SAMUEL CORD STIER AND JEAN POTTER

SCIENCE IN SECONDS FOR KIDS

100+ experiments and activities you can do in 10 minutes or less

SECOND EDITION

JOSSEY-BASS™
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SECOND EDITION

This book is dedicated to my dear friend James H. Harless in appreciation for his friendship and love for fellow man and for his significant contributions to the field of education.

— Jean

To teachers everywhere who guide children toward a good life by fostering wonder, curiosity, and discovery – sensations evolution has given us the capacity to feel that have made humankind what it is today.

— Sam

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Introduction

Science in Seconds for Kids contains 108 quick and easy activities and experiments that will help you discover the wonders of science and our world, from how rockets work to what causes lightning. Each activity takes only 10 minutes or less to complete. You will soon be able to look quickly into many exciting topics.

How This Book Is Organized

Science in Seconds for Kids is divided into sections by topic. If you are looking for a particular activity, you can find it in the Activities Index at the back of the book.

Each activity answers a particular question about science and includes a list of the materials you need, easy-to-follow steps, and an explanation of what the activity demonstrates. There is no need to buy special materials, but you may want to visit the Internet or a library for additional information on the topic.

Tips for Completing the Activities

Try to be very careful as you perform your activities. These tips will help:

Be prepared. Read through any activity before you begin to do it. Collect all the materials required before you start, and place them in the order in which you will use them. Science can be messy, so wear old clothes while doing activities. Give yourself enough space to work and enough ventilation. Cover surfaces with newspaper in case of spills.

Be accurate. When conducting your activities, follow the directions closely, and write down all results. Consider repeating experiments to see if you get the same result again. Doing an experiment more than once can help improve the accuracy of your results.

Be creative. After completing an activity according to the directions, try to think of ways that you can change an experiment. Look for the results from your change to the experiment. Before you make the change, ask an adult if your substitution is all right.

Be careful. Ask for adult assistance and supervision when using sharp instruments. Materials should be used for the purpose for which they are intended. Work cautiously.

Be neat. Keep your work and your work area as neat as you can. Use clean instruments, and wash them after every use. Put your materials away after they have been washed.

Have fun! Because our world is so interesting, science is full of discoveries and adventure that lasts forever!

Image by Free-Photos from Pixabay

Air

Air is a special mixture of gases that surrounds and protects our planet and makes Life possible. Since it is colorless, odorless, and tasteless, we sometimes do not remember it is there. But it is, and it is very important.

Air has many uses, from keeping living things alive to making it possible for you to play basketball, fly a kite, or fly in an airplane. In this section, you will do some activities and experiments to learn how air can push objects, lift things, and make balls bounce.

Dry Paper

Can Paper Stay Dry in Water?

