INTRODUCTION

The Solids and Liquids kit contains
- Teacher Toolkit: Solids and Liquids
  1 Investigations Guide: Solids and Liquids
  1 Teacher Resources: Solids and Liquids
  1 FOSS Science Resources: Solids and Liquids
- FOSS Science Resources: Solids and Liquids
  (1 big book and class set of student books)
- Equipment for 32 students

A new kit contains enough consumable items for at least two classroom uses before you need to resupply.

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 Materials Safety Data Sheets (MSDS), go to www.FOSSweb.com. Links to replacement-part lists and customer service are also available on FOSSweb.
# SOLIDS AND LIQUIDS — Materials

## KIT INVENTORY List

### Drawer 1—print materials

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Toolkit: Solids and Liquids (1 Investigations Guide, 1 Teacher Resources, and 1 FOSS Science Resources: Solids and Liquids)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>FOSS Science Resources: Solids and Liquids, student books</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>FOSS Science Resources: Solids and Liquids, big book</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

### Drawer 2—permanent equipment

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basins, 8 L</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Card deck sets for Go Fish, 24 cards/set (sets A, B, C, D, E)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Card deck sets for Memory, 12 cards/set (sets A, B, C, D, E)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Cardboard pieces, 7.5 cm (3&quot;) square</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Cloth pieces, 10 cm (4&quot;) square</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Cornmeal, container, 350 g/container (12.5 oz.)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Dropers</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Lima beans, container, 350 g/container (12.5 oz.)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Material, ceramic (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Material, fabric (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Material, leather (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Material, metal (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Material, paper (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Material, plastic (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Material, rubber (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Material, wood (rectangle)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Mung beans, container, 350 g/container (12.5 oz.)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Posters, Science Safety and Outdoor Safety</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Poster, set, liquid-properties, 6/set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rubber bands, #14</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Screen sets, 3 screens/set</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Screen transparencies, 2 sets/sheet</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Screws, metal</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Sticks, craft</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Straws, jumbo</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Triangles, plastic</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Tubes, clear plastic, 5 cm (2&quot;)</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

*These items might occasionally need replacement.*
<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Wires, insulated, 13 cm (5&quot;)</td>
<td></td>
</tr>
<tr>
<td>40 Wood cylinders</td>
<td></td>
</tr>
<tr>
<td>100 Zip bags, 1 L (1 qt.)</td>
<td></td>
</tr>
</tbody>
</table>

**Drawer 2—consumable equipment**

- 2 Aluminum foil, rolls, 7.5 m (25')/roll
- 100 Cups, paper, 150 mL (5 oz.)
- 1 Food coloring, set, 4 colors/set
- 1 Mints, hard, bag, 30/bag
- 1 Pinto beans, container, 350 g/container (12.5 oz.)
- 1 Rice, container, 350 g/container (12.5 oz.)
- 1 Rock salt, container, 454 g/container (1 lb.)
- 2 Self-stick notes, pads, 100/pad
- 1 Toothpaste, 175 g, (6 oz.)/tube
- 100 Zip bags, 1 L (1 qt.)

**Drawer 3—permanent equipment**

- 8 Beakers, plastic, Tri-Pour, 50 mL
- 1 Bottle brush
- 84 Bottles, plastic, with caps, 120 mL (4 oz.)
- 8 Containers, plastic, 1 L
- 18 Containers, plastic, 1/4 L
- 27 Containers, plastic, 1/2 L
- 32 Cups, plastic, 250 mL (9 oz.)
- 5 Funnel, clear, plastic
- 24 Glue sticks
- 5 Lids, plastic, for 1/2 L containers
- 6 Scoops, 25 mL
- 10 Spoons, plastic
- 1 Thermometer, Celsius
- 12 Vials, with caps, 7 dr.
- 12 Vials, with caps, 12 dr.

**Drawer 4—permanent equipment**

- 5 Bus trays

*These items might occasionally need replacement.*
MATERIALS Supplied by the Teacher

Each part of each investigation has a Materials section that describes the materials required for that part. It lists materials needed for each student or group of students and for the class.

