

Remote Control Roller

Grade Level: 3

Strand: Understanding Matter and Energy

Topic: Forces and Movement

Specific Expectation:

- To investigate the ways in which static electricity can change the speed or direction of a moving object.
- To distinguish between kinds of motion and indicate whether the motion is caused indirectly (e.g. static electricity) or directly (e.g. by applied force).

Overall Expectations:

- To demonstrate an understanding of how movement is caused by forces and by energy that is stored and then released.
- Investigate how different forces affect the operation of everyday devices, and design and construct devices that use a form of energy to create controlled movement.
- Identify objects, devices, and systems in everyday life that are affected by forces and movement and explain in what ways they are useful to us.

Materials Needed

- Empty soda can
- Blow up balloon
- Your hair

Procedure

What do I do?

1. Put the can on its side on a table or the floor -- anyplace that's flat and smooth. Hold it with your finger until it stays still.



2. Rub the balloon back and forth on your hair really fast.



3. Hold the balloon about two centimetres in front of the can. The can will start to roll, even though you're not touching it!



4. Move the balloon away from the can -- slowly -- and the can will follow the balloon.
5. If you move the balloon to the other side of the can, the can will roll in the other direction.



6. How fast will the can roll? How far can you roll it before the can stops? Will it roll uphill?
7. If you have some friends with cans and balloons, you can have a race across the room or down the sidewalk.

Scientific Principle

Why does the soda can roll?

With Remote Control Roller, basically, you pile up electrons on one thing and use them to attract the protons in something else. When you rub a balloon on your hair, it ends up loaded with electrons. Those electrons can attract the protons in a soda can, the protons in a trickle of water, the protons in your hair, or the protons in a wall.

Why do clothes stick together in the dryer?

The attraction between protons and electrons can also make clothes stick together in the dryer. When you dry clothes in the dryer, different fabrics rub together, and electrons from a cotton sock (for instance) may rub off onto a polyester shirt. That's why clothes sometimes stick together and make sparks when you pull them apart. You may have used antistatic sheets in your dryer. As these sheets bounce around with your clothes, they add a uniform antistatic coating to the fabric. Rather than cotton rubbing against polyester, you've got the antistatic coating on the cotton rubbing against the antistatic coating on the polyester. No electrons rub off and you don't get any static cling.

References

http://www.exploratorium.edu/science_explorer/

The Ontario curriculum Grades 1 to 8 Science and Technology,
Ministry of Education and Training, 1998

www.sciencemadesimple.com/static.html#ICANREAD

Opportunities and Other Considerations

A Xerox machine uses static electricity to make copies. When you rub a balloon on your head, the balloon is charged with electricity. Inside a Xerox machine is a plastic drum that is also charged. When you put a piece of paper on the glass, a copy of it goes onto the drum. Where there were dark places on the paper, the static charge on the drum attracts the black plastic toner powder. Then the powdered places go onto a blank piece of paper, and the paper is heated. The toner melts and makes black letters on the new piece of paper.

Bend Water

Turn on the faucet in your bathroom or kitchen. Don't run the water too hard, but more than a little trickle.

Now rub a balloon on your head and hold the balloon near the water. The stream of water will bend toward the balloon!

Give Yourself Funny Hair

Rub the balloon on your head, then pull it away. Your hair will stick out and look really funny. (This can also happen when you comb your hair with a plastic comb.) What if you hold the balloon near your arm? Can you feel the hairs on your arm move? Will it work on doll hair? How about animal fur?

Stick the Balloon to Your Face!

Once you've rubbed the balloon on your head, it will stick to other things -- with no glue. You can stick it to the wall, to the TV, or even to your face!