



Hurricanes 6–8

Hurricane Safety



Visit the American Red Cross Web site
at www.redcross.org/disaster/masters

LESSON PLAN 3

Response and Recovery

When young people see what individuals and communities can do before, during and after a hurricane, they will begin to understand the importance of people working together.

Key Terms and Concepts

| | | |
|----------------------|-------------------|----------------|
| emergency management | hurricane WATCH | response |
| evacuation | hurricane WARNING | structural |
| eye of the hurricane | intensity | engineering |
| floodwater | mitigation | wind-resistant |
| hurricane hazards | recovery | |

Purposes

To help the students and their families know the steps to take to prepare for a hurricane and mitigate possible damage

To help the students and their families understand the dangers after a hurricane and locate community agencies responsible for response and recovery

Objectives

The students will—

- Learn the potential dangers when a hurricane strikes; discuss ways of staying safe and keeping property intact.
- Use *Construction Plans* to build a house of paper that can resist wind.
- Evaluate class constructions to determine why some were more wind-resistant than others.
- Use *Hurricane Safety at Home* to conduct a hurricane hazard hunt at home and make a plan to prepare their homes to withstand a hurricane. (Home Connection)
- Invite a mechanical or structural engineer to class to discuss building hurricane-resistant homes. (Linking Across the Curriculum)
- Use a topographic map of their area to find the most and least vulnerable places in case of a hurricane. (Linking Across the Curriculum)
- Use *Issues for a Meeting of the Emergency Management Team* to assume roles and responsibilities for community preparedness and response.
- Read *Emergency Response and Recovery Scenario* to role play responses to emergency scenarios; analyze responses to evaluate actions.



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- Contact real-life emergency responders to compare an actual response with a simulated one. (Linking Across the Curriculum)
- Use *Emergency Response and Recovery Scenario* to determine what kinds of losses and problems their community would have sustained. (Linking Across the Curriculum)
- Play a game at the Web site for the International Strategy for Disaster Reduction; analyze what they learned about hurricane preparation while playing. (Linking Across the Curriculum)

Activities

“Building a Hurricane-Resistant House”

“What Will We Do First?”



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Materials

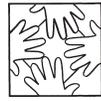
- Fan

For each team:

- Construction Plans
- 2 sheets of construction paper
- 4 straws
- Glue stick
- Cellophane tape or plastic wrap
- Aluminum foil
- Styrofoam tray
- Ruler
- *Hurricane Safety at Home*, 1 copy per student (Home Connection)



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“Building a Hurricane-Resistant House”

SET UP 30 minutes CONDUCT 50 minutes

Science: Technology; Language Arts: Writing

TEACHING NOTE This activity takes the students one step further in preparing their homes for hurricanes. To be sure the students understand the basic concept of being prepared with a family disaster supplies kit, a disaster plan and an evacuation plan, complete Lesson Plans 1 and 2 in the *Be Disaster Safe* module.

Help the students understand the need for creating safe, wind-resistant buildings in areas prone to hurricanes.

1.  Write the term “hurricane” in the center of the board. Have the students think of words and phrases that describe why you must prepare your home for a hurricane and how you can accomplish this.
 - What are the hazards associated with a hurricane? (High winds, storm surges, torrential rainfall, floods, power outages and fires.)
 - How can you increase the odds of staying safe and keeping your property intact during a hurricane? (Have a communication and evacuation plan; evacuate when told to do so; keep a family disaster supplies kit that includes flashlights with extra batteries; and know how to prepare your home for the coming winds and flood.)
2. Pose this question: Can buildings be constructed to resist a hurricane’s strong winds? Divide the class into construction teams and provide each team with a set of materials. Have them follow the steps on *Construction Plans* to build the safest structures possible.
3. After construction, test each house for wind resistance. Begin with a fan turned on and placed about 9 to 10 feet (3 to 4 meters) away from the house to simulate a tropical storm. Proceed by moving in closer to simulate a category 1 hurricane. Finally, move the fan to expose the house to the wind from all sides to simulate hurricane winds as the eye passes.



