

# Witch's Broom

## Materials:

- Straw
- Pencil
- Scissors
- Tape



## Activity overview:

Place your broom on the launcher (straw). Take a deep breath and blow. Challenge your friends and family to see whose broom can fly the farthest. Then try mounting your witch on the broom and see how it flies.

## The Science:

Your broom's flight can be explained using Newton's First and Third Laws of Motion. Newton's First law of Motion states an object at rest remains at rest, or if in motion, remains in motion at a constant velocity unless acted on by a net external force. The law is represented because your broom does not move until you apply a force by blowing through the straw.

1. Why didn't your broom continue to fly? What force acted upon it to bring it to the ground?

Newton's Third Law of Motion states that for every action, there is an equal and opposite reaction. The law is represented because the action of blowing in the straw creates a reaction of the broom moving. The passage of air out the back of your broom creates thrust which provided enough force to enable your broom to fly.

## How to build your own:

### Witch's Broom

2. Cut out a 2 inch by 5-inch rectangle and bristles from this paper.
3. Color and decorate the rectangle and bristles – keep in mind not all of it will show on the outside.
4. Wrap the rectangle around a pencil and tape it.
5. Remove the pencil from the paper cylinder and cut a point into one end of the cylinder to make a point at one end of the broom, this will act similarly to a nose cone on a rocket.
6. Put the pencil back inside the cylinder and tape up around the point where you have cut the cylinder. Don't tape it to the pencil though; you're just using the pencil for support.
7. Pull the pencil out again and blow through the open end of your broom. If too much air escapes, tape up the pointed end of the broom better.
8. Attach the bristles to the bottom of the broom. These will act like the fins on a rocket to help add stability. Apply tape to the straight middle piece of the bristles to tape it to the body of the



broom. You can have 2 or 3 bristles taped at the back of your broom, but they must be equally spaced to maintain balance.

9. Fold the bristles upwards towards you.
10. Insert the straw into your rocket and blow into the straw to launch the rocket!
11. For an additional challenge cut out the witch below, fold it at the hat so that your witch is visible from two sides and tape it on both sides of the broom. See how your broom flies now. What can you do to adjust for the extra weight and drag created by the witch?