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

**For all investigations**
- Chart paper and marking pen
- Drawing utensils (pencils, crayons, colored pencils, marking pens)
- Glue sticks (if you need additional)
- Projection system
- Science notebooks (composition books)

**For outdoor investigations**
- 1 Bag for carrying materials
- 32 Bottles, drinking-water, plastic, with caps, recycled, 1/2 L
- 32 Clipboards
  - Containers for water (plastic gallon jug, 2 L soft-drink bottles, bucket)
  - Newspapers
  - Pencils
- 1 Whistle or bell

**Investigation 1: Solids**
- 1 Paper bag or box
- 1 Rock, wood block, or other solid object
- 1 Twig
- Water
Investigation 2: Liquids
5 Books (large) or pieces of cardboard
2 Bottles, drinking-water, plastic, with caps, recycled, 1/2 L
• Chart paper for collages (optional)
• Cooking oil, 1/2 L (1 pt.)
• Corn syrup, clear, colorless, 1/2 L (1 pt.)
• Liquid dish soap (detergent), blue or green, 1/2 L (1 pt.)
• Liquid fabric softener or starch, 1/2 L (1 pt.)
• Liquid hand soap, white, 1/2 L (1 pt.)
• Magazines (optional)
• Paper towels
32 Scissors
• Tape, transparent
• Water

Investigation 3: Bits and Pieces
1 15-bean soup mix (optional)
5 Books (large) or pieces of cardboard
32 Bottles, drinking-water, plastic, with caps, recycled, 1/2 L
1 Broom and dustpan
• Construction paper (optional)
• Glue (optional)
1 Scissors (optional)
• Water
Investigation 4: Solids, Liquids, and Water

1. Bottle, plastic, 4 L (1 gal.), (optional)
2. Chalk pieces
3. 10 Chocolate chips
4. 6 Cookies (small)
   • Cooking oil, about 250 mL (8.5 oz.)
   • Corn syrup, about 250 mL (8.5 oz.)
5. 1 Freezer
6. 1 Glass (optional)
7. 10 Ice cubes (small) or chunks
   • Liquid dish soap, about 250 mL (8.5 oz.)
   • Liquid fabric softener or starch, about 250 mL (8.5 oz.)
   • Liquid hand soap, about 250 mL (8.5 oz.)
   • Margarine, stick, 15 mL, (1 Tbsp.)
   • Paper towels
   • Raisins (6 spoonfuls)
   • Scissors
   • Scratch paper
   • Tape, transparent
8. 1 Tea bag (optional)
9. • Vacuum bottles or insulated chest
   • Water (room temperature and hot water)
10. 1 Writing paper, sheet
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. Acquire liquids
   Purchase at least 1/2 liter (L) (1 pt.) of each of the following:
   - Corn syrup, clear, colorless
   - Cooking oil
   - Liquid dish soap (blue or green)
   - Liquid hand soap (white)
   - Liquid fabric softener or laundry starch

2. Prepare water with food coloring
   Fill a 1/2 L container with water, and add the appropriate color or colors of food coloring until it is close to the color of the dish soap you are using. Use it for the colored-water bottles.

3. Prepare bottles for solids and liquids
   The kit has 12 bags of 7 bottles each, for a total of 84 clear plastic bottles with screw caps. This may seem excessive, but teachers requested enough bottles so that some would be used with solids only and others used with liquids only.

   Seven bottles are spares. The other bottles need to be identified as solid or liquid bottles. Divide the bottles for these uses, and put labels in or on the zip bags. Some teachers use a permanent marking pen to mark an S for solids on the bottom of the bottle and the top of the cap to identify each bottle.

   Investigation 2. Fill 35 bottles with specified liquids. Fill bottles halfway, making sure the volume of liquid is the same in each bottle. Cap the bottles tightly. Do not label the bottles. Put each set (one bottle of each type of liquid) in a zip bag.

   5 Water, plain
   5 Water with color
   5 Corn syrup
   5 Cooking oil
   5 Liquid dish soap
   5 Liquid hand soap
   5 Liquid fabric softener or starch

Solids and Liquids Module
These remain filled for the rest of the year, to be reused by other classes. These 35 permanent bottles of liquids are never opened and might last unspoiled for many years.

**Investigation 3.** Reserve 20 bottles for solid bits and pieces only.

**Investigation 4.** Reserve 18 bottles for mixing liquids and investigating toothpaste. These bottles are filled in Investigation 4, Parts 2 and 3. Four additional bottles are reserved for use with oil and water only.

1. Water with color
2. 3–4 Corn syrup
3. 3–4 Cooking oil
4. 3 Liquid dish soap
5. 3 Liquid hand soap
6. 3 Liquid fabric softener or starch

These bottles are washed and reused. The kit includes a bottle brush. Do not wash the bottles in the dishwasher, as they will melt.

4. **Prepare center instruction sheets**
   Each investigation part that involves a small number of students at a center has a center instruction sheet written for a parent or other helper working with students. Make one copy of teacher masters 9, 18, and 22–24, the five center instruction sheets. Copy them on colored paper, a different color for each center, and laminate them or put them in clear-plastic sheet protectors.

