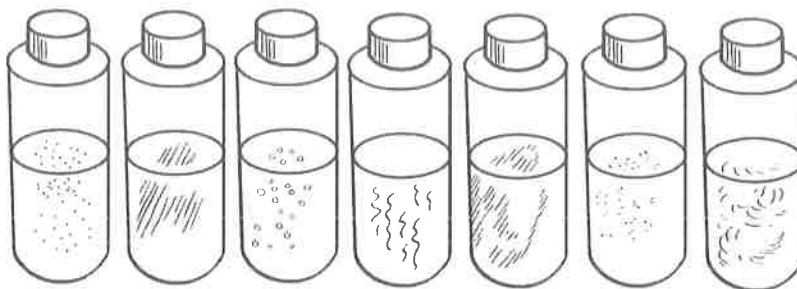


## CENTER INSTRUCTIONS—LIQUIDS IN BOTTLES

### Materials

- 5 Basins
- 5 Sets of seven liquids
- 5 Large books or pieces of cardboard



### Set Up the Center

Space the five basins, each with seven bottles, evenly around the table.

### Guide the Investigation

- 1. Describe the investigation.** Show students a set of bottles. Tell students that their job is to work with a partner to find out as much as they can about the liquids in the bottles. Students are not allowed to open the bottles for any reason.
- 2. Keep the activity moving forward.** Provide little guidance as students work with the bottles. Let students start a free exploration of the liquids.
- 3. Focus the observations.** After students have worked with the bottles for several minutes, ask some guiding questions.
  - *How are the liquids the same? How are they different?*
  - *Do all the liquids move the same?*
  - *What happens to the liquids when you slowly tip the bottles on their sides? When you turn the bottles upside down?*
  - *What happens to the liquids when you spin the bottles?*
  - *What happens to the liquids when you roll the bottles across a flat table or down a ramp? Which bottles roll best?*
  - *What happens to the liquids when you shake the bottles?*
  - *Can you make a tornado in the bottles? In which ones?*

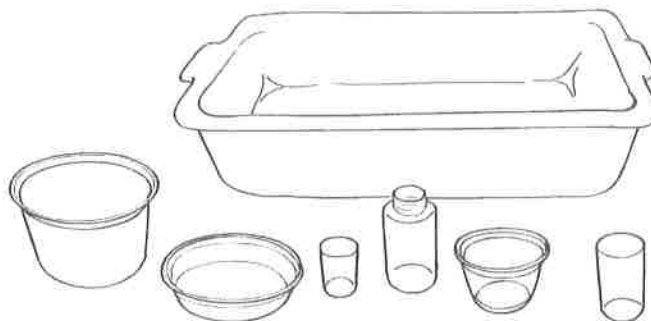
If students focus on the identities of the liquids, ask them how the liquids are the same and how they are different. Emphasize their properties, but don't identify the liquids.

- 4. Rotate groups.** After 20 minutes, ask students to return the bottles to the basins, and rotate the next group into the center.

# CENTER INSTRUCTIONS—LIQUIDS IN CONTAINERS

## Materials

- 5 Bus trays, each containing
  - 1 Container of water, 1 L
  - 1 Vial, 7 dram
  - 1 Vial, 12 dram
  - 1 Plastic bottle
  - 1 Container, 1/4 L
  - 1 Plastic cup
- Colored pencils or crayons
- Paper towels



## Set Up the Center

Fill five 1-liter (L) containers with water. Add a drop of food coloring to each container. Space the five bus trays with their containers evenly around the table. Have paper towels and colored pencils or crayons on hand. Have a copy of notebook sheet 8, *Liquids in Containers*, for each student.

