

# Tornado in a Bottle



## OVERVIEW

Simulate a tornado with this handmade contraption and learn some weather science along the way. Watch how a vortex forms and moves in the water, and connect the dots to how tornadoes form and function in the real world.

## OBJECTIVES

Students will be able to:

- Create a unique simulation.
- Simulate the formation of a vortex.

## BACKGROUND INFORMATION

This “tornado in a bottle” is actually a water vortex. A vortex is defined as “a spiral motion of fluid within a limited area, especially a whirling mass of water or air that sucks everything near it toward its center.”

As the mass of water swirls in a circular motion, gravity pulls it down and forms a powerful vacuum. This is the same effect you see with a tornado funnel—just replace the water with air.

## MATERIALS

- Two 2-liter plastic soda bottles.
- 3MTM Duct Tape.
- ScotchTM Precision Scissors.
- Water.
- Dishwashing liquid.
- Food coloring.
- Glitter or confetti.

## HOME ACTIVITY

- Wash the empty soda bottles. Fill one of the bottles with water 3/4 of the way to the top.



- Add a few drops of dishwashing liquid to the water. Add a drop of food coloring and the confetti to make your tornado more visible and dramatic!
- Criss-cross two 4-inch pieces of duct tape and make a small hole (about ¼ inch) in the center. You could use a sharp knife, scissors, hole punch, knitting needle, chopstick or ball-point pen. Place a criss-cross of duct tape over the mouth of the empty bottle. Add extra tape if necessary to seal completely.
- Now place the empty bottle on top of the full bottle, mouth to mouth. Wrap duct tape around the two mouths, using plenty of tape to make sure the seal is secure and leak-proof.
- Now carefully flip the bottles over. Gently swirl the bottles and slowly pick up speed. As the water from the top bottle starts to swirl down into the empty bottle it will create a funnel effect, forming a whirlpool. It looks just like a mini tornado!

## VOCABULARY

- **Vortex:** is a fast flow of liquid spinning. The motion of swirling quickly around the center is called the vortex.
- **Gravity:** an invisible force that pulls objects toward each other.

## THOUGHT/CONVERSATION STARTERS

- How do tornadoes form?
  - A: The majority of tornadoes are formed during violent thunderstorms. A combination of several different weather conditions (like warm, moist air) must be present, plus a trigger like a strong cold front, and instability in the upper atmosphere. The cold air lifts the warm, moist air into the atmosphere, where unstable conditions create havoc.
- How is a thunderstorm cloud created?
  - A: In an unstable atmosphere, the air temperature decreases rapidly with height. When warm, wet air rises to great heights in an unstable atmosphere, it produces a thunderstorm cloud.

## DOCUMENT THE LEARNING IDEA

- Using a science journal or piece of paper, draw your unique tornado. Draw an arrow to identify the vortex.
- Using a smartphone with a camera, film the tornado using slow-motion. Is there an app that allows you to explain what is happening? Give it a try! Share the video with the teacher to show us what your tornado looked like and what happened.



\*Work together as a family to document your learning. Add a short description to your creation, explaining what you did and what you learned. Bring the creation to school to share with the class.

## CONTINUE MAKING CONNECTIONS

Continue to look for opportunities to make connections with your young scientist.

- Think about other times you have seen a vortex created with liquid (draining a bathtub or kitchen sink, stirring sugar into a glass of tea). Talk about how this is similar to or different from the mini tornado
- As weather occurs or reports of weather in other places across the world are reported. Have conversations about what is happening. How does a tornado form? How does a hurricane form? How does a whirlpool form? Identify the vortex if possible.