr>
<tr>
<td>100</td>
<td>Self-stick notes</td>
</tr>
</tbody>
</table>

**Drawer 3 of 3**

**Items for Investigation 4**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Container lids, oval, plastic, clear with slits</td>
</tr>
<tr>
<td>10</td>
<td>Containers, oval, plastic, black, 1/4 L</td>
</tr>
<tr>
<td>10</td>
<td>Containers, oval, plastic, white, 1/4 L</td>
</tr>
<tr>
<td>20</td>
<td>Containers, round, plastic, clear, 1/4 L, with clear lids with slits</td>
</tr>
<tr>
<td>8</td>
<td>Containers, 1 L</td>
</tr>
<tr>
<td>1</td>
<td>Dispensing bottle</td>
</tr>
<tr>
<td>1</td>
<td>Marking pen, permanent</td>
</tr>
<tr>
<td>1</td>
<td>Objects set, 2 wood beads, 2 corks</td>
</tr>
<tr>
<td>1</td>
<td>Soil, potting, bag, 2 kg/bag (4 lb.) 👓</td>
</tr>
<tr>
<td>2</td>
<td>Stoppers, rubber, #4, 1-hole</td>
</tr>
<tr>
<td>20</td>
<td>Vials, 12 dram, with caps</td>
</tr>
<tr>
<td>20</td>
<td>Zip bags, 7 × 12 cm 👓</td>
</tr>
</tbody>
</table>

**Items for Investigation 5**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FOSS® balance</td>
</tr>
<tr>
<td>25</td>
<td>Craft sticks 👓</td>
</tr>
<tr>
<td>16</td>
<td>Dice, white, 5/8”</td>
</tr>
<tr>
<td>1</td>
<td>Globe, inflatable</td>
</tr>
<tr>
<td>2</td>
<td>Graduated cylinders, 50 mL</td>
</tr>
<tr>
<td>100</td>
<td>Gram pieces (1 g)</td>
</tr>
<tr>
<td>12</td>
<td>Lids, plastic, dome, for 250 mL cups</td>
</tr>
<tr>
<td>2</td>
<td>Spoons, 5 mL</td>
</tr>
</tbody>
</table>

*NOTE*

This module includes access to FOSSweb, which includes the streaming videos, interactive simulations, virtual investigations, and tutorials used throughout the module.

*These items might occasionally need replacement.*
NOTE
Throughout the Investigations Guide, we refer to materials not provided in the kit as "teacher-supplied." These materials are generally common or consumable items that schools and/or classrooms already have, such as rulers, paper towels, and computers. If your school/classroom does not have these items, they can be provided by teachers, schools, districts, or materials centers (if applicable). You can also borrow the items from other departments or classrooms, or request these items as community donations.

MATERIALS Supplied by the Teacher

Each part of each investigation has a list of materials required for that part. The list divides up the materials needed for each student or group of students and for the class.

Be aware that you must supply some items. These are indicated in the materials list for each part of the investigation with an asterisk (*). Here is a summary list of those items by investigation.

For all investigations
- Chart paper and marking pen
- Computer with Internet access
- Drawing utensils (pencils, crayons, colored pencils, marking pens)
- Extension cord (optional)
- Glue sticks
- Projection system
- Science notebooks (composition books)
- Scissors
- Self-stick notes (for review sessions)

For outdoor investigations
- Bag for carrying materials
- Pencils

Investigation 1: The Sun
- Clock or watch
- Earth globe, >23 cm diameter, with stand
- File or small knife
- Painter’s tape
- Rolling cart (optional)
- Ruler
- Scratch paper
- Straightedges or rulers
- White glue
- Piece of white paper

Investigation 2: Planetary Systems
- Calculators (optional)
- Earth globe, >23 cm diameter, with stand
Investigation 3: Earth’s Atmosphere
1  Local weather report
1  Metal fork

Investigation 4: Heating Earth
1  Clock or watch
2  Insulated coolers (optional)
1–2  Infrared heat lamps, 250 watt (optional)
1  Hot pot or hot plate (optional)
1–2  Lamps, clip-on, with ceramic sockets (optional)
   •  Paper or cloth towels
1  Penny
8  Stopwatches (optional)
16  Pieces of white paper
1  Bottle, 1 L (optional)
1  Watch or stopwatch

Investigation 5: Water Planet
1  Insulated cooler (optional)
   •  Frozen objects such as containers of water, metal
     objects, small bags of sand (optional)
   •  Hand lenses (optional)
   •  Crushed ice, 1–1.5 L
   •  Ice cubes, 12–15 or more
1  Flat mallet, wooden spoon, rolling pin, or muddler
   •  Paper towels (optional)
1  Plastic bag, sturdy, 4 L
1  Small cloth towel
   •  Soft-drink cans, empty, recycled (optional)
PREPARING a New Kit

If you are preparing a new kit for classroom use, you can do several things initially that will save time during routine preparation for instruction.