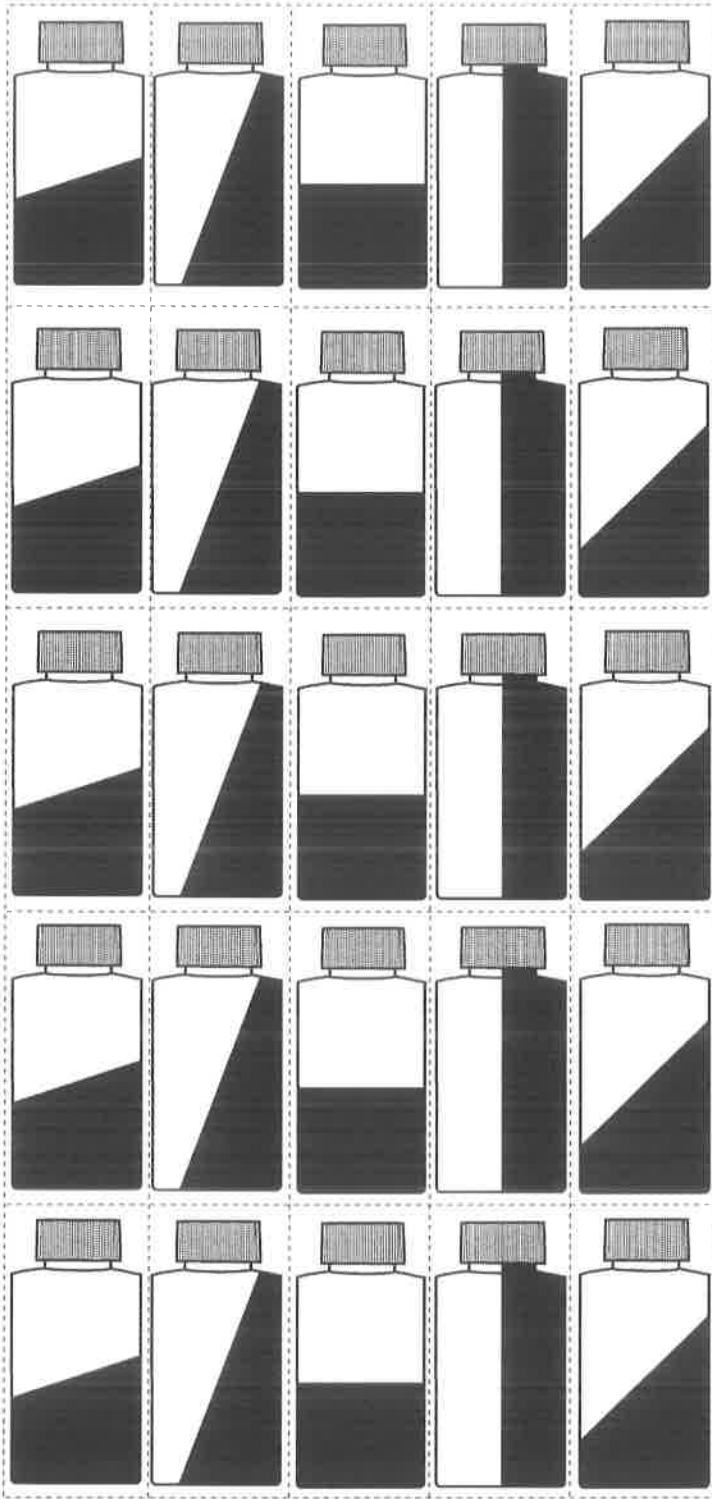
## Guide the Investigation

1. **Introduce the investigation.** Show students a set of containers and the *Liquids in Containers* sheet. Describe the procedure, modeling the actions as you proceed.
  - a. Work with a partner to line up the containers as they are on the sheet.
  - b. Pour one full, *small* vial of water into each container.
  - c. Draw a line on each picture showing the level of the water.
  - d. Color the picture if you would like to.
2. **Suggest close observations.** As students work, ask,
  - *What is the shape of the water in the bottle? In the flat container? In the large vial? In the cup?*
  - *Which container looks like it has the most water in it?*
  - *Does each container have the same amount of water in it?*
  - *Where do you think the water level will be if we add another vial of water to each container?*

Students can put a second vial of water into each container and draw a second line on each picture.

3. **Prepare the center for the next group.** When time is nearly up, ask students to pour all the water back into the 1 L container. Use the paper towels to clean up any spills. Make sure each bus tray has a complete set of containers.

# FALLING-BOTTLE PUZZLE



# CENTER INSTRUCTIONS—SOLIDS IN CONTAINERS

## Materials

- 5 Bus trays, each containing
  - 2 Plastic cups
  - 2 Bottles with caps
  - 2 Vials with caps, 12 dram
  - 2 Vials with caps, 7 dram
  - 1 Beaker
  - 1 Funnel
  - 1 Scoop
  - 1 Container of particles (cornmeal, rice, mung beans, pinto beans, or lima beans)
- 5 Wood cylinders
- 5 Screws



## Set Up the Center

The cylinders and screws should be in a container in a central spot. Space the five bus trays with their containers and particles of solid material evenly around the table.

