Wonders of Weather: Teacher’s Guide

Grade Level: 6-8  Curriculum Focus: Weather  Lesson Duration: Two class periods

Program Description
Terrifying tornadoes. Horrifying hurricanes. Hailstones as big as basketballs. The weather is a constant source of amazement, amusement, and wonder. From the jet stream to the Gulf Stream, discover where the weather comes from and why.

Onscreen Questions
Part I: The Weather Machine
- Discuss the nature of seasons. Explain why the Northern Hemisphere experiences winter while the Southern Hemisphere experiences summer.
- Discuss the effect of air pressure on the human body. Why does air pressure have to be regulated in airplanes and submarines?

Part II: Hurricane
- Discuss how a hurricane travels across Africa and moves toward the United States. Where does it get its strength to travel so far?
- Discuss disaster relief efforts for hurricane victims. Are there volunteer opportunities in your community?

Part III: Tornado
- Discuss how the destructive forces of a tornado can impact a house. Discuss what to do in a tornado.
- Make a tornado plan for your house and family. What precautions should you take during a tornado warning?
- What is the X Prize?

Part IV: Things That Fall From the Sky
- Discuss why hail does not form during every thunderstorm.
- Discuss the connection between the 1815 Mount Tambora volcanic eruption in Indonesia and the snow and killing frost in parts of the United States in July 1816.
Lesson Plan

Student Objectives

• Study the structure and formation of tornadoes.
• View and discuss the devastation tornadoes can cause.

Materials

• Wonders of Weather video and VCR
• Print and Internet research materials on tornadoes
• Computer with Internet access
• Plastic bottle with cover
• Water
• Salt
• Teaspoon
• Liquid detergent
• Food coloring
• Small plastic objects, such as houses from a popular
• Board game

Procedures

1. Review with your students what they have learned about storms. Have them research tornadoes to find out what they are, how they form, and the damage they can cause. Students should find out the following before working on the activity:
   • A thunderstorm may draw air up from the ground, creating unstable combinations of rising and falling air and resulting in a violent rotating storm. If the storm touches the ground, it becomes a tornado.
   • A tornado can cause extensive and devastating damage
2. Explain that a tornado is a vortex, or spiral motion of fluid. In the case of a tornado, the fluid is air. Gases such as air and fluids are similar in the way they move or flow.
3. Tell students they are going to make a tornado in a bottle. Divide the class into small groups, and provide each group with the materials listed above.
4. Give students these instructions:
   (1) Fill the bottle with water to one inch from the top.
   (2) Add one teaspoon of salt.
   (3) Cover the bottle, and shake it until the salt has dissolved.
(4) Add one drop of liquid detergent.
(5) Add one drop of food coloring.
(6) Cover the bottle tightly and move it in a swirling motion.

5. To demonstrate the destructive potential of tornadoes, have students place small plastic objects in the bottle, swirl it, and observe what happens to the objects.

6. To make sure students understand the relationship between their bottle tornado and a real tornado, ask them what the water in the bottle represents. (Answer: The water in the bottle represents swirling currents of air in a real storm.)

7. Have the students use their research and project findings to write a brief description of a real tornado, including an explanation of its causes and effects.

**Assessment**

Use the following three-point rubric to evaluate students’ work during this lesson.

- **3 points:** Students presented accurate descriptions with complete and correct accounts of causes and effects; writing was clear and error-free.
- **2 points:** Students presented accurate descriptions with incomplete or partially incorrect accounts of causes and effects; writing was mostly clear with some errors in grammar, usage, and mechanics.
- **1 point:** Students’ descriptions contained inaccuracies with incomplete or incorrect accounts of causes and effects; writing lacked clarity and had numerous errors in grammar, usage, and mechanics.

**Vocabulary**

funnel cloud
*Definition:* A spiral shaped cloud that emerges from the base of a thundercloud, with winds rotating violently
*Context:* A funnel cloud may become a tornado.

hurricane
*Definition:* A tropical cyclone with winds 74 miles an hour or greater that occurs especially in the western Atlantic
*Context:* Residents of Florida and other southern coastal states sometimes experience hurricanes.

jet stream
*Definition:* A high-speed, meandering wind current, generally moving west at speeds often exceeding 250 miles an hour
*Context:* Clouds marking the path of the jet stream can be seen from space.
supercell
Definition: Turbulent thunder clouds with strong updrafts of wind
Context: A hailstorm begins when heat rising from the ground forms a supercell.

trade winds
Definition: A wind blowing almost constantly in one direction; especially those moving toward the equator
Context: The trade winds are named after the early traders who sailed from Europe to America.

vortex
Definition: 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
Context: A tornado is a type of vortex.

Academic Standards

National Academy of Sciences
The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit http://books.nap.edu.

This lesson plan addresses the following science standards:
- Earth and Space Science: Structure of the earth system
- Science in Personal and Social Perspectives: Natural hazards

Mid-continent Research for Education and Learning (McREL)
McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit http://www.mcrel.org/.

This lesson plan addresses the following national standards:
- Science—Earth and Space Sciences: Understands atmospheric processes and the water cycle
- Language Arts—Viewing: Uses viewing skills and strategies to understand and interpret visual media; Writing: Uses the general skills and strategies of the writing process

Support Materials
Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- http://school.discovery.com/teachingtools/teachingtools.html