

Science

Vortexes

Purpose:

Create and observe vortexes
Learn about tornados and how they are created
Demonstrate that science is fun

Activity 1: The Water Race:

Supplies: (1) 2-litre bottle for each participant or team; stopwatch for each participant or team; paper and pencils; water, sink or basin

Fill the 2-litre bottle with water. Record prediction of how quickly the bottle can be emptied of all the water on a piece of paper. Without squeezing the sides of the bottle or swirling the water, empty the bottle into a sink or basin. Using the stopwatch, time how long it takes to empty out all of the water. Repeat this experiment three times to be sure the data are accurate.

Fill the bottle to the same level as before. Give the bottle a swirl. Time how long it takes to empty the swirling water out. Repeat three times.

Discussion: How close was your prediction?

Explanation: The action of swirling the water in the bottle while pouring creates a vortex, which looks like a tornado in a bottle. The opening of the vortex allows water to flow out of the bottle while air molecules move upward into the bottle. Without the vortex, the water and air molecules have to take turns passing through the mouth of the bottle.

Activity 2: Tornado in a Bottle

Supplies: (2) 2 liter bottles for each participant or team; tube connector; water; optional glitter, beads, small plastic animals, trees, houses, etc.

Fill one bottle 2/3 full of water. Screw on the tube connector to the bottle of water and then screw an empty bottle on top. Flip over the bottles and again observe how the water moves from one bottle to another. Then swirl the bottle with water in it and watch as the tornado is created. Add some of the above items and create your own vortex or tornado. Observe the vortex and answer these questions:

Where were the plastic houses, beads or animals before you swirled the water?
Where did they move when the vortex was started?
What similarities are there between the vortex created in the bottle and a real tornado?

Discussion: What other variations can you come up? What if you use more or less water? Does it make a difference if the water is hot or cold?

Explanation: A vortex is defined as “a whirling liquid.” When swirling the water it causes the liquids to travel in a spiral. As the water swirls in the experiment above it moves the houses, beads, glitter etc. These items will move at different speeds depending on where they are in the vortex. This is similar to a tornado. A tornado is defined as “a violent destructive whirling wind.” It is a rotating column of air ranging in width. Air and water droplets create a tornado. The water droplets form condensation, which is the visible tornado. The funnel or tail touches the earth and picks up objects in its path.



Science activities for grades 5 - 8. Allow 1 hour. Science Standards - Investigation, Weather.
Colorado State University Cooperative Extension 4-H Youth Development