Plate Tectonic Cycle

Earth's Moving Force

SECOND GRADE

HAZARDS

1 WEEK
LESSON PLANS AND
ACTIVITIES

PLATE TECTONIC CYCLE
OVERVIEW OF SECOND GRADE

VOLCANOES

WEEK 1.
PRE: *Investigating the parts of a volcano.*
LAB: *Comparing the parts of a volcano to different types of models.*
POST: *Discovering that volcanoes occur around the world.*

EARTHQUAKES

WEEK 2.
PRE: *Discovering earthquake faults.*
LAB: *Tracing a fault map of the San Francisco Bay Area.*
POST: *Exploring how deep you can drill into the Earth.*

PLATE TECTONICS

WEEK 3.
PRE: *Exploring how the Earth's outermost portion moves.*
LAB: *Exploring the results of movement on the Earth's crust.*
POST: *Exploring how plates have moved through time.*

HAZARDS

WEEK 4.
PRE: *Discovering how to think during an earthquake.*
LAB: *Assessing what a mayor should do during a strong, moderate, and weak earthquake.*
POST: *Analyzing earthquake safety at home.*

PLATE TECTONIC CYCLE - HAZARDS (2)

PRE LAB

Students evaluate what to do after a severe earthquake.

OBJECTIVES:

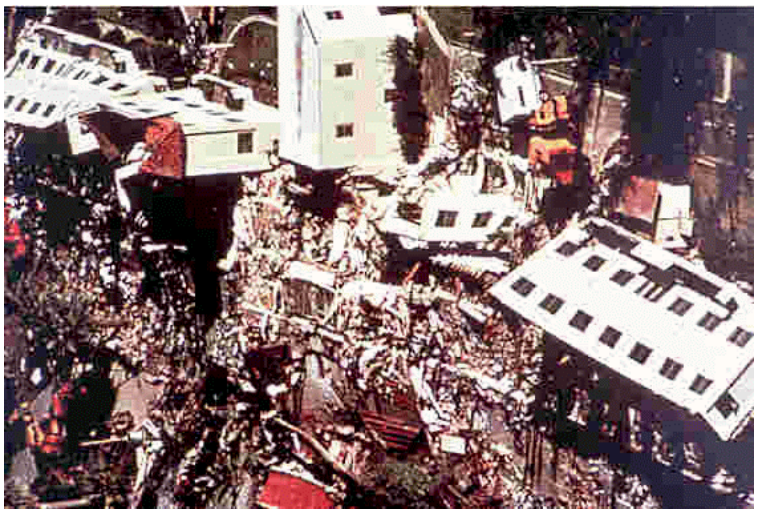
1. Evaluating where a student can seek shelter during an earthquake.
2. Discovering how to think during an earthquake.

VOCABULARY:

earthquake
hazard
plate tectonics
tremor

MATERIALS:

worksheet



Collapsed building in Japan.

BACKGROUND:

The motions of the plates cause earthquakes and volcanoes. When a volcano erupts or an earthquake shakes the ground, it can have a profound effect on the lives of people that live nearby. These events are natural phenomena that cannot be “stopped” by human intervention. Scientists cannot engineer a way to prevent erupting or shaking. People need to cope with these possible dangers. Danger and damage can be minimal if certain logical steps are taken. To illustrate this concept, this unit will emphasize earthquake hazards and what to do when an earthquake shakes the ground.

When an earthquake strikes, many people are unprepared. Fear takes over their body and mind. The mind thinks quickly looking for a memory that might help them, but if there is no memory of what to do the body is just stricken with inactivity. The more a child hears about what to do in a disaster, the most likely they will react.

PROCEDURE:

1. Remind the students that earthquakes and volcanoes are caused by plate movement. Emphasize that earthquakes and volcanoes are natural. Explain that disasters only occur when people are hurt by one of these events, and that most eruptions and earthquakes cause little or no destruction to people and property.

