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# V



## Earthquake Safety and Survival

## Earthquake Curriculum, K-6 -- Scope and Sequence Chart

### Unit V: Earthquake Safety and Survival

| Part | Concept  | Laboratory  | Mathematics | Language Arts   | Social Studies  | Art  |
|------|--|---|-------------|---|---|--|
| 1    | <p>Earthquake shaking is possible everywhere in the United States. People may feel, see, hear, and smell the signs of an earthquake.</p> <p>Earthquakes affect people in many ways.</p>  | Earthquake simulation   |             | <p>Describe experiences</p> <p>Earthquake vocabulary</p>  | <p>Locating states and corresponding level of earthquake hazards</p> <p>Demonstrating earthquake-safe behavior</p>  | <p>Coloring an earthquake hazard map</p> <p>Drawing pictures or constructing diagrams of earthquake damage</p> |
| 2    | <p>Every environment contains potential earthquake hazards. Students can identify hazards and eliminate them or reduce their impact.</p>   | <p>Classroom hazard hunt</p> <p>Home hazard hunt</p> <p>Community hazard hunt</p> |             | <p>Discussion and list making</p>   | <p>Discussion of damage to buildings caused by earthquakes</p> <p>Hazard hunt and ways to reduce danger</p>   | <p>Illustrations of earthquake hazards in classrooms</p>   |
| 3    | <p>Students can increase their chances for survival in an earthquake by having essential supplies before they are needed.</p> <p>Students can help to assemble emergency kits of supplies for their classroom, home, and family vehicle.</p> <p>Students can help to inform others about earthquake safety and survival.</p> | Safety kit preparation  |             | <p>Disseminating information to family and neighbors</p> <p>Group solutions</p> <p>Slogan writing</p> | <p>Discussion of essential items needed during evacuation</p> <p>Earthquake safety kits</p> <p>Poster distribution</p>  | Earthquake safety posters  |
| 4    | <p>Students can cope with hazards during evacuation.</p> <p>Students are responsible first for their own safety and can then help if others are injured.</p> <p>Students can cope with the disturbed environment and their own emotional reactions.</p>  | Evacuation drill  |             | Hazard descriptions   | <p>Discussion of hazards during evacuation</p> <p>Giving aid to the injured</p> <p>Feelings and events after an earthquake</p> <p>Drop and cover procedures</p> | Safety kit decorating  |

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# V

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## Earthquake Safety and Survival

Scientists cannot accurately predict when and where an earthquake will occur. We can teach our students what to expect, however and how to protect themselves. Teaching our students to recognize an earthquake and take immediate positive action can help them and those around them to come through the disaster safely. Students can also learn to recognize earthquakes hazards and learn how to eliminate some and avoid others. Classroom activities and discussions provide opportunities for students to develop pride in the competency they have gained.

# Earthquake Safety and Survival

*All 50 states and all U.S. Territories are vulnerable to the hazards of earthquakes. Earthquakes have caused, and can cause in the future enormous loss of life, injury, destruction of property, and economic and social disruption.*

Earthquake Hazards Reduction Act of 1977  
(Public Law 95-124, as amended)

## **Part 1: What Happens During an Earthquake?**

Most people caught in earthquakes have a feeling of helplessness. Especially if they have never experienced a quake before, they have no idea how long it is going to last or what will happen next. In this unit you will take your students through several steps that will help them know what to expect and what to do if an earthquake occurs.

### **What to Expect**

The first indication of a damaging earthquake may be a gentle shaking. You may notice the swaying of hanging plants and light fixtures or hear objects wobbling on shelves. Or you may be jarred first by a violent jolt (similar to a sonic boom). Or you may hear a low (and perhaps very loud) rumbling noise. A second or two later, you'll really feel the shaking, and by this time, you'll find it very difficult to move from one place to another. A survivor of the 1906 San Francisco Earthquake compared the physical sensation to riding down a long flight of stairs on a bicycle.

It's important to take "quake-safe" action at the first indication of ground shaking. Don't wait until you're certain an earthquake is actually occurring. As the ground shaking grows stronger, danger increases. For example,

Free-standing cabinets and bookshelves are likely to topple. Wall-mounted objects (such as clocks, maps, and art work) may shake loose and fly across the room.

Suspended ceiling components may pop out, bringing light fixtures, sprinkler heads, and other components down with them.

Door frames may be bent by moving walls and may jam the doors shut. Moving walls may bend window frames, causing glass to shatter and send dangerous shards into the room.