Materials

tap water

plastic tub

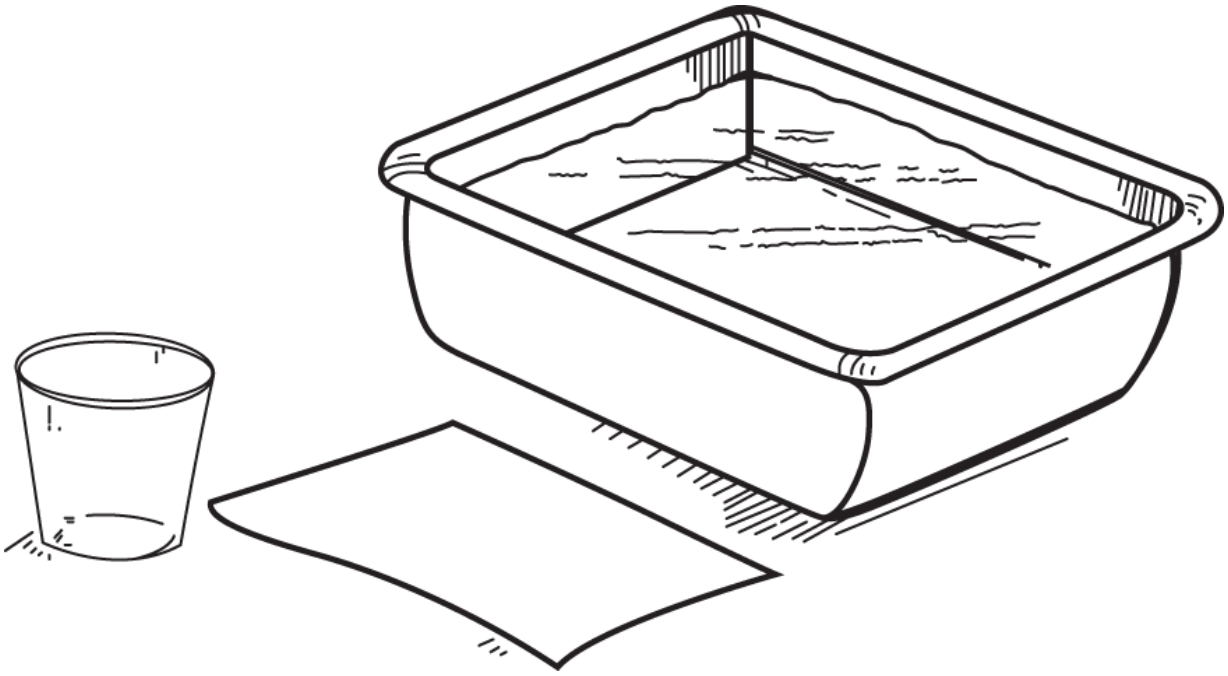
sheet of paper

plastic cup

Try This

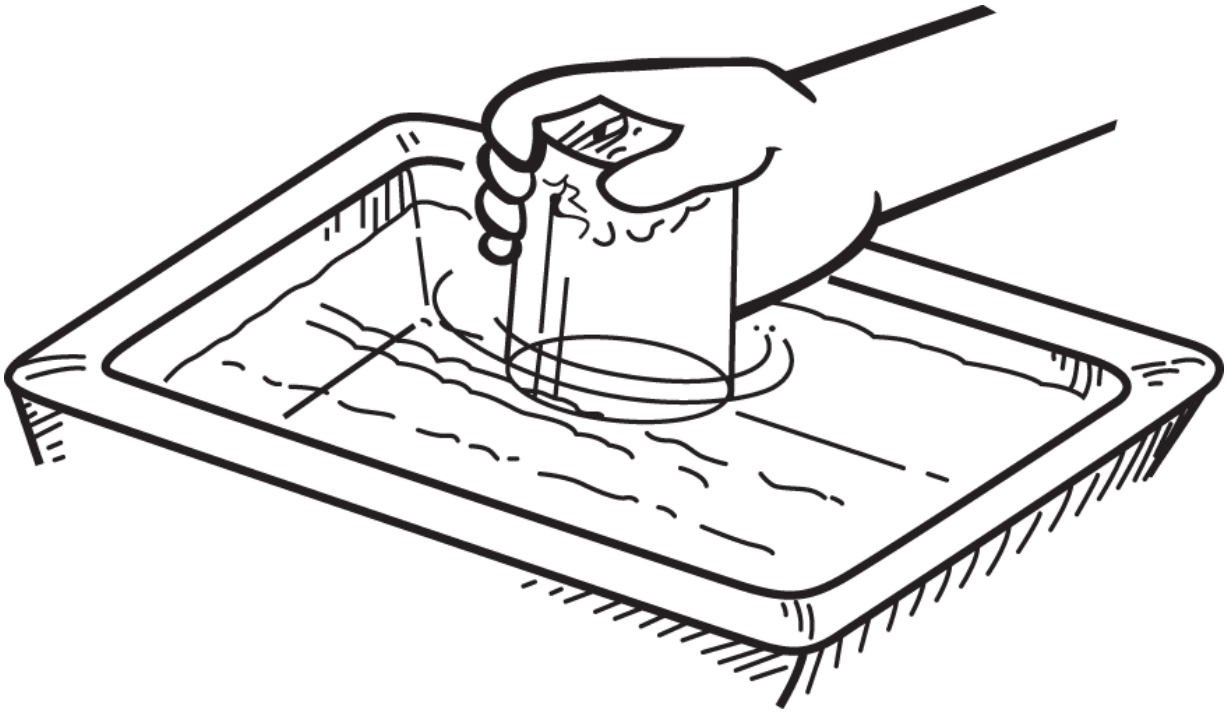
1. Run tap water into the plastic tub until the tub is about three-fourths full.
2. Crumple the sheet of paper and push it to the bottom of the plastic cup. Use enough paper so it will stay at the bottom when the cup is upside down.
3. Hold the cup upside down and push it into the water. Be sure to hold the cup straight up and down, not tilted.

4. Pull the cup straight up out of the water and, with dry hands, remove the paper. What happens to the paper?



What's Going On?

