Scratch and Slide!

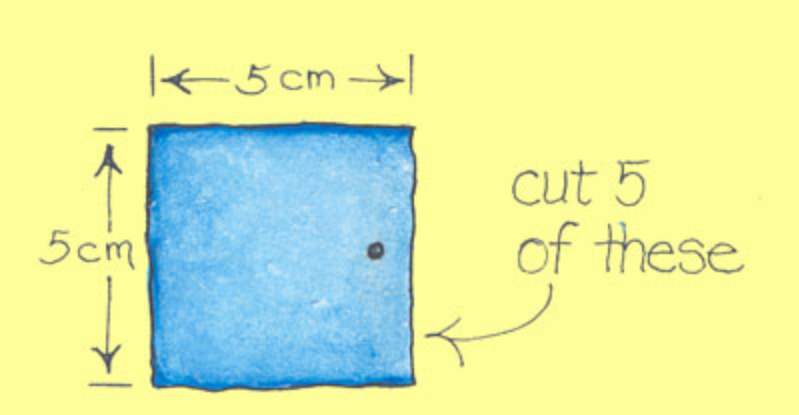
Whenever you try to move any object, you have to push or pull it with a certain amount of force. You have to use enough force to move the weight of the object itself but you also need to overcome something called friction which makes it harder to move the object. Let's do an activity to see what friction is and how it works.

Materials:

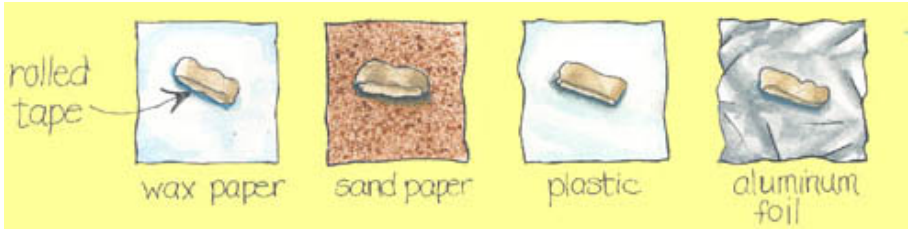
- Construction paper
- Scissors
- String
- Wax paper
- Sand paper
- Aluminum foil
- Plastic bag
- Pencil or pen
- Pennies
- Tape
- Small paper cup
- 4 paper clips

Parent or Teacher Preparation:

Use scissors to cut construction paper into 5 squares, each about 5 centimeters long on each side. Use a pencil or pen to carefully poke a small hole in the middle of one side of each square.



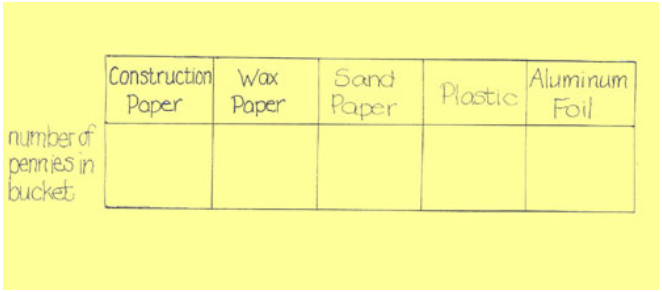
Also cut a 5cm x 5cm square of wax paper, sand paper, plastic bag, and aluminum foil. Do not poke a hole in these. Roll up 4 pieces of tape and use them to tape the wax paper, sand paper, plastic, and aluminum foil to one side of four of the construction paper squares.



Procedures:

1. Carefully cut 5 pieces of string about 60 centimeters long. Thread one end of the string through the hole in each square of construction paper and tie a knot.

2. Slightly unbend each of the 5 paper clips and tie one to the end of each string as shown.
3. Make a little bucket out of a piece of string and a paper cup: Use a pencil or pen to poke a hole on opposite sides of the cup near the rim. Thread a piece of string through the holes and tie them to make a handle.
4. Stack 10 pennies and tape the stack together with 2 pieces of tape. Make a chart like the one shown below.



5. Hook the bucket to the paper clip on the friction tester with just construction paper. Place the pennies in the center of the paper and let the bucket hang over the edge of the table as shown.

6. Slowly add pennies, one at a time, to the bucket until the construction paper begins to slide smoothly toward the edge of the table. Record the number of pennies in the bucket under "Construction Paper" in your chart.
7. Dump the pennies from the bucket and move the bucket to the wax paper friction tester. Make sure the wax paper side is touching the table. Place the pennies on the tester and set it up the way you did before. Add pennies to the bucket and see when the tester slides smoothly. Record the number of pennies.
8. Repeat this same test for the sand paper, plastic, and aluminum foil.

Think about this ...

What do you think your test results would be like if you used half the number of pennies on your friction testers? How about twice as many? Try it and see!

Where's the Chemistry?

Friction is caused when two surfaces are touching and are sliding against each other. The amount of friction depends on how hard they are pressing against each other and what they are made of. Surfaces like sandpaper with lots of bumps tend to cause more friction than smoother surfaces like glass or polished metal. But sliding something over these surfaces will cause friction too because they have bumps and grooves too, they are just not as large and obvious as the ones in sandpaper.

The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".