

CURIOSITY AT HOME

TORNADO IN A BOTTLE



Weather is defined as the state of the atmosphere and is around us all the time. Studying the weather helps us describe how the atmosphere feels through temperature, how wet or dry it is, the shape of the clouds, and much more. In this experiment, you'll get to make your very own severe weather from the safety of your home—a tornado!

MATERIALS

- A clear jar with a lid (cylindrical jars work best)
- Water
- Dish soap
- Food coloring
- **Optional:** Vinegar
- **Optional:** Small beads
- **Optional:** Glitter

PROCEDURE

- Fill the jar up with water until there is about 1 inch of space at the top.
- Put a few drops of dish soap and one to two drops of food coloring. Make sure you don't add too much food coloring or the water will be too dark for you to see your tornado.
- Place the lid on the jar and make sure it is sealed tight.
- Grip the jar with two hands and start swirling it around in a circular motion, then set it still on a flat surface to see your tornado. What shapes do you notice forming in the jar?

TIP: Your water will probably get very bubbly. If it's too bubbly just scoop some of the bubbles out and try again.

- Try spinning your bottle again with a different speed or direction to see what kinds of shapes your tornado makes. How long you can get it to spin? How tall can you make your tornado? You may have to try it several times to get a good tornado.
- **Optional:** If the bubbles continue to be too much, you can add 1 teaspoon of vinegar to the solution and try again. prevent dye from staining hands.



Experiment continued on next page...



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER



CURIOSITY AT HOME

TORNADO IN A BOTTLE



EXPLORE MORE:

- Add some small beads or glitter to your solution and see how they move inside and around the tornado. What do you observe happening?

TIP: When you're done, make sure you use a strainer to catch all the beads or glitter before dumping the water out!

- Try putting some larger items in the bottom of your bottle like dried beans or even a baby carrot. How does the tornado move different sized objects? Imagine what these objects might represent in real life.
- How do you think the tornado would change if the size or shape of the container changed? Make some predictions and try this out in a different bottle if you can.

TIP: Pour the solution from your original bottle into the new shapes and sizes so you do not have to make a new solution.



WHAT'S HAPPENING?

Tornadoes are funnel clouds, a rotating column of air that stretches all the way to the ground. They do not always touch the ground for very long, sometimes just for a few seconds, but they usually touch the ground for around 10 minutes or less, dissipating in that time as well. Most are formed from a supercell, which is a rotating thunderstorm that begins spinning faster and faster. A supercell forms when wind is travelling in different directions at different levels in the atmosphere. When this combines with updrafts of warm air meeting downdrafts of cooler air, the thunderstorm basically turns on its side, creating the intensely powerful funnel cloud. The internal wind speeds of a tornado can reach up to 300 miles per hour, although most only reach 100 miles per hour. In the United States, there are approximately 1200 tornadoes a year, mostly occurring in the flatter states in the middle of the country where warm air from the Gulf of Mexico meets cooler air from Canada.

DID YOU KNOW?

In the southern hemisphere, tornadoes tend to rotate clockwise and in the northern hemisphere they most often spin counterclockwise.



Experiment continued on next page...



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER



CURIOSITY AT HOME

TORNADO IN A BOTTLE



K-2 GRADE EXPLORATION

Here are some questions you can explore together:

- Do you think this would work if you shook the jar up and down instead of in a circular motion? Why or why not? Give it a try to find out.
- If you added the beads or glitter, what do you think those represent in a real tornado situation?
- Do you think this would work with a thicker liquid such as a smoothie? If you can, try the experiment again with a thicker liquid.



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER



CURIOSITY AT HOME

TORNADO IN A BOTTLE



3–5 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Tornadoes are rare in the Pacific Northwest. What are some other examples of extreme weather that occur in this region?
- Safety in severe weather is important. Can you identify a few locations within your home where you would be safe from severe weather such as a tornado? Remember to stay away from breakable things like windows or things that could fall, like shelves.
- What else do you know about tornados? What other questions do you have about tornados? List what you know and what you're curious about in your science notebook.



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER



CURIOSITY AT HOME

TORNADO IN A BOTTLE



6–8 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Why do you think tornados are rare in the Pacific Northwest?
- If you are able, look up some videos of real tornadoes and make some observations of what looks different between your tornado model and a real tornado. Make a list of the similarities and differences in your science notebook.
- Does your tornado look different in the center of the jar versus on the edges? What about on the bottom versus the top of the jar? What do you think happens in the center and on the edges of a real tornado?



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER

