

Teachers, please copy both sides of this page for your students to take home.

Dear Students and Parents,

We hope you enjoyed your recent day of science exploration and investigation with Pacific Science Center's *Physics on Wheels* van. The Science On Wheels program, which began operating in 1974, is an interactive outreach program that travels to schools across the state of Washington.

The *Physics on Wheels* van provides students with hands-on science experiences. Students explore an interactive exhibit area and receive a 45-minute hands-on lesson. Our goal is to foster an interest in science, technology and mathematics.

We encourage you to talk about our visit and investigate the activities below. They require few materials and are easy to do. Remember, your child and his or her friends may become our next physicists. We hope you enjoy doing these activities together!

~Science On Wheels Teachers

Unfriendly Balloons

When you shuffle across a carpet in your socks or rub a balloon in your hair, you are actually creating a charge of static electricity. In this experiment you can test what happens when you have two objects with the same static charge.

Procedure

- Tie one balloon to each end of the piece of string.
- Hold the stick out in front of you and hang the two balloons over it. The balloons should be hanging right next to each other. Does anything special happen?
- Create a static charge on your balloons by rubbing both balloons in your hair or on a sweater.
- Let the balloons hang down from the stick again and observe what happens. Your balloons should be repelling, or pushing away from one another.

Materials

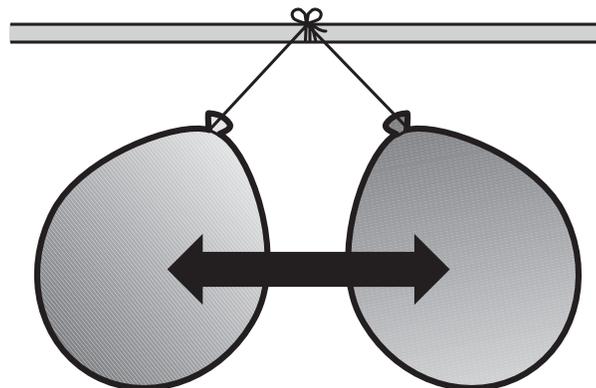
- 160 cm (2 feet) piece of string
- 2 balloons (blown up)
- 1 thin stick or a dowel rod

Challenge

In this experiment you actually gave the two balloons a negative charge. What would happen if you held one of these balloons against something with a positive charge? Recharge one of your balloons by rubbing it in your hair again. Now put it up to a wall or a friend. What happens?

What's going on?

The two balloons repel each other because you have given both balloons the same charge. Two objects with the same charge will naturally try to push away, or repel.



Easy Roller



Discover how to move heavy objects with less effort.

Procedure

- Place the shoebox in the middle of a table.
- Attach a piece of string to one end of the shoebox, either with tape or by punching a small hole in the box.
- Pull the box across the table with the string. Is it easy to move?
- Attach the yogurt container to the other end of the string. Allow the container to hang over the edge of the table. Add pennies to the container until the box moves toward the table edge. (If the box didn't move at all, try it again with only one shoe in the box). How many pennies did it take to move the box?
- Empty the penny container. Put four pencils under the box, evenly spaced apart. Add pennies to the container one at a time until the box moves. How many pennies were needed to move the box this time?

Materials

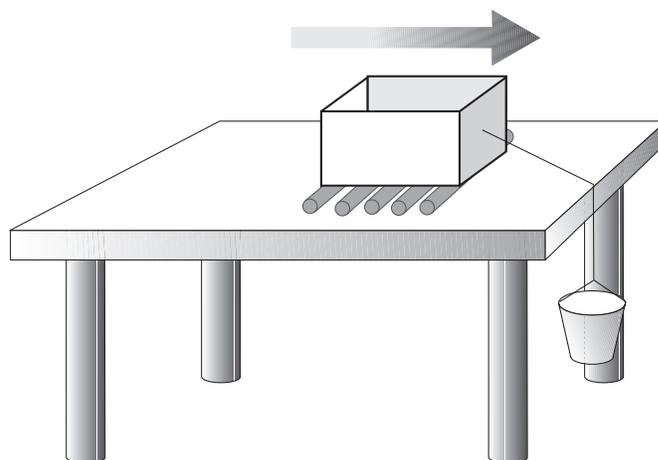
- 4 round pencils
- shoebox (or similar box) containing 2 shoes or an object of similar weight
- 200 pennies
- string (about 1 meter long)
- yogurt container or similar plastic container

Challenge

Try this activity again using several more pencils. Try using different rollers, like marbles or empty soda cans. Does the size, shape, or weight of the roller change how many pennies are needed to move the box? Which roller works the best? Is it better to use many rollers or only a few? What conclusions can you draw?

What's going on?

Friction between the box and table makes it difficult to move the box. Friction occurs when two objects rub against each other. In general, rougher objects cause more friction and smoother objects cause less friction. Think about walking on a slippery floor in your socks, as compared to walking across the same floor in sneakers. Often surfaces are not as smooth as they seem. If you looked at what appears to be a smooth surface with a microscope, you would see many bumps and holes that cause friction. When the box is directly on the table, there is quite a bit of friction between them. Putting rollers under the box decreases the amount of friction, making the box easier to move. Rollers made of logs were used by the Egyptians to move the heavy stones needed to build pyramids.



Resources

Find these books at your local library or bookstore:

101 Physics Tricks, by Terry Cash, 1991

175 More Science Experiments to Amuse and Amaze your Friends, by Terry Cash, Steve Parker and Barbara Taylor, 1989

200 Illustrated Science Experiments for Children, by Robert J. Brown, 1987

Physics for Every Kid, by Janice VanCleave, 1991

Physics for Kids: 49 Easy Experiments with Acoustics, by Robert W. Wood, 1991

Credits

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