The paper did not get wet. Air surrounded the paper in the cup. When you pushed the cup into the water, the air was trapped in the cup. The trapped air pushed back on the water, keeping it from reaching the paper. If you had tilted the cup, the air would have escaped, and the water would have taken its place. In that case, the paper would have become wet.



Elastic Air

Why Does a Balloon Filled with Air Bounce?

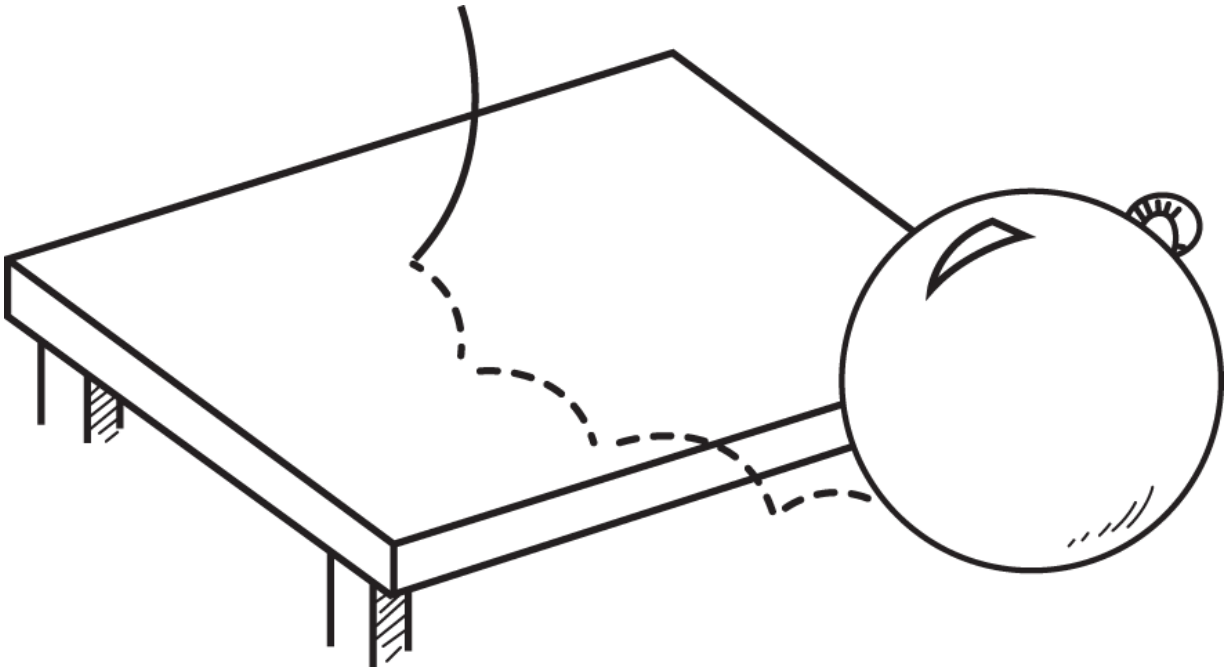
Materials

balloon

string

Try This

1. Inflate the balloon.
2. Tie the neck of the balloon closed. Tie a string to the neck.
3. With your hand, push in the balloon at different places.
4. Bounce the balloon against a table or your fist. What happens to the balloon when you press or bounce it against something?



What's Going On?

Balloons are made of an **elastic** (stretchy) material called **latex**. When you blew air into the balloon, the air **molecules** (the smallest particle or amount of a chemical substance) were packed closer and closer together. When you pushed in on the balloon, you actually felt all those air molecules pushing back. Because the balloon and air are elastic, the balloon bounced back when you pushed it against a table or your hand. If the balloon were filled with sand, it would not bounce! This is why basketballs, soccer balls, and other balls are filled with air.

Air Rocket

What Happens to Air When You Squeeze It?

