

How Strong Can a Tornado Be?

Lesson Plan

Grade Level: 6-8

Curriculum Focus: Weather

Lesson Duration: Two class periods

Student Objectives

- Study how the Fujita Scale of Tornado Intensity rates wind-speed damage by tornadoes.
- Examine ways in which engineers and architects can create tornado-proof designs for houses and other buildings.

Materials

- Discovery School video on *unitedstreaming: Raging Planet: Tornado*
Search for this video by using the video title (or a portion of it) as the keyword.

Selected clips that support this lesson plan:

- Model of a Tornado
 - The Tornado Scale
 - Close Observation of a Tornado
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- Copy of the Fujita Scale of Tornado Intensity (one for each student)
 - Research materials on tornado proofing buildings
 - Computer with Internet access

Procedures

1. Review with your students what they have learned about tornadoes. Your discussion should include a description of what a tornado is like, what kind of damage a tornado can do to homes and other structures, and how a tornado is formed.
2. Continue the discussion with a brief brainstorming session with the class about how engineers and architects could create and test designs for tornado-proof buildings.
3. Write on the chalkboard or distribute copies of the Fujita Scale of Tornado Intensity (below), explaining that this scale rates tornadoes according to wind speed and type and extent of damage to buildings.

Fujita Scale of Tornado Intensity		
Rating	Wind Speed	Damage
F-1	73 - 112 mph	Rips shingles off roofs; flips mobile homes.
F-2	113 - 157 mph	Upturns and flips boxcars.
F-3	158 - 206 mph	Exterior walls and roofs blown off homes. Metal buildings collapsed or severely damaged. Forests and farmland destroyed.
F-4	207 - 260 mph	Few walls left standing. Large concrete blocks launched far distances.
F-5	261 - 318 mph	Homes flattened with all debris removed. Schools, motels, and other larger structures damaged considerably with exterior walls and roofs gone. Top floors demolished.

4. Divide your class into groups, and have students use the materials you have provided in addition to the Internet to research work that has been done to design buildings that are tornado proof.
5. Have each group member use what he or she has learned from the research to design and draw a tornado-proof building.
6. Each student should write a paragraph describing his or her building and explaining the tornado-proof features.
7. Encourage groups to critique the different designs and select their best ones.
8. Have groups present their best designs to the class.
9. If possible, invite an architect to review the students' plans and explain why each would or would not be suited to withstand a tornado.

Discussion Questions

1. Do you think improved building codes would help lessen property loss during a tornado (see the Fujita Scale above)? What would you have to do to make a building "tornado proof"?
2. Would a ban on mobile homes in tornado-prone areas be a good idea or a bad one? Who would it affect and how?
3. Use the Fujita Scale to determine what would happen to your community should an F-5 tornado go through the main business district in your community. Assume the tornado is moving at 60 mph and is on the ground for six minutes. The funnel is 1/8 mile across.

Assessment

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

- 3 points: Student's description of building is precise and thorough; tornado-proof features clearly explained; paragraph error-free.



- 2 points: Student's description of building is adequate; explanation of tornado-proof features lacking in clarity; paragraph contains some errors.
- 1 point: Student's description of building is vague; explanation lacking in clarity; paragraph contains numerous errors.

Vocabulary

Doppler radar

Definition: A radar system that utilizes the Doppler effect for measuring velocity.

Context: Doppler radar measures how fast an object, like a raindrop, is moving away from you. In effect, it is measuring wind speed.

supercell

Definition: Turbulent thunderclouds with strong updrafts of wind.

Context: In spring, humid air traveling north collides with cool, dry air traveling south. Where these air streams meet, huge supercell thunderclouds begin to build.

Tornado Alley

Definition: Area in the western United States from west Texas to the Dakotas known for its frequency of tornado strikes.

Context: More than nine hundred tornadoes touch down in America every year. Most in tornado alley, making this area the tornado capital of the world.

wall cloud

Definition: A wedge of slowly rotating clouds shaped like the base of a pyramid.

Context: A wall cloud is the final sign a tornado could form in minutes.

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 Science: Structure of the earth system

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/compendium/browse.asp>.

This lesson plan addresses the following national standards:



- Science – Earth Science: Understands Earth's composition and structure.
 - Technology: Understands the relationships among science, technology, society, and the individual.
 - Geography – Physical Systems: Knows the physical processes that shape patterns on Earth's surface.
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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>