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The California State University, Northridge parking garage after the January 17, 1994 Northridge earthquake. This is an example of *violent* shaking (see the Simplified Intensity Scale on page 167). Photo by Gerald R. Schimke.

When a strong earthquake occurs nearby, children are interested in what happened and why. This fascination can stimulate a variety of classroom activities and encourage discussion about the relationship between the natural forces that affect our world and us. The following is an easy classroom activity that focuses on your students' natural curiosity after an earthquake. It can be adapted for grades 3 through 12.

HOW BIG WAS THE EARTHQUAKE?

There are several ways to describe the size of an earthquake. One is magnitude, which is determined by analyzing the recordings of seismographs. Magnitude is a measure of how much energy is released by an earthquake at its source. Since magnitudes can be easily determined by seismographic stations

remote from the earthquake source area, they are one of the first pieces of information available after an earthquake. Preliminary information on epicenter location and magnitude for strong earthquakes within the United States and anywhere in the world are now routinely determined within minutes after the event.

A second way of describing earthquake size is intensity. Intensity measures how strong the ground shaking is at a particular site and is determined by looking at the nature of damage and the observations of people living in the area affected by the earthquake. Each earthquake large enough to be felt will have a range of intensities. Usually (but not always) the highest intensities are measured near the earthquake epicenter and lower intensities are measured farther away. The intensity in a particular location depends on several factors including

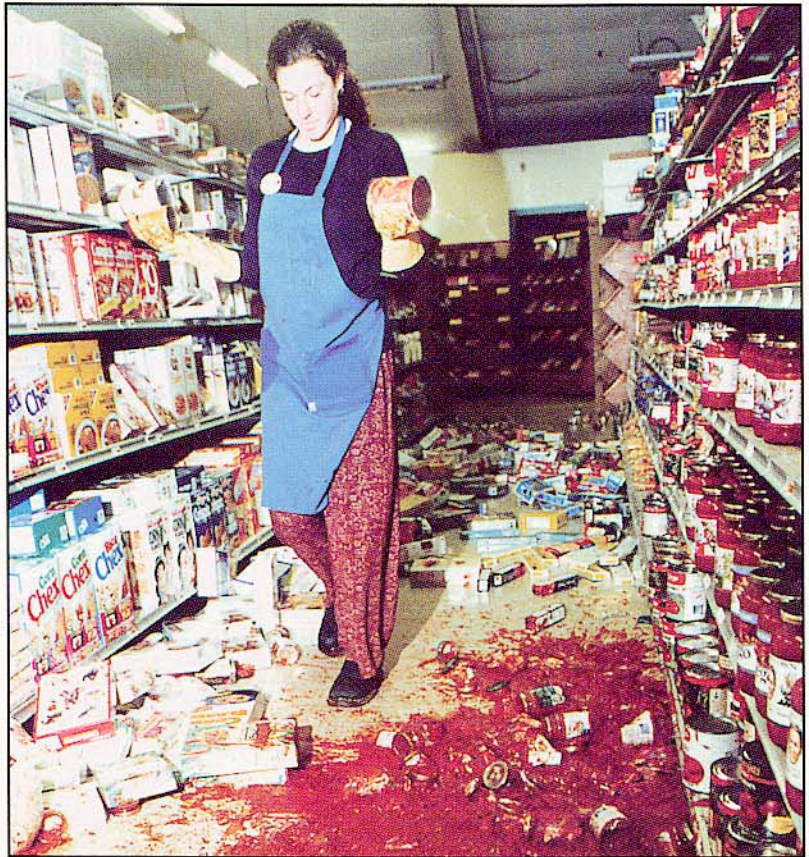
the magnitude of the earthquake, distance from the epicenter, local and regional geology, and the type of earthquake faulting. Maps showing distribution of intensities are called isoseismal maps (see map, next page) and can be used to visually compare the effects of different earthquakes.

To determine intensities:

1. Copy and distribute the survey on page 167. Ask your students and/or their families what their experiences were during the earthquake.
2. Collect surveys and assign intensities using the Simplified Intensity Scale on page 167. Group the surveys by town or community. (If you have a lot of survey data for a particular town or city, you might consider further subgroupings by town sections.) Use the Simplified

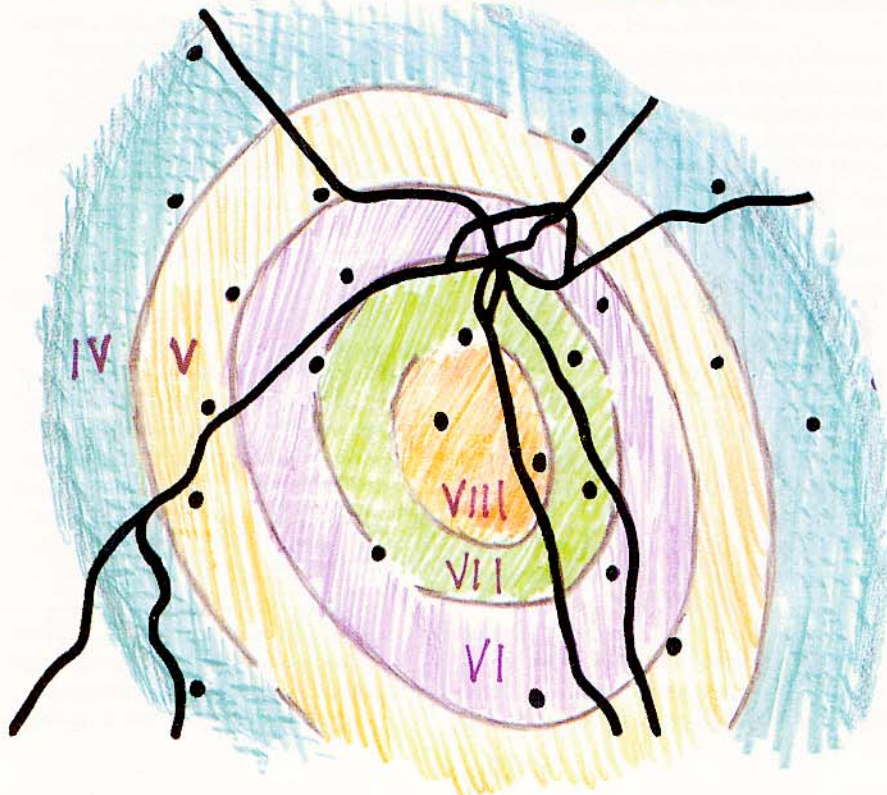
Intensity Scale and all the surveys in the group to assign an intensity level to the community.

3. Get additional intensity information from other communities. Possible methods are:
 - Contacting friends and relatives who live in different communities
 - Reading newspapers from other areas
 - Contacting other schools and exchanging surveys with similar grades
 - Using the Internet to exchange earthquake information with schools in other areas
4. Construct a map showing the pattern of ground shaking. Get a good base map of the region affected by the earthquake. Choose different colors to represent each of the five intensity levels on the Simplified Intensity Scale. Color the communities for which you have assigned intensities. With a pencil, draw continuous lines separating the different colored zones. You will not have intensity information everywhere, but from the pattern you can infer intensities in those areas.



Amy Degenfelder, an employee of the Arcata Co-op Market, walks in the pasta sauce aisle. Numerous items in this store were knocked off the shelves during the Mendocino Fault earthquake in 1994. This is an example of *strong* shaking. Photo by Robert Scheer, Times Standard.

- IV NOT FELT
- V WEAK
- VI MODERATE
- VII STRONG
- VIII VIOLENT



These organizations' daily-updated recorded messages give earthquake locations and magnitudes:

- National Earthquake Information Center, Golden, Colorado (303) 273-8516 (national and global earthquakes)
- University of California at Berkeley Seismographic Stations, Berkeley, California (510) 642-2160 (northern and central California earthquakes and larger global earthquakes)
- U.S. Geological Survey, Menlo Park, California (415) 329-4025 (northern and central California earthquakes)
- U.S. Geological Survey/California Institute of Technology, Pasadena, California (818) 395-6977 (southern California earthquakes)
- Humboldt Earthquake Education Center, Arcata, California (707) 826-6020 (north coast California earthquakes, summary of California and global earthquakes)



Teacher Feature continued...

CLASSROOM INTENSITY SURVEY FORM

1. What town were you in during the earthquake? _____
2. Were you inside or outside? inside outside
 - a. If inside, what type of building? house apartment mobile home school other _____
 - b. What were you doing? sleeping lying down sitting standing walking driving
 playing other _____
3. Did you feel the earthquake? YES NO
 - a. If you did not feel the earthquake, do you know anyone in your town who did?
 YES NO
4. If you felt the earthquake, answer the questions below:
 - a. How would you describe the ground shaking? violent strong moderate mild weak
 - b. If you were inside during the earthquake, did you: run outside? duck and cover? move to doorway?
 do nothing? other? _____
 - c. Did you notice doors swinging or lamps swaying, etc.? YES NO
 - d. Did you notice any noise? (creaking, glasses clinking, etc.) YES NO
5.
 - a. Did anything fall over or fall off shelves during the earthquake? YES NO
If yes, how many items fell?
 just a few many everything
 - b. Did any heavy furniture move during the earthquake? YES NO
 - c. Did pictures on walls move, tip, or fall? YES NO
 - d. Did chimneys or windows break? YES NO
 - e. Did water splash out of glasses, fish tanks, etc.? YES NO
6. What happened to your home or the building you were in?
 - a. Was there any damage? YES NO
If yes, what kind of damage? (check all that apply)
 cracks in walls, ceiling, or floors chimney foundation broken windows
 collapse of walls broken pipes other _____
 - b. Were any other buildings or roads in your community damaged in the earthquake?
 YES NO DON'T KNOW

? A QUESTION FOR THE CLASS ?

The January 17, 1994 Northridge earthquake was one of the most expensive natural disasters in the history of the United States in human and fiscal terms. However, its magnitude was only 6.7 and it released less than half as much energy as the Mendocino Fault earthquake on September 1, 1994. Why did the Northridge earthquake do so much more damage than the Mendocino Fault earthquake?

Simplified Intensity Scale

NOT FELT: No one in the town or community reports feeling the earthquake.

WEAK: Felt only by very few people indoors. They may notice creaking of walls or swaying of hanging lamps or curtains.

MODERATE: Felt by most people inside and some people outside. No one reports any items falling off shelves. Many notice swaying and creaking, and pictures on walls may be knocked crooked. Water in filled containers may splash. No damage.

STRONG: Felt by everyone inside; most everyone outside. Some reports of items toppling over or falling off shelves, broken dishes, water splashes. A few may report cracks but no major damage to buildings.

VIOLENT: Felt by everyone, even people driving cars. Many run outside. Almost everyone reports many items off shelves. Reports of cracks in walls, broken windows, damaged chimneys, and damage to foundations. Some buildings and roadways may be destroyed.