Materials

piece of string about 6 ft (2 m) long

2 chairs

drinking straw

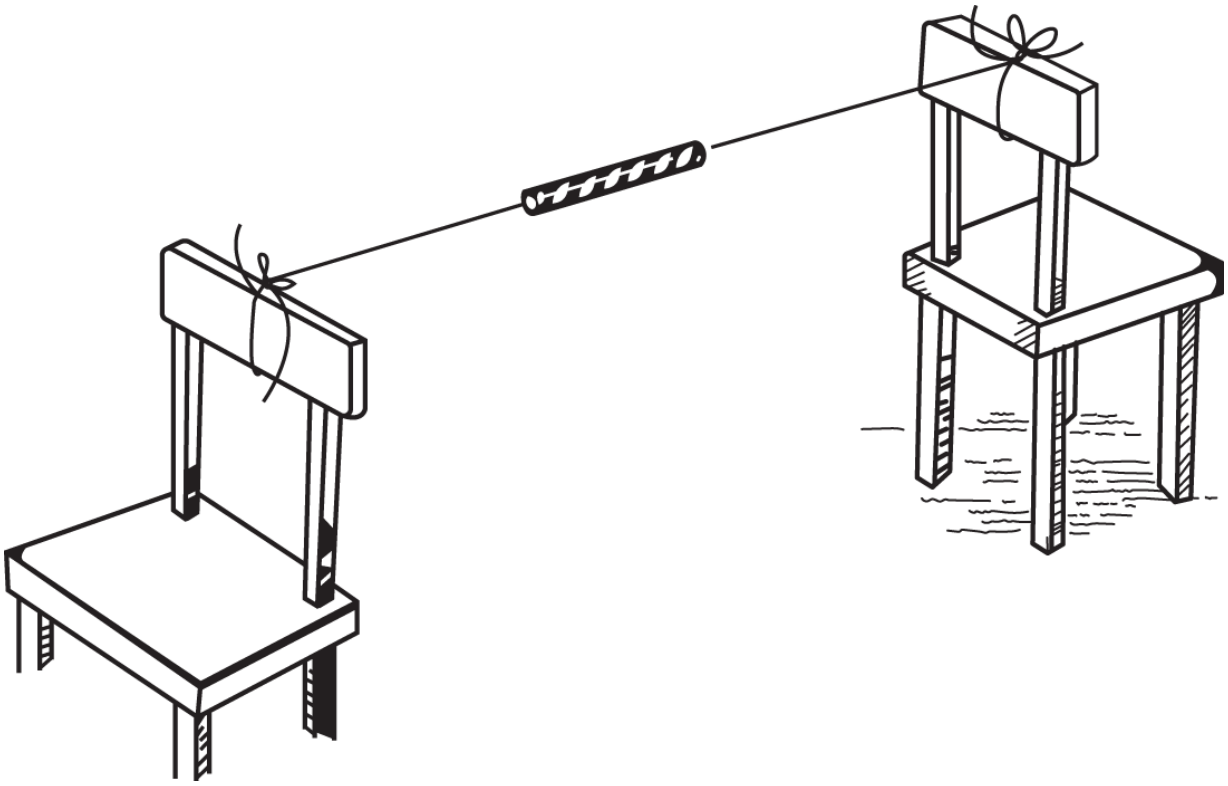
long balloon

masking tape

Try This

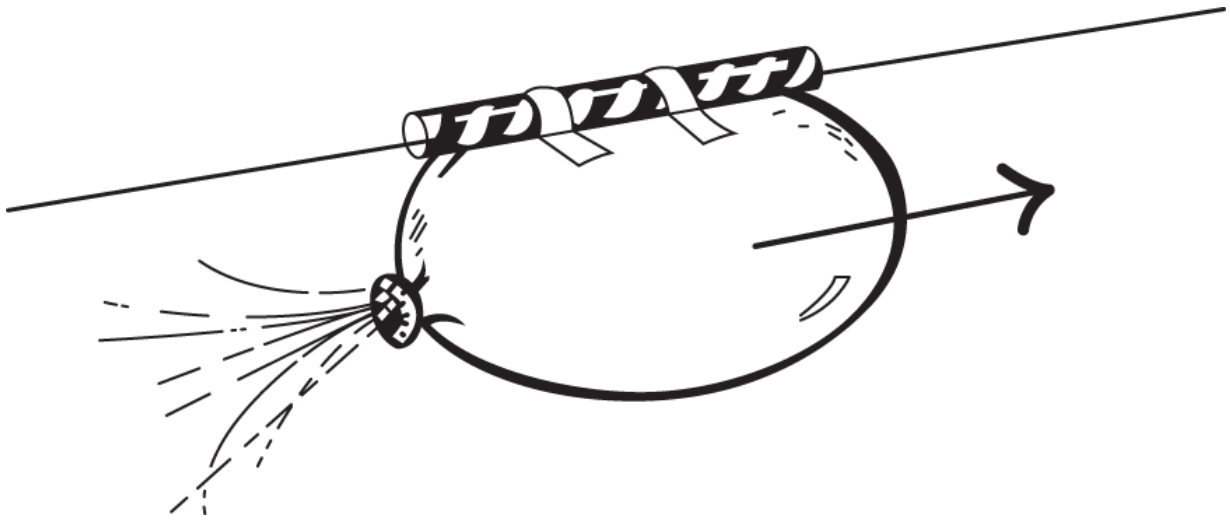
1. Tie one end of the piece of string to the first chair.
2. Lace the string through the drinking straw.
3. Tie the other end of the string to the second chair.
4. Move the chairs apart so the string is stretched tight.
5. Inflate the balloon and hold the neck so that no air escapes.

6. Keep the neck of the balloon closed as you tape the balloon to the straw.
7. When the balloon is taped, release the neck. What happens?



What's Going On?

The balloon was forced along the string. When you inflated the balloon, you pushed air into it, stretching out the latex skin. The elastic skin of the balloon then put **pressure**, or **force**, on the air inside the balloon. When you released the balloon, the air rushed out one end with a force that pushed the balloon in the opposite direction. When a rocket is launched, tremendous force is required to lift it off the ground. The rocket gets this force from fuel, which is **ignited** (set on fire), forcing heated gas out the end of the rocket, pushing the rocket up in the other direction.



Air Push

Air Pressure Is All Around Us

Materials

5-by-8-in. index card

plastic cup

tap water

bowl

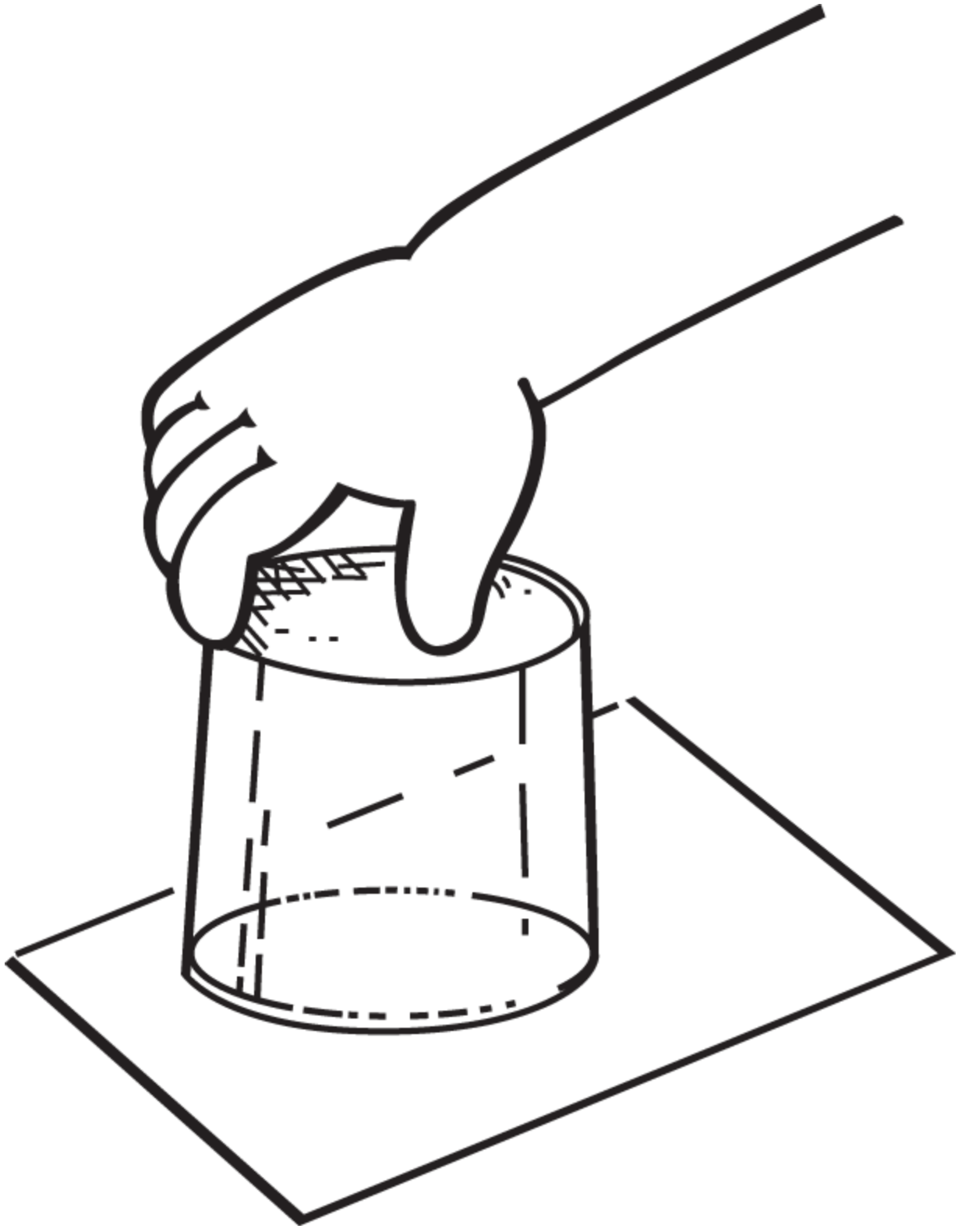
Try This

1. Make sure the index card is large enough to completely cover the top of the plastic cup.
2. Fill the cup with tap water to the brim so that no air space remains.
3. Place the index card on top of the cup. Make sure there is no air between the card and the water. If there is air space, remove the card, add more water, and replace the card.
4. Hold the card in place by putting one hand on it.

5. Turn the cup upside down over the bowl and slowly remove your hand from under the card.
6. Turn the cup slowly in different directions. Can you make the card stay on the glass when you move it in different directions?