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Wrap-Up

Rate the construction teams:

- 10 points—neatness.
- 10 points—effective use of materials. Use as much as possible with no waste. (Deduct 5 points for each extra piece of construction paper needed.)
- 20 points—design, which includes (1) top-view drawing with actual dimensions, (2) side-view drawing with actual dimensions and (3) a list and description of the science principles used in the design of the house.
- 20 points—correct calculations of volume, a minimum of 125 cubic inches (2,048 cubic centimeters).
- 20 points—how well it withstands the wind.
- 20 points—cooperation of the construction team. From the designing stage to building to hurricane occurrence, all team members will cooperate with each other. Each student will do his or her part to make the building a success.
- 5 bonus points—for the team whose house withstands the strongest wind.

In class discussion, have the students describe their constructions and the reasons for their stability or instability in the wind.



Challenge the students to research online to learn about actual construction methods designed to withstand hurricane winds. Have them share their information in a class discussion and apply it to their evaluation of their classroom construction projects. Does the information gathered from building the model houses apply to real buildings? Explain. What kinds of materials and construction techniques make the safest homes? Why?



Home Connection

Ordinary objects inside and outside can cause injury or damage during a hurricane. Anything that can move, fall, break or cause a fire is a potential hazard. Examples:

- Windows can be blown in by debris or by the storm surge.
- Tree limbs can break away and pull down electrical wires.
- Bikes, hanging plants, outdoor furniture, trash cans and toys can become missiles in the wind.

Distribute *Hurricane Safety at Home*. Have the students compile a class list of possible hurricane hazards and write them on the activity sheet. (See Hurricane Safety in the Background of this module for a complete list.)

Students will take home their copies of *Hurricane Safety at Home* to share with their families for a home inspection, inside and outside. Together they will list potential hazards, make a plan to correct observed problems and compile a list of things to do during a hurricane WATCH.

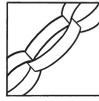


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Linking Across the Curriculum

Science: Technology

Invite a mechanical or structural engineer to talk to the class about building hurricane-resistant houses. What materials and building techniques are the most effective? Why?

Science: Technology; Social Studies: Geography

For this activity you will need a local topographic map.

The location of a building also affects its hurricane resistance. Have the students use a map of their area to find the most and least vulnerable areas. Remind the students to consider proximity to water, height above sea level and surrounding land forms.



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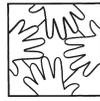
Response and Recovery

Materials

- *Issues for a Meeting of the Emergency Management Team*, 1 copy per student
- *Emergency Response and Recovery Scenario*, 1 copy per student
- Cardboard nameplates and markers



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"What Will We Do First?"

SET UP 25 minutes CONDUCT three 45-minute class sessions

Social Studies: Civics

TEACHING NOTE Your students may work individually or in pairs. This is a student-directed simulation. Your role is to facilitate research and help the students work to formulate their responses.

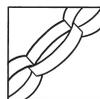
Ask the students: What happens when a hurricane is heading toward your community? Who prepares to respond before and after the hurricane hits?

1. Tell the students that in this activity they will simulate the roles and responsibilities of those involved in emergency planning and response.
2. Distribute *Issues for a Meeting of the Emergency Management Team*.
3. As a class, go over the community roles and the questions facing the emergency team. Assign roles to the students and distribute to each a cardboard nameplate designating the assigned role. Allow time for the students to research and take notes on their responsibilities within an emergency hurricane situation.
4. When the students feel comfortable with responsibilities and the kinds of actions they can take, have them pull their desks into a large circle and place their nameplates so that everyone can see them.
5. Distribute *Emergency Response and Recovery Scenario*. As the students note the changing situation, they will discuss and prioritize the problems facing their city and their emergency responses to create a status board that indicates the time, the problem and the actions taken; however, they can't take too long at any point because people need help right away.



Wrap-Up

After the simulation, have the students review their notes and analyze their responses. What areas were the most difficult to handle? What decisions were the hardest to make?



Linking Across the Curriculum

Social Studies: Civics

Have the students responsible for each role contact their real-life community counterparts to come to class to discuss the simulation. The students can ask the counterparts about their responsibilities and reactions in past emergency situations. Have the students share their interviews and compare the real response with the simulation.



