

# Weight Versus Volume

Roma Rae Geiger

## INTRODUCTION

The *volume* of an object is the amount of space it takes up. Objects of different sizes take up different amounts of space.

Does an object's weight affect its volume? If two containers are the same size, but one weighs more, will it have a greater volume? This experiment lets you find out!

## TIME NEEDED

Preparation: 30 min.

Completion: 45 min.

## WHAT YOU NEED

- 2 baby-food jars of equal size, with lids
- sand, pebbles, or beans—to use for weight
- medium-strength string or yarn
- scissors
- ruler
- 500-1,000 milliliter beaker
- large container of water
- large bowl to catch *displaced* water
- 2 small milk cartons of equal size
- masking tape



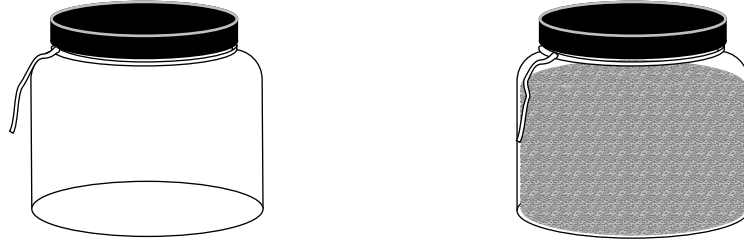
## Safety Precautions

Please click on the checkmark to view the safety guidelines.

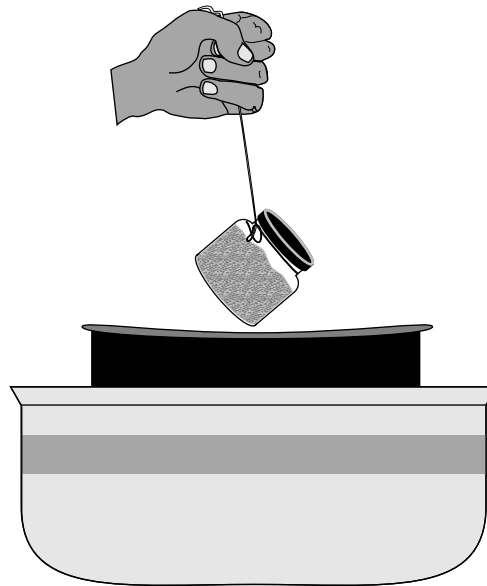
## WHAT YOU DO

1. **Fill** 1 jar with sand, pebbles, or beans. **Leave** other jar empty.
2. **Cut** two 25-cm pieces of string.

3. **Tie** large knot on one end of each piece of string.
4. **Place** knotted end of string in each jar with "tail" hanging out.
5. **Put** lid on each jar and tighten carefully.



6. **Set** water container in large bowl, then **fill** water container to top.
7. **Lower** empty jar into water until whole jar is just below water's surface.



8. **Remove** jar, then **pour** water from catch pan into beaker.
9. **Record** amount on data table.

**DATA TABLE****VOLUME**

Empty Jar	ml
Weighted Jar	ml
Empty Carton	ml
Weighted Carton	ml

10. **Pour** water from beaker back into container, then **repeat** steps 7–9 for heavier jar.
11. **Repeat** experiment using 2 small milk cartons to double-test hypothesis that weight doesn't affect volume. Be sure to **seal** each carton top with tape. You may have to push the empty carton down with your finger.

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 **OBSERVATIONS**

1. Did the heavier jar push out or *displace* more water than the lighter jar?
2. Does it matter what you use as weight?
3. Why do you have to pour the displaced water back into the container?

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 **OUR FINDINGS**

Click on the above link to see what we found.

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**Follow-Up**

Some people confuse weight with volume. Take a survey. Show people the empty jar and the weighted one. Ask, "Which has the most volume?" Tally the replies, then demonstrate the experiment to show the jars have equal volume. Use the survey data to create a bar graph comparing the number of people who knew the difference between weight and volume with the number of people who didn't.

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**Words to Know**

*displace* — to move out of position

*volume* — how much space an object takes

# Our Findings

## 2. BASIC SKILLS

### **2.5 WEIGHT VERSUS VOLUME**

1. The measurements should be about the same. They might be slightly different because water “stuck” to the sides of the catch pan.
2. No, any weight gives the same result.
3. Volume measures how much water is pushed out of the jar’s way. So if the water in the container isn’t filled to the top, there wouldn’t be enough water to be pushed out of the container.

# SAFETY GUIDELINES

## Special Safety Note To Experimenters

Some activities in this book have special safety rules to follow. The special rules are on the page with that activity. But even if every safety rule in the world is not listed with an experiment, you have to know how to be safe when doing science projects. So it's very important that you read, copy, and follow the Everyday Safety Rules that follow.

Sometimes science experiments can be dangerous. Things can spill, break, or even catch fire. You have to know what to do. . . fast. So be prepared. Read the directions for each experiment carefully, and follow any special safety rules listed with it, then be careful.

Always follow common-sense safety rules like NEVER RUN WITH SCISSORS IN YOUR HAND or BE CAREFUL WITH HOT THINGS! You already know a lot of common-sense safety rules ...so remember to follow them, and have fun!

## Everyday Safety Rules

### PREPARE

- Clear off your work space.
- Read all directions.
- Know what problems might happen, and be prepared.

### PROTECT YOURSELF

- Follow directions step-by-step.
- Do just one experiment at a time.
- Locate exits, fire extinguisher, eye wash, and first-aid kit before you start. Ask an adult to show you how to use a fire extinguisher.
- Be sure there's fresh air in the room.
- Wear an apron and safety goggles.
- Don't wear contact lenses, have bare feet, or wear very loose clothing.
- Keep work space and floor clean.
- Clean up spills immediately,
- Don't drink or eat around the experiment work space.
- Don't eat or drink any stuff tested, unless a grown-up says it's OK.

### USE EQUIPMENT CAREFULLY

- Don't set up equipment too near the edge of your work space.

- Be cautious when using pointed or sharp instruments, like scissors, screwdrivers, or knives.
- Unplug any electric device by pulling out the plug, not pulling on the cord.
- Use only low voltage batteries, like those used in flashlights or smaller.
- Be careful when using chairs or step-stools.

### **USING CHEMICALS**

- Have an adult help you with all experiments requiring chemicals.
- Don't inhale or taste chemicals.
- Read all labels carefully.
- Label all chemicals.
- Wear goggles, apron, and gloves so chemicals don't touch your skin.
- Wash hands before and after using solutions.
- Wipe up spills thoroughly.

### **HEATING THINGS**

- Wear goggles, apron, and gloves when boiling water.
- Use safety tongs and heat-resistant mitten or hot pads.
- Never leave heated things unattended.
- Turn off hot plates and oven burners when you're finished.
- Keep flammable things away from heat and flames.
- Have a fire extinguisher ready.

### **IN THE FIELD**

- Never go on a field trip alone: follow the Buddy System.
- Tell a responsible grown-up where you're going.
- Know the area and be aware of dangers, like poisonous plants and deep water.
- Dress for the weather conditions.
- Bring along a first-aid kit.
- Don't drink water or eat plants in the wild, unless the grown-up you're with says it's OK.

### **FINISHING UP**

- Clean up the equipment and your work space.
- Return chemicals to the proper containers.
- Don't throw stuff down the drain unless instructed to.
- Wash your hands.
- To protect the environment, get rid of chemicals according to local, state, and federal laws.