What's Going On?

The air that surrounds us pushes in all directions. When you turned the water-filled cup upside down, the air around the cup maintained its pressure on the index card and held it in place, even against the weight of the water. The card will stay pressed against the cup until a force stronger than the surrounding air moves it.



Air Support

How Does the Shape of an Object Affect How It Falls Through the Air?

Materials

scissors

ruler

8-foot (2.4-m) piece of string

2 square handkerchiefs

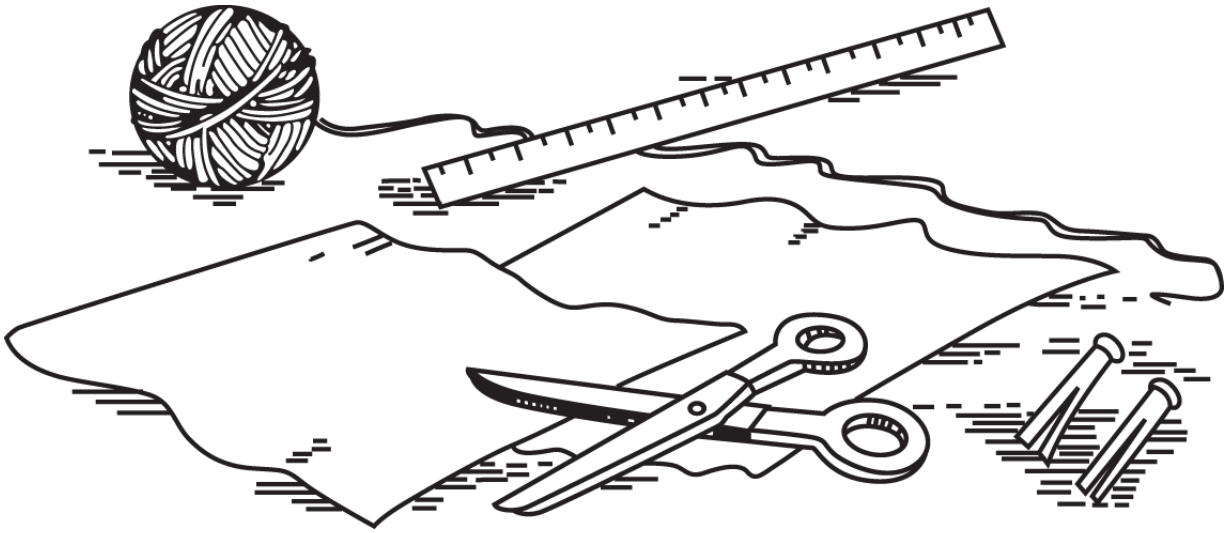
2 clothespins or small binder clip

Try This

1. Cut the piece of string into eight 1-foot (30-cm) lengths.
2. Tie a big knot in the middle of one handkerchief.
3. Tie one length of string to each corner of each handkerchief.
4. Gather the ends of the loose strings leading from each handkerchief and tie them in a knot around the head of

each clothespin or similarly weighted object.

5. Grip the center of each handkerchief and toss both handkerchiefs into the air, or drop them from a high place. What happens?



What's Going On?

The handkerchief knotted in the middle fell to earth faster than the unknotted handkerchief. When an object falls through the air, it hits air molecules. Each molecule pushes up slightly on the falling object. Because the unknotted handkerchief was able to spread out, it caught more air molecules, which slowed its fall.