5. **Cut screen transparencies in half**
   The kit has 16 sheets of screen transparencies. Each sheet has two sets of screens printed on it. Cut each sheet in half lengthwise so each student can use one set of screens.
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, toothpaste, rice, beans, rock salt, mints), and others will wear out (paper cups, straws, cardboard, rubber bands, zip bags, aluminum foil). The items that cannot be reused for the particular FOSS investigation may 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 food materials**
   The solids used for bits and pieces are food. They make the most economical and lightweight mixture for sorting by size. When the kit arrives, the materials are in plastic bags inside their containers. This is to avoid messes in shipment—the bags can be emptied into the containers when preparing the materials for students.

   When storing the containers, be sure the lids are on securely. Put each of the closed containers in a large zip bag. If the kits are stored where small animals might get into the box, store the containers in rodent-proof cans.

3. **Prepare sets of liquids in bottles**
   Five sets of liquids in bottles (seven bottles—one of each type of liquid—per set) are used in Investigation 2. They are permanent equipment and are never opened. Several classes can use them during a year. Organize the liquids in bottles into five sets to confirm that the liquids are in good condition. If you need to replace them, follow the instructions in the Preparing a New Kit section of this chapter.

4. **Care and reuse of materials**
   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.
5. **Bus trays and basins**
There are two kinds of large containers—five bus trays and five plastic basins. They are used to organize and contain materials and as totes to carry the materials to students’ work areas. These containers can be used as temporary storage bins for materials between activity sessions.

6. **Containers**
A variety of containers are in the kit. The first time they are used, they are described and illustrated for easy identification. Metric capacities are used to distinguish the containers. We also include the English equivalents for the first description. Be sure to use the correct container for each investigation.

7. **Liquid-properties posters**
There are six laminated liquid-properties posters in the kit. If these get lost or if you want to make them part of a bulletin-board display, use the teacher masters in the teacher guide to make copies of the posters and laminate them.

8. **Organize the decks of cards**
The liquid-property cards are used to play the Memory game and the Go Fish game. Check that the card sets are assembled correctly. Each deck has a letter of the alphabet on the back (A, B, C, D, or E).
- Memory game—12 cards per deck (two sets of six cards). Five decks for Memory are included in the kit.
- Go Fish game—24 cards per deck (four sets of six cards). Five decks for Go Fish are included in the kit.

If the cards get mixed up, reorganize the decks by using the five patterns on the backs of the cards.

Teacher master 10, *Masters for Card Decks*, has six different cards, each a representation of one liquid property. If cards get lost or destroyed, use the master to make additional copies. Card sets are also available from Delta Education.

9. **Photocopy notebook sheets**
You will need to make copies of science notebook sheets before each investigation. See Getting Ready for Investigation 1, Part 1, for ways to organize the notebook sheets for this module. If you use a projection system, you can download electronic copies of the sheets from FOSSweb (www.FOSSweb.com).
10. **Word wall and pocket charts**
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. See Investigation 1, Part 1, for suggestions about how to do this in your classroom.

11. **Consider safety issues indoors and outdoors**
Two safety posters are included in the kit—*Science Safety* and *Outdoor Safety*. You should review the guidelines with students and post the posters in the room as a reminder. Getting Ready for Investigation 1, Part 1, offers suggestions for this discussion. Emphasize that materials do not go in mouths, ears, noses, or eyes. Encourage responsible actions toward other students.

Also be aware of any allergies that students in your class might have. Students with latex allergies should not handle the rubber bands.

12. **Plan for letter home and home/school connections**
Teacher master 1, *Letter to Family*, is a letter you can use to inform families about this module. The letter states the goals of the module and suggests some home experiences that can contribute to students’ learning. Space is left at the top so you can copy the letter onto your school letterhead.

There is a home/school connection for most investigations. Check the last page of each investigation for details, and plan when to make copies and send them home with students.

13. **Gather books from library**
Check your local library for books related to this module. Visit FOSSweb for a list of appropriate trade books that relate to this module.

14. **Check FOSSweb for resources**
Go to FOSSweb to review the print and digital resources available for this module.
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 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).

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 two classes of 32 students.

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

- Keep the liquids in the five sets of seven bottles (from Investigation 2). Make sure the caps are secure. Store each set of seven bottles in a zip bag.
- Reserve 20 bottles for solids only. Clean and rinse the other bottles. Keep the four oil bottles in a separate, labeled bag.
- Make sure items are dry before storing them.
- Inventory and bag the small items.
- Sort the cards into five Memory decks and five Go Fish decks.
- Secure the lids on all containers of materials.

The items in the kit have been selected for their ease of use and durability. 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.