1. **Number pairs of thermometers**
   The metal-backed thermometers in the kit might not all read exactly the same. Let all the thermometers equilibrate at room temperature and then look for pairs that read the same temperature. Use a permanent marking pen to label them in pairs: two 1s, two 2s, and so forth. Each collaborative group will be assigned two numbers and will use those pairs of thermometers throughout the investigations.

2. **Prepare measuring cups**
   Put 100 milliliters (mL) of water in a plastic cup and mark the level using a permanent marking pen. Mark four cups at the 100 mL level.

3. **Prepare the atmosphere posters**
   The kit includes two tall, thin posters. *Earth’s Atmosphere* represents the entire 600 kilometers (km) of Earth’s atmosphere. The second poster, *The First 30 km of the Atmosphere*, represents the troposphere. Each poster comes in three sections. Align the parts, and use transparent tape to stick them together.

4. **Put pointer on balance**
   Find the balance pointer. Insert the rounded end first, into the balance beam. Leave the pointer on the balance when you store it.
PREPARING the Kit for Your Classroom

Some preparation is required each time you use the kit. Doing these things before beginning the module will make daily setup quicker and easier.

1. **Check consumable materials**
   A number of items in the kit are listed as consumable. Some of these items will be used up during the investigations (food coloring, rock salt, index cards, self-stick notes, chalk), and others will wear out and need replacement (transparent tape, zip bags, potting soil, cells). Any items that cannot be reused for the particular FOSS investigation might be usable in another part of the curriculum. Before throwing items out, consider ways to recycle them, and get your students involved in this process.

2. **Check compasses**
   Check the 16 magnetic compasses to make sure they all work properly (the needle points to north). Test them away from any metal objects.
   There is one larger compass with a clear plastic base used to assemble the weather vane in Investigation 3, Part 3.

3. **Check flashlights and AA cells**
   Check the condition of the flashlights and AA cells, and replace the cells as necessary. Make sure the flashlights are turned off.

4. **Inventory golf tees**
   Make sure you have a golf tee for each pair of students and one for the class.

5. **Clean Moon Calendar**
   Make sure the Moon Calendar is wiped clean and ready for use.

6. **Inventory posters**
   There are a number of posters in the kit. Make sure all the sets are complete. The Moon-phase poster has four sheets.

7. **Inventory solar system cards**
   There are 16 sets of solar system cards, each set with 18 cards. Inventory each set to make sure it is complete.

8. **Check soil**
   Check the quantity of soil. You need about a liter of soil for the class in Investigation 4.
9. **Check food coloring**  
To enhance observations, food coloring is added to water in several of the investigations. Color is also used to indicate temperature. Green is added to room-temperature water, blue to cold or ice water, and red to hot water. Recipes are discussed in the Getting Ready sections. Check to see that there is a good supply of the three colors needed for this module.

10. **Inventory labels**  
Labels are used on cups and dome lids throughout the module. Self-stick notes are provided for this purpose because they are handy and easy to remove. If they come off before you want them to, anchor them with a small piece of transparent tape.

11. **Assemble a wind vane**  
Determining wind direction requires assembling a simple wind vane and installing it on the compass provided in the kit. Refer to the detailed instructions for making the wind vane in Getting Reading for Investigation 3, Part 3.

12. **Become familiar with other equipment**  
A number of pieces of equipment in the kit are similar. Become familiar with them so you can tell them apart.

**Cups and Containers.** There are many kinds of cups and containers, identified by their capacity and material. Some of them have lids. Some containers are round and some oval in shape.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beaker, 1 L</td>
</tr>
<tr>
<td>10</td>
<td>Containers, oval, black, 1/4 L</td>
</tr>
<tr>
<td>10</td>
<td>Containers, oval, white, 1/4 L</td>
</tr>
<tr>
<td>10</td>
<td>Container lids, oval, clear, with slits, for 1/4 L containers</td>
</tr>
<tr>
<td>20</td>
<td>Containers, round, clear, 1/4 L</td>
</tr>
<tr>
<td>20</td>
<td>Container lids round, plastic, flat, with slits, for 1/4 L round containers</td>
</tr>
<tr>
<td>8</td>
<td>Containers, 1/2 L</td>
</tr>
<tr>
<td>8</td>
<td>Containers, 1 L</td>
</tr>
<tr>
<td>50</td>
<td>Cups, plastic, 250 mL</td>
</tr>
<tr>
<td>16</td>
<td>Cups, plastic, 500 mL</td>
</tr>
<tr>
<td>12</td>
<td>Lids, plastic, dome, for 250 mL cups</td>
</tr>
</tbody>
</table>
13. Familiarize yourself with the digital weather station
The digital weather station requires a one-time setup for Investigation 3, Part 3. The instructions for installing the batteries and setting the time, date, and reporting units are with the instrument in the module kit. In case the instructions get lost or the model of the weather station in the kit changes, look for the latest instructions on FOSSweb in “Important Module Updates” for the Earth and Sun Module.

14. Plan for a water source
Water is needed for many activities. In many cases, room-temperature water is required; in others, hot water, cold water, or ice is required. Plan ahead to have the right amount of water on hand at the right temperature. If you don’t have a water supply in your classroom, fill pitchers with water. A large bucket can be used to collect liquids when no sink is available or when plain water is to be recycled.

Hot water can be kept hot in a vacuum bottle, an insulated container, or an electric hot-water pot. You could use a hot plate to heat the water and introduce students to this tool used in the laboratory. Be sure you have adequate supervision before using the hot plate in the classroom.

Keep water and ice cold in a cooler.

15. Plan for cleanup
This module uses containers and tools that must be cleaned, dried, and inventoried if they are to stay in top condition. This responsibility should be assumed by students. Assign one collaborative group to do this after each session. Plan where this cleanup will take place in the classroom (if you have a sink) or elsewhere in the school if a sink is not available in your room. All the plastic items in the kits are meant to be rinsed, dried, and reused.

Also plan for disposal of liquids. A collection bucket works well when there is no sink.

16. Consider safety issues indoors and outdoors
Two safety posters are included in the kit, one for science indoors and one for working outdoors. You should review the guidelines with students and hang the posters in the room as a reminder. Getting Ready for Investigation 1, Part 1, offers suggestions for this discussion. Also be aware of any allergies that students in your class might have. Students with latex allergies should not handle the rubber stoppers.
17. Print or copy notebook sheets
You will need to print or make copies of science notebook sheets before each investigation. See Getting Ready for Investigation 1, Part 1, for ways to organize the science notebook sheets for this module. If you use a projection system, you can download electronic copies of the sheets from www.FOSSweb.com.

18. Check FOSSweb for resources
Go to FOSSweb, register as a FOSS teacher, and review the print and digital resources available for this module, including the eGuide, eBook, and “Resources by Investigation,” such as streaming videos, virtual investigations, and tutorials.
This module uses a number of videos, animations, and weather resources on FOSSweb. Sometimes these are viewed by the whole class at one time as teacher-facilitated demonstrations, and some times they are used by pairs or individual students. Familiarize yourself with how to access these resources on FOSSweb in “Resources by Investigation.” Plan to have a projection system with computer and Internet access whenever there is something for the class to view.

19. Plan for word wall
As the module progresses, you will add new vocabulary words to a word wall or pocket chart, and model writing and responding to focus questions. Plan how you will do this in your classroom.
You may also find it beneficial to use a pocket chart to display the equipment photo cards as reference for students as they gather needed items from the materials station for each part. Print the photo cards from FOSSweb.

20. Acquire books from library
Check your local library for books. Visit FOSSweb for a list of appropriate trade books that relate to this module.

21. Plan for letter home and home/school connections
You will need to print or make copies of teacher master 1, Letter to Family, for the module and the Home/School Connection teacher masters for each investigation.
CARE, Reuse, and Recycling

When you finish teaching the module, inventory the kit carefully. Note the items that were used up, lost, or broken, and immediately arrange to replace the items. Use a photocopy of the materials list (the Kit Inventory List), and put your marks in the “Equipment condition” column. Refill packages and replacement parts are available for FOSS by calling Delta Education at 1-800-258-1302 or by using the online replacement-part catalog (www.DeltaEducation.com/RefillCenter).

Standard refill packages of consumable items are available from Delta Education. A refill package for a module includes sufficient quantities of all consumable materials (except those provided by the teacher) to use the kit with three classes of 32 students.

Here are a few tips on storing the equipment after use.

- Rebag polystyrene balls and straws.
- Check the compasses and put them in boxes. Carefully package the compass used for the wind wane.
- Remove the cells from the base and transmitter of the digital weather station. Return the parts of the weather station to the storage box and make sure the setup instructions are with the instrument.
- Remove the cells from the flashlights and store them separately.
- Package the metal-backed thermometers carefully.
- Take posters and calendars down from your classroom walls and store them appropriately in the kit.
- Rebag the cut-and-stick Moons.
- Organize and store small items in bags.
- Keep the balance pointer on the balance.
- Rinse and dry all containers and lids before storing.
- Return the dry soil to the soil bag and seal securely.
- Deflate the globe.
- Check quantity of consumables and order more if necessary.

The items in the kit have been selected for their ease of use and durability. Make sure that items are clean and dry before putting them back in the kit. Small items should be inventoried (a good job for students under your supervision) and put into zip bags for storage. Any items that are no longer useful for science should be properly recycled.