## Guide the Investigation

1. **Describe the challenge.** Tell students that they will work with a partner to find out as much as they can about each of the five solid materials by transferring them from one container to another.
2. **Keep the activity moving forward.** Provide very little guidance as students work with the materials and containers. If necessary, remind students to work in the bus trays. Don't allow students to mix materials.
3. **Focus the observations.** Ask questions to focus students' observations on the properties of the solid materials.
  - *Put one level scoop of material in each container. Note the level of the material in each container. Does the highest level mean the most material?*
  - *Describe how these materials pour.*
  - *Can you put the material in a pile, a line, a circle, a square?*
  - *What happens when you put the wood cylinder and the screw in a cup of the material?*
4. **Move to a new station.** After students become familiar with the first material, suggest that they move to a new station to investigate a different material. Have students spend 3–5 minutes at each station.

## CENTER INSTRUCTIONS—SEPARATING SOUP MIX

### Materials

- 5 Bus trays, each containing
  - 1 Container of soup mix
  - 4 Containers, 1/2 L
  - 1 Scoop
  - 1 Screen, small mesh
  - 1 Screen, medium mesh
  - 1 Screen, large mesh



### Set Up the Center

Space the five bus trays with their containers, scoop, screens, and soup mix evenly around the table.

### Guide the Investigation

1. **Describe separating soup mix.** Tell students to work with a partner to separate the soup mix into containers in order to find out how many kinds of material are in the mixture.
2. **Keep the activity moving forward.** Provide very little guidance as students work with the soup mix and screens. If necessary, remind students to work in the bus trays. If they don't use the screens at the start, that's OK.
3. **Monitor the separation.** If, after an extended period of time, the screens are not being used, suggest that the screens might be useful. Ask,
  - *How are screens used?*
  - *Can screens be used to separate the soup mix?*
  - *Which screen is the best for separating cornmeal from the soup mix?*
  - *Can you get each of the materials in its own container?*
4. **Discuss separations.** After students have had some success separating the soup mix, ask some questions to focus students' thinking on the separation process.
  - *How many different materials were in the soup mix?*
  - *Were you able to separate the mix? How did you do it?*
  - *If you used the screens to sift the mixture, what is the best way to use them? Which screen did you use first?*
5. **Prepare the center for the next group.** When time is nearly up, ask students to return the soup mix to its original container. Make sure each bus tray has a complete set of screens and 1/2 L containers.

## CENTER INSTRUCTIONS—SOLIDS IN BOTTLES

### Materials

- 5 Bus trays, each containing
- 4 Bottles with caps
- 1 Scoop
- 1 Funnel
- 1 Container of cornmeal
- 1 Container of rice
- 1 Container of mung beans
- 1 Container of lima beans
- 5 Large books or pieces of cardboard



### Set Up the Center

Space the five bus trays with four bottles, four containers of solids, a funnel, and a scoop evenly around the table.

### Guide the Investigation

**1. Describe filling the bottles.** Tell students that with a partner, they will fill bottles at one of the bus trays. Point out the funnel that students can use to direct the materials into the bottles.

- a. *Put the material from one container into one of the bottles. Put the cap on tightly.*
- b. *Repeat the process until a different material is in each bottle.*
- c. *Roll, shake, and tip the bottles while observing what happens.*

**2. Keep the activity moving forward.** Watch to see that students put only one kind of material in each bottle. Once the bottles are filled and the caps are screwed on tightly, provide very little guidance as students start their investigation.

**SAFETY NOTE:** Caution students not to drop the bottles or hit them on anything, as they will crack. They should be handled carefully throughout the investigation.

**3. Suggest close observation of the bottles.** After students have had plenty of time to try their own ideas, ask questions to focus their observations.

- *What happens when you turn the bottles upside down slowly?*
- *What happens when you shake the bottles?*
- *What happens when you spin the bottles on the floor?*
- *What happens when you roll the bottles down a ramp and across the floor?*

**4. Prepare the center for the next group.** When time is nearly up, ask students to return the materials to their original containers. Make sure each bus tray has a complete set of bottles and materials.

## LABELS FOR SOLIDS IN WATER

---

Cookie

Name \_\_\_\_\_

Craft Stick

Name \_\_\_\_\_

Beans

Name \_\_\_\_\_

Cardboard

Name \_\_\_\_\_

Rice

Name \_\_\_\_\_

Mint

Name \_\_\_\_\_

Cloth

Name \_\_\_\_\_

Rock Salt

Name \_\_\_\_\_

Raisins

Name \_\_\_\_\_

Aluminum Foil

Name \_\_\_\_\_

Chalk

Name \_\_\_\_\_

Name \_\_\_\_\_