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Social Studies: Economics

If the hurricane described in *Emergency Response and Recovery Scenario* had actually passed through your community, what kinds of loss would the community and its citizens have sustained? Have the students make a list of the problems and the costs, such as the overextension of hospital resources, the devastation of small businesses and the people left without homes.

Points to consider:

- What do local insurers do?
- What is the role of the American Red Cross?
- What are the responsibilities and strategies of the Federal Emergency Management Agency (FEMA)?
- How can citizens help the recovery process?
- How does the community afford the cost of rebuilding?



Social Studies: Civics; Science: Technology

Give student teams time to visit the game site, produced by the International Strategy for Disaster Reduction, at <http://www.stopdisastersgame.org>. Instruct them to follow site directions to play the “Disaster Reduction” game, using the hurricane scenario. When all teams have had a chance to play, ask the students to discuss what they learned while they were playing. How successful were they at protecting the town from the impact of the hurricane? What were the best strategies?



Visit the American Red Cross Web site at www.redcross.org/disaster/masters



Construction Plans

Page 1 of 1

Name _____

Directions: Designing and constructing buildings that can withstand hurricane-force winds must be a top priority in hurricane-prone areas.

Your task is to design and construct a wind-resistant building, using the materials listed below.

Building Material

- 2 sheets of construction paper
- 4 straws
- Glue stick
- Cellophane tape or plastic wrap
- Aluminum foil
- Styrofoam tray
- Ruler

Construction Strategies

Your home can be any shape, but must include—

- At least 2,000 cubic centimeters.
- At least 3 windows and 1 door.

Note: Aluminum foil may be used for support, but not as the main building material.

If you need to “purchase” an extra sheet of paper, 5 points will be deducted from your final grade.

Before You Begin

Complete the following calculations: After calculating volume, be sure to have your calculations checked and have your house plan approved. GOOD LUCK!

Calculations of Volume

The volume of a rectangular solid or cylinder is the area of the base · the height.

The volume of any cone or pyramid shape is $\frac{1}{3}$ volume of original shape.

The volume of a sphere is $\frac{4}{3} \cdot \pi \cdot r^3$ ($\pi \cong 3 \frac{1}{7}$)

Describe the science principles you used to construct your building.

Draw the top view and side view of your structure on the back of this page.





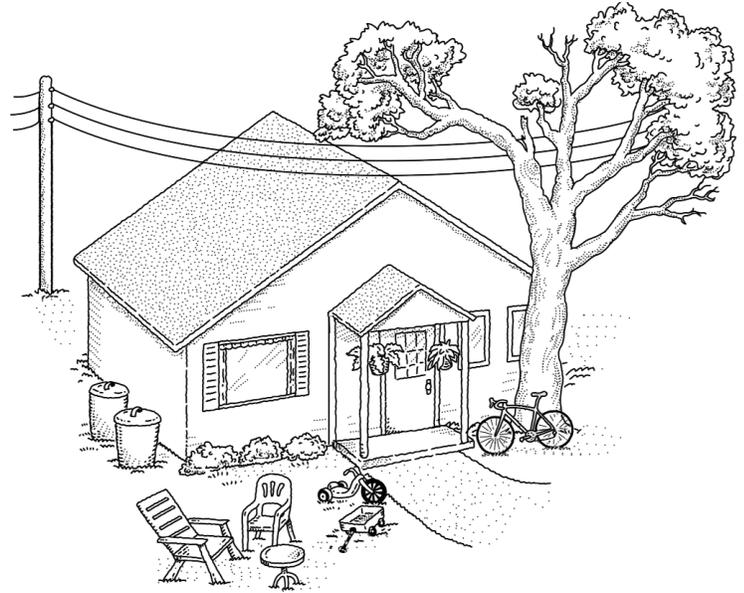
Hurricane Safety at Home

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Name _____

Directions: List possible hurricane hazards below. Then, work with your family to make your home safer in preparation for a possible hurricane.

Hurricane Hazards List



Make a plan to correct observed problems.

Compile a list of things to do during a hurricane WATCH.



