

Year Level: 5/6

Key learning area: Science

Bottled Up Tornadoes

Objectives

By the end of this lesson the student will:

- have simulated a tornado by using swirling water in connected bottles.

Background

Tornadoes are large masses of twisting air and water. You can simulate this by using two bottles filled with water. The water inside the upper bottle swirls, forming a funnel shape as it pours into the lower bottle. You have probably seen this happen when you let water out of a bath. The funnel formed by the swirling water is called a vortex (a whirling mass of air or water). The vortex formed by the water is the same shape as the vortex formed by a tornado (a violently rotating funnel cloud that touches the ground). Tornado formation appears to be related to the convergence (meeting) of air occurring underneath a developing cumulonimbus cloud. The swirling air is then tilted upwards to form the tornado. Air flows into the tornado through the bottom and out through the top. Tornadoes are also called twisters. They range in size from a few metres across to about a kilometre wide.

Fact File

During the 1960's, a thunderstorm and a rapidly moving cold front produced a tornado in Sydney. It was about 600 metres high and 50 metres wide. As it passed through Cremorne, wind speeds reached 210 kilometres per hour. In little over a minute, a million dollars' worth of damage had been done. The tornado uprooted trees, lifting them into the air. It also destroyed roofs and caused windows to explode and car boots to fly open.

More tornadoes form on the flat plains east of the Rocky mountains in the United States than anywhere else on earth.

Resources and actions

Demonstrate the importance of rotating the top bottle (the one with the water in it) in creating the vortex and allowing the water to quickly transfer to the bottom bottle. If the top bottle is **not** rotated the water will take more time to transfer to the bottom bottle. This can lead to a discussion and investigation into what might cause the vortex to be started in a real tornado.

Print off the student's worksheet and photocopy one for each student:
http://www.bom.gov.au/lam/Students_Teachers/Worksheet4.shtml

Ask the students to carry out the activity from the worksheet then go over their results at the end of the class.

Solutions

1. We expect to observe the movement of water from the top bottle into the bottom bottle.
2. A funnel of water (vortex) is created and the water moves much more quickly from the top bottle into the bottom bottle.
3. It created a funnel (vortex) which allowed the air from the bottom bottle to escape into the top bottle through the centre of the funnel and water from the top bottle to flow into the bottom bottle.

Time

45 - 50 minutes

Assessment Task

Q3 & 4.