The noise that accompanies an earthquake may cause considerable emotional stress—especially if students are not prepared to expect the noisy clamor of moving and falling objects, shattering glass, wailing fire alarms, banging doors, and creaking walls. The noise will be frightening, but a little less so if it's anticipated.

### Part 2: Hazard Hunts

Contrary to popular imagination, an earthquake does not cause the Earth to open up and swallow people. Especially in the smaller earthquakes, which make up the vast majority of all quakes, most injuries and fatalities occur because the ground shaking dislodges loose objects in and on buildings.

*Anything that can move, fall, or break when the ground starts to shake is an earthquake hazard if it can cause physical or emotional harm.*

Classrooms, homes, and all the other places where children spend time indoors contain objects that could cause injury or damage during a quake. Because students have already learned a great deal about earthquakes in the previous lessons, they are able to identify many of these objects themselves. They make class lists of the hazards in different settings and then work with teachers, parents, and other adults to eliminate as many hazards as they can.

Students can remove objects that could fall and cause injury during earthquake shaking. Those objects that cannot be removed should be securely fastened. In the classroom these may include fish tanks and animal cages, wall maps, models, and wheeled items such as pianos and rolling carts for audiovisual equipment. At home, bookcases, china cabinets, and other tall furniture should be secured to wall studs. Hanging lamps, heavy mirrors, framed pictures, and similar ornaments should be removed or permanently fastened.

There will be some hazards in the classroom, home, and community that students will not be able to eliminate. Be sure they know how to avoid those things they cannot change.

#### Operation A-R-R-R

- |                                   |                                 |
|-----------------------------------|---------------------------------|
| <input type="checkbox"/> Anchor   | <input type="checkbox"/> Refit  |
| <input type="checkbox"/> Relocate | <input type="checkbox"/> Remove |

## **Part 3: Prepare and Share Emergency Kits**

After a quake you and your students may spend several days together, cut off from many of the normal sources of community support. In Part 3 of this unit the class will devise emergency kits for several settings and make one for the classroom. Students will also make posters as a way of sharing their knowledge of earthquake preparedness.

## **Part 4: Earthquake Simulation and Drill**

During an earthquake, the most important thing for any child or adult to remember is the Drop and Cover drill:

*At the first indication of ground shaking, get under a desk or table, face away from windows, bend your head close to your knees. Use one hand to hold onto the table leg and protect your eyes with your other hand. If your "shelter" moves, move with it.*

After the quake it is important to get out of the building and into a clear space, taking the emergency kit along with your roll book. In Part 4, students will point out various hazards that might occur in the course of leaving the building and discuss ways of dealing with various obstacles.

Aftershocks may occur without warning, minutes or even months after the major earthquake. Practice Drop and Cover on the way out of the building, and in as many other settings as possible, until the drill becomes second nature to you and your students.

Give your students several opportunities to ask questions and discuss their fears and concerns. They'll have plenty of "what if" questions. Don't feel that you must provide all the answers. Let your students hold problem-solving sessions. Class and group discussions provide opportunities for students not only to express their negative (and normal) feelings, but also to emphasize the positive skills they have gained.

**IMPORTANT NOTE:** This unit is intended to be used by all the grades, kindergarten through sixth. Feel free to modify the materials and procedures to suit your students.

# Part 1: What Happens During an Earthquake?

## Vocabulary

**natural hazard**

## Content Concepts

1. Earthquake shaking is possible everywhere in the United States.
2. Students might feel, see, hear, or smell the signs of an earthquake.

## Objectives

Students will

- identify the earthquake hazard for their state.
- identify hazards caused by earthquakes.
- demonstrate safe behavior during an earthquake simulation

## Learning Links

**Language Arts:** Describing experiences

**Social Studies:** Locating states and corresponding level of earthquake hazard, experiencing a simulation of an earthquake

**Art:** Coloring an earthquake hazard map, drawing, picture, or constructing dioramas of earthquake damage

## Assessment

Explain why, when, and (demonstrate) how to Drop and Cover.

## Activity One: Size Up Your State

### Materials for the teacher

- Transparency made from Master 37, Earthquake Hazard Map
- Map, colored according to directions in step 3 below.
- Overhead projector

### Materials for each student

- Copy of Master 37, Earthquake Hazard Map
- Crayons or colored pencils

## Procedure

1. Read and discuss the definition of natural hazard. Ask: If an earthquake occurs in an uninhabited region and has no impact on human beings or their property, is it a hazard? (Not for human beings, though it may be for other life forms.)