Issues for a Meeting of the Emergency Management Team

Page 1 of 2

Name _____

1. **Mayor**—You have been in office for only one month, and there is a category 4 hurricane about to hit your city.
2. **City Emergency Manager**—You are responsible for managing the community response and for ensuring public welfare.
3. **City Public Information Officer**—You are the spokesperson for the city. You deal directly with the media.
4. **Public Works Officer**—You are responsible for water, sewer, street and park maintenance. Major thoroughfares are flooded and blocked with debris, and the water is contaminated.
5. **Electric/Gas Company Officer**—You are responsible for making sure your company fixes the many fallen power lines and the broken gas main. Your company is responsible for turning the gas back on in residential neighborhoods.
6. **Phone Company Representative**—You are responsible for making sure the city is able to communicate via telephones and cell phones.
7. **Fire Chief**—Your personnel are responsible for fighting the several fires that are burning as a result of a broken gas main. Your personnel will also respond to any medical emergencies.
8. **Police Captain**—Your personnel are directing traffic during the evacuation process and providing security for evacuated areas.
9. **Hospital Representative**—Yours is the only hospital in town and your chief of staff is on vacation abroad.
10. **American Red Cross Representative**—You are responsible for providing food, drinking water and shelter for people who have been displaced from their homes.
11. **Citizens Advisory Committee Chairperson**—You are responsible for representing the views, concerns and needs of the citizens of the community.
12. **Building Inspector**—You are responsible for making sure people do not return to their homes and offices until the buildings are safe.
13. **Humane Society Representative**—You are responsible for helping many people with pets who choose to stay in shelters. Pets are not allowed in shelters.
14. **National Weather Service Representative**—You are responsible for relaying the most current and accurate weather information.
15. **Media Personnel**—You are responsible for reporting accurate information about the storm and what the public should do before, during and after the hurricane.





Issues for a Meeting of the Emergency Management Team

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Questions

1. This is a response and recovery operation—what needs to happen first?
2. What is each person responsible for doing before, during and after the hurricane?
3. Can each person do his or her job with all the damage that has occurred?
4. Is it important that residents are able to get back to their homes or that residents have a safe place to stay?
5. Whom do you assist first: Elderly people? Injured people? People staying in shelters? Stray animals?
6. Was the community properly prepared for the hurricane? (Were windows covered, etc.?)
7. Did the community know what to do when the WATCH was issued and then when the WARNING was issued?
8. When do you know it is safe to allow citizens to return to their homes? How long should you wait before beginning the cleanup process?
9. Does the community know what to be watchful for when going outside after the hurricane has passed?
10. What can the community do in the future to be better prepared for a hurricane?





Emergency Response and Recovery Scenario

Page 1 of 1

Name _____

You live in a coastal community. It is the afternoon of June 19. The National Weather Service (NWS) issued a hurricane WATCH a few hours ago and predicts that the storm will increase in intensity overnight.

It is now 1:15 a.m. on June 20. The NWS reports that the storm has increased to a category 4 on the Saffir-Simpson hurricane scale and issues a hurricane WARNING. The storm is still offshore, but is expected to make landfall within 12 hours. The city emergency manager contacts the mayor to request that an immediate evacuation be ordered. The mayor agrees. The emergency manager and the mayor contact the police chief. The emergency manager and the city public information officer contact the local television and radio stations.

People are asked to leave their homes as soon as possible and go to the safe place they arranged for when they completed their family disaster plan. If they can't get there, the American Red Cross has opened evacuation shelters in a city just 10 miles inland. The Red Cross cannot open shelters in your community because the entire area has been evacuated and could be unsafe during the hurricane.

By 2:55 a.m., it appears that the storm has passed. It is very quiet. Within 15 minutes the storm returns with the winds blowing in the opposite direction. The eye of the storm has passed directly over your community.

At 3:55 a.m., fallen trees have knocked down communication and power lines. All power has been lost in the city. There is widespread flooding in the city. Fires have broken out in parts of the city because of the use of candles. Streets are blocked by debris, making movement by police and emergency workers very difficult.

At 6:00 a.m., the worst of the storm has passed. Some people who refused to evacuate are hurt and need medical attention. There are a few fires burning in the city. Power is still out and roads are blocked. People who need medical attention overwhelm the hospital. Many people want to return to their homes and assess the damage. The problem is that the roads are not safe and many homes are not safe to enter. The emergency manager has convened a meeting for 6:30 a.m. You are there.