2. Tell students that thousands of earthquakes occur in the United States each year. Most are too small to be felt by people. Only a few are strong enough to cause damage.

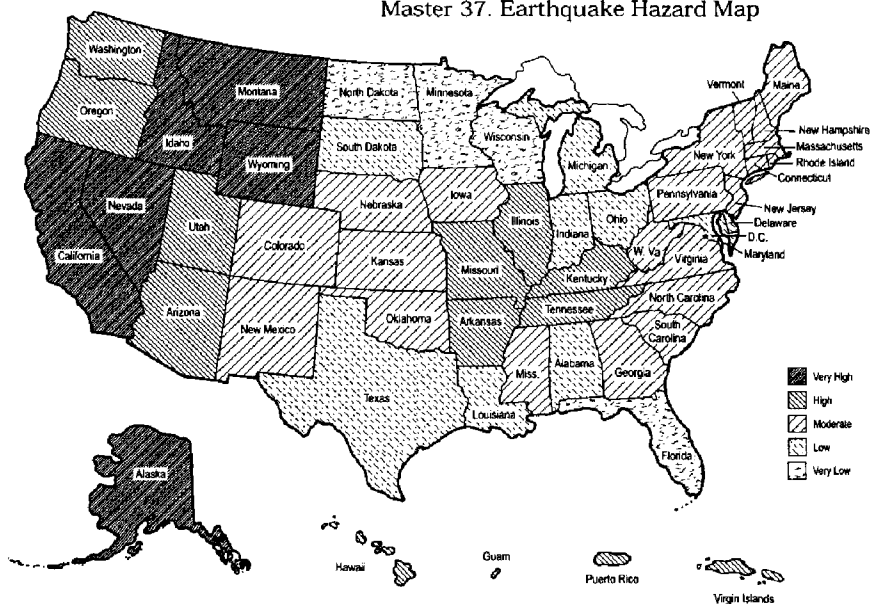
Allow students to speculate on the following questions:  
Are all regions of the U.S. likely to receive earthquake damage? What states are most likely to receive earthquake damage?

3. Tell students that earthquake shaking is possible in all 50 states and all U.S. Territories. People hundreds of miles from the epicenter of a strong earthquake may experience shaking and damage.

## nat • u • ral haz • ard

Any of the range of natural Earth processes that can cause injury or loss of life to human beings and damage or destroy property.

Master 37. Earthquake Hazard Map





**Teacher Take Note:** If your school is not in a moderate to very high earthquake hazard state, help students realize that they may visit one or move to one someday. Tell them that it is important that they learn how to protect themselves.

Distribute a copy of Master 37, U.S. Earthquake Hazard Map, along with crayons or colored pencils, to each student. Give these instructions:

- a. Use green to color in the states marked with a **VL**. In the legend, use green to color in the box in front of the word Very Low.
- b. Use blue to color in the states marked with an **L**. In the legend, use blue in the box in front of the word Low.
- c. Use yellow to color in the states marked with an **M**. In the legend, use yellow in the box in front of the word Moderate.
- d. Use orange to color in the states marked with an **H**. In the legend, use orange in the box in front of the word High.
- e. Use red to color in the states marked with a **VH**. In the legend, use red to color in the box in front of the word Very High.

4. After the maps have been colored, project the overhead and conduct a class discussion around the following questions:

What is the earthquake hazard for our state?

How many states in the U.S. are believed to be totally free from earthquake hazards? (none)

How many of you have favorite places to visit (on vacation or to see relatives) that are in states with moderate to very high earthquake hazards?

## Activity Two: Earthquake Simulation

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### Materials for the teacher

- Master 38, Earthquake Simulation Script
- Transparency made from Master 39, Drop and Cover Master 40, Coalinga Schools Report (teacher back-ground only)
- Overhead projector

### Materials for the students

- Desks or tables to get under
- Optional items for simulation activity (chairs to rattle; pencils, books, and other objects to drop)

## Procedure

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1. Explain that you are going to talk through an imaginary earthquake to help students understand what might happen during a real one. Display the transparency of Master 39, Drop and Cover, and direct students to practice the following actions:

- Get under a desk or table
- Face away from windows
- Bend your head close to your knees
- Use one hand to hold onto the table leg (approximately 6" from the floor to avoid pinching fingers) and protect your eyes with your other hand.

2. Create Special Effects. (This step is optional. If you decide to carry it out, warn your teacher-neighbors.) Appoint student helpers for the simulation. Before the simulation, describe what each helper should do according to the script.

**Teacher Take Note:** Do not excuse children with special needs from participating in earthquake drills. Children who are blind, deaf, or have impaired mobility especially need experiences which build confidence in their ability to avoid and cope with dangers. Plan with other teachers and the school nurse to determine quake-safe actions for these children.

It may not be possible for children with impaired mobility to get under a desk or table. They can, however, learn to react quickly and turn away from windows; move away from light fixtures and unsecured bookcases; and use their arms or whatever is handy to protect their heads.



**Teacher Take Note:** Once you are confident that your students have learned and practiced the skills to protect themselves, place yourself in a safe position (e.g., under your desk) during future drills. Your students need to know that you too will be safe.

3. Read the simulation, Master 38 (the first three paragraphs should take approximately 45 seconds).

4. Take time after the simulation to let students respond to the experience. Encourage them to ask questions and discuss their fears and concerns.

5. Discuss what to do in various situations.

6. Practice **Drop and Cover** in as many other settings as possible, until the drill becomes second nature to you and your students. You may want to time how long it takes to get into a safe position in a safe manner (too much haste may cause bumps and bruises).

In teaching this activity lesson, be sensitive to your students' fears and concerns, and give them chances to talk and ask questions. Let your students know that fear is a normal reaction to any danger. Remind them that they will become less afraid when they learn how to take care of themselves if an earthquake happens.

## Earthquake Safety Reminders for Students

### **If you're outside**

- Stay outside.
- Go to an open area away from hazards.

### **If you're inside**

- Crouch under a desk or table,
- Face away from windows,
- Bend your head close to your knees,
- Use one hand to hold onto the table leg (approximately 6" from the floor to avoid pinching fingers) and protect your eyes with the other hand.

### **If no desk or table is nearby:**

- Kneel against an interior wall
- Face away from windows,
- Bend your head close to your knees,
- Clasp hands on the back of your neck.

## **Activity Three: Know What Might Happen**

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### **Materials for the students**

- Pencil and paper
- Crayons or colored pencils

### **Procedure**

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1. Review with the students information they have learned about the different locations where earthquakes occur, emphasizing that earthquakes occurring where people live is our greatest concern.

2. Tell the students that during an earthquake, the Earth beneath their feet moves like a deck of a ship. The actual movement of the ground, however, is seldom the direct cause of injuries or deaths. Most injuries and deaths are caused by falling objects and debris from damaged buildings. Point out that the Earth does not split open and swallow people and homes. Emphasize that we can avoid or reduce our chances of being hurt if we know what to expect and what to do during an earthquake.

3. Review the classroom earthquake drill, call out "Drop and Cover," and ask students to demonstrate quake-safe procedures.

4. Read to the class descriptions of what they might see, feel, hear, or smell if they were at home during an imaginary earthquake.

- a. Before you begin to describe what may happen in a living room, ask students to pretend they are in a safe place in their own living room (or that of a relative or friend).
- b. After you described what may happen in the living room, ask students if the place they selected would keep them safe. If some students are concerned about their safety, allow time for the class to discuss how to become quake safe.
- c. Repeat 4a and 4b for the bedroom and neighborhood.

**Teacher Take Note:** As an alternative activity to the drawings, ask student groups to design and construct a shoebox diorama of a setting that has been affected by an earthquake.

5. Ask the students to draw or write about what they saw, heard, and felt during the imaginary earthquake and share with the class. If one or more of your students had experienced a damaging earthquake, allow them to describe to the class what they saw, felt, etc.

### **Living Room**

You might become aware of a gentle movement which grows stronger, or you might be jarred by a sudden jolt and wonder if a truck hit your home.

You would see hanging objects swing and sway, and possibly fall from their hooks. You might see tall pieces of furniture topple over. Plaster may drop, windows may shatter. Electric lights may flicker and go out.

You would hear a low rumbling noise that quickly grows louder. You might also hear creaking and grumbling from the house itself. You might smell odors from spilled food and liquids.

### **Bedroom**

You would see pictures and mirrors fall and break. Things on shelves will topple over. Water would slosh out of aquariums. Books would fall off shelves.

You might hear the house creak and grumble. You might hear bricks tumbling from chimneys. You might hear animals make loud, excited noises.

### **Outside**

You might see bricks come loose and tumble from buildings. Separate parts of buildings such as signs and decorations may fall and cause damage. Water pipes may begin to leak and flood the streets.

You may hear church bells ringing, cars honking, and sirens wailing. You may smell gas, or smoke from gasoline leaks and fires.



**IMPORTANT NOTE:** This unit is intended to be used by all the grades, kindergarten through sixth. Feel free to modify the materials and procedures to suit your students.

## Part 2: Hunt for Hazards

### Vocabulary

hazard  
cornice  
parapet

### Learning Links

**Language Arts:** Discussing hazards and making lists, using and applying action verbs, sharing information with parents and families

**Social Studies:** Identifying hazards throughout the community on several levels: school, home and beyond

**Art:** Drawing home hazards that are not on the Home Hazard Hunt worksheet

### Content Concepts

1. Every environment contains potential earthquake hazards.
2. Students can identify hazards and eliminate them or reduce their impact.

### Objectives

- Students will
- identify potential hazards in their classroom that may cause damage, injury, or death during an earthquake.
  - list, and if possible, make changes in their classroom to reduce potential hazards.
  - identify potential earthquake hazards in their homes.
  - list, and, if possible, make changes in their homes to reduce potential hazards.

### Assessment

List three things you have done to make yourself, your family, and/or your classmates safer from earthquake hazards.

## Activity One: Classroom Hazard Hunt

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### Materials for the teacher

- Transparency made from Master 41, Fourth Grade Classroom
- Overhead projector
- Transparency marker

### Materials for each student

- Handout made from Master 41, Fourth Grade Classroom
- Crayons or colored pencils
- Handout made from Master 42 Classroom Hazard Hunt
- Drawing paper (optional)

## haz • ard

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An object or situation that holds the possibility of injury or damage.

## Procedure

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1. Review with students the definition of an earthquake hazard.

***Anything that can move, fall, or break when the ground starts to shake is an earthquake hazard if it can cause physical or emotional harm.***

Tell students that there will be many hazards that we cannot correct, but identifying these hazards will help us to anticipate them and avoid danger and injury.

2. Invite students to conduct a hazard hunt in their classroom to identify things that might hurt them during an earthquake. Refer to Master 42, Classroom Hazard Hunt, to help students identify hazards

3. Distribute Master 41, Fourth Grade Classroom. Have students circle or color those hazards which are found in their classroom. Ask them to make a list of any other hazards that are in their classroom but are not included in the picture, or to draw their own classroom and point out additional hazards.



4. Conduct a class discussion about the hazards you have identified and how they might cause harm. Use the overhead of Master 41 in your discussion.

Ask students to decide what they can do as a group to make the room safer. Actions might include tying down objects, moving hanging objects, placing objects on lower shelves, and so on. You may want to write the following action verbs on the blackboard:

|          |           |
|----------|-----------|
| move     | anchor    |
| relocate | replace   |
| attach   | remove    |
| fasten   | eliminate |
| secure   | change    |
| tie down |           |

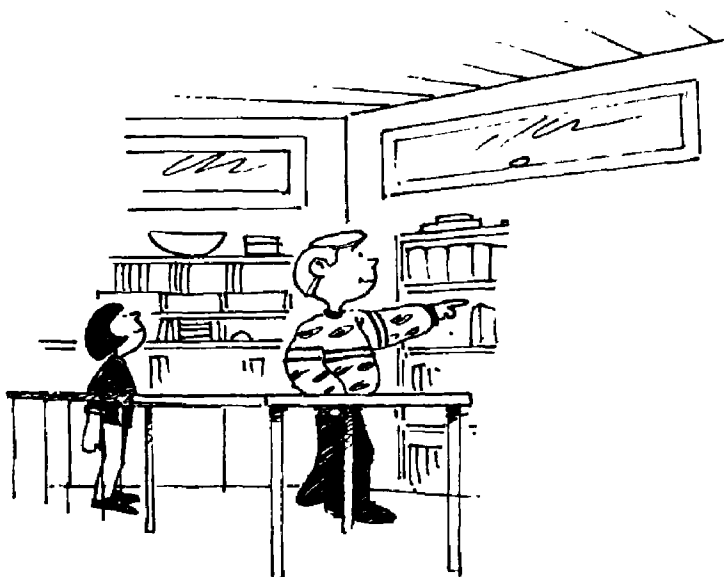
**Teacher Take Note:** This activity will take about 60 to 90 minutes, or longer if students modify their classroom to make it safer during an earthquake. You may want to divide the procedure between two separate sessions.

5. If appropriate, have students spend time changing the things they can change to make their room safer.

6. Have students make a list of things that could be changed, but not without adult help. These might include putting latches on cabinets, blocking wheels on the piano, and attaching cabinets to walls.

If appropriate, have students help to make these changes. They might want to meet with the principal or work with the custodians to help make their room safer.

When changes can't be made, be sure students are aware of the remaining hazards, and know they must avoid or move away from them if an earthquake occurs.



## Activity Two: Home Hazard Hunt

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### Materials for the teacher

- Transparencies made from Master 43a, b, and c, Home Hazard Hunt Worksheets
- Overhead projector

### Materials for each student

- Handouts made from Master 43a, b, and c
- Handout made from Master 44, Quake-Safe Home Checklist
- Pencil or pen

## Procedure

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1. Explain to students that there may be many possible earthquake hazards in their homes -- objects that can fall, break, spill, or cause damage and injury in other ways.
2. Conduct a brainstorming session with your students and see how many home hazards they can think of. List these on the board.
3. Tell students that they are going to conduct a hazard hunt at home to identify things that might hurt them or their families during an earthquake. Distribute the student worksheets. Discuss each of the pictures with the students and ask why the item pictured could be a hazard. Remind students that this sheet does not include all the possible home earthquake hazards -- just some of them.
4. Instruct students to take the worksheets home and have other children and their parents or guardians join them in looking through the house for hazards. Some hazards may exist in more than one place. Give these instructions:
  - a. Put a check in the box beneath every hazard you find in your home. (If the hazard occurs more than once, students may write a total number in the box instead of a check )
  - b. If you can, write the name of the room(s) in which the hazard is located.

**Teacher Take Note:** How you use the Quake-Safe Home Checklist will depend on the grade level of your students. K-2 teachers may want to adapt this sheet.



## Extension

Since homes without young children also need to be prepared for earthquakes, you and the class might explore ways of disseminating the Quake-Safe Home Checklist to other members of your community. What about grocery stores, community centers, libraries and churches? Students may have other ideas.



- c On a separate piece of paper or on the back of the worksheets, list or draw any potential earthquake hazards that are found in your home but are not on the list.
- d Bring your completed worksheets back to class.

5. Conduct a classroom discussion about the hazards that students found in their homes. Especially discuss hazards they identified that were not on the list. You may want to use transparencies of the home hazard worksheets during your discussions.

6. Explain to students that now that they have identified earthquake hazards in their homes they can take action to reduce their danger. Emphasize that there are some actions they can take which cost little or no money, while other actions will cost quite a bit and will have to be done by adults.

7. Distribute copies of the Quake-Safe Home Checklist (Master 44) to students. Discuss the items on the list. Determine which changes can be made easily and which will be more difficult. Again, emphasize that this list does not include everything that can be done to make a home safer.

8. Have students take the list home to discuss with their families. Families may decide which changes could be made immediately in their homes and which ones will have to wait. Encourage students to help their parents in any way possible to make the changes that can be made. As you did in Activity One, remind students that they will have to be responsible for avoiding the hazards they cannot remove.

9. You may want the children to bring back the completed checklists so they can have a follow-up discussion in class.

## Activity Three: Community Hazard Hunt

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### Materials for the teacher

- Transparencies made from Master 45, Neighborhood Hazard Hunt
- Overhead projector
- Transparency marker

### Materials for each student

- Handouts made from Master 45, Neighborhood Hazard Hunt
- Crayons or colored pencils
- Handouts made from Master 46, Safety Rules for Shoppers
- (Older students) Handouts made from Masters 47a, b, and c, Community Hazard Hunt

## Procedure

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1. Review materials from Unit Four about ways in which ground shaking from earthquakes can damage buildings. Remind students that the movement of the ground during an earthquake seldom causes death or injury. Most deaths and injuries from earthquakes are caused by falling debris from damaged buildings.

### Building damage can include:

- Toppling chimneys
- Falling brick from walls and roof decorations, such as parapets and cornices. (Show pictures or draw pictures of these decorations; or if they're attached to your school building, point them out to the students.)
- Collapsing exterior walls, falling glass from broken windows.

### Damage inside the building can include:

- Falling ceiling plaster and light fixtures
- Overturned bookcases (Have students mention some of the hazards they discovered in Activities One and Two.)

## cor • nice

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The exterior trim of a structure at the meeting of the roof and wall

## par • a • pet

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A part of a wall which is entirely above the roof.