2. Discuss what the students should do during a severe earthquake. This would

be an event where utilities were offline, much structural damage occurred, and communications were disrupted. Fires and other secondary disasters might also occur. To prepare for this scenario, students need to be informed about where they should seek shelter and whom they should contact. Most earthquakes are only small tremors, but one must always be prepared.

3. The answers to this exercise will vary from area to area. For example, services available in an urban as opposed to a rural area will be different. Try to have the students assess why they should go to a certain area and not to another. Remember that structures such as electrical lines probably will go down during a severe earthquake, so be sure to discuss dangerous areas to avoid. This exercise can be used in different situations such as at home, at school, and at church. If you do not know the answers for your area, consult your principal who should have a school disaster plan. Many states require them by law.

Students should seek a safe area after the shaking ends. Families, schools, and churches should all have a "safe" area where all members should meet, so that everyone is accounted for, and damage can be assessed. Places like a firehouse will not be a good place to go because firemen will be out helping the community. Schools may be designated in your state as focal places for communities. Emphasize to the students that after the quake, they should logically think of what is the safest place for them. Second graders are old enough to assess danger versus safety.

Students should learn that they should not hide during an earthquake. Their parents, teachers, and friends need to know that the child is safe, so hiding will not help the situation.

Discuss that the students may not be able to call for help after an earthquake, because phone lines might be down. If they are operating, only one phone call might get through, so the students should know in advance who and where they are going to call.

4. If you know the name of the school, local fire house, and any other locations, have the students write their names on the worksheet.

PLATE TECTONIC CYCLE - HAZARDS (2) PRE LAB

WHERE DO I GO AFTER A SEVERE EARTHQUAKE?

***** COLOR THE PLACES THAT YOU CAN GET ASSISTANCE

***** LABEL THE PLACES THAT WOULD NOT BE SAFE

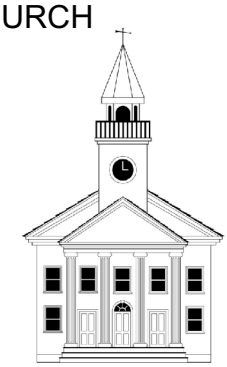
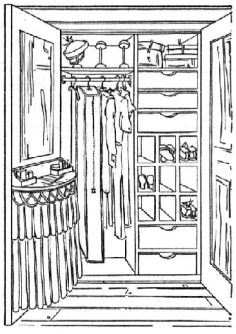
FIRE HOUSE 	SCHOOL 	FOREST 
GROCERY STORE 	FRIEND 	RED CROSS 
CHURCH 	CLOSET 	WHERE ELSE?

PLATE TECTONIC CYCLE - HAZARDS (2)

LAB

Students decide what actions a town mayor should take after an earthquake.

OBJECTIVES:

1. Simulating strong, moderate, and weak earthquakes.
2. Assessing what a mayor should do during a strong, moderate, and weak earthquake.

Ground rupture, Pt. Reyes, California, 1906

VOCABULARY:

aftershock
moderate
strong
weak

MATERIALS:

Primary Shaker Table or shaker boards
toys

BACKGROUND:

This lab is designed to stimulate discussion of what to do during an earthquake. Letting the students play the part of a mayor will help them realize that they may have to assume responsibility in case of a major disaster. The important points of the lab are that during a weak to moderate earthquake, the mayor should check with the local agencies and the hospitals. However, during a strong earthquake almost all aspects of the city have to be looked at to see if they survived the event intact. Areas such as shopping centers, hospitals, roads, and homes must be examined in order to determine if their use is safe. Utilities and other services must also be evaluated.

PROCEDURE:

1. Explain and contrast the effects of moderate and severe earthquakes to the students. Have the students suggest how damage levels would differ between the two levels of shaking. You may also want to include a brief discussion concerning aftershocks. Aftershocks may happen after a big earthquake. Many times you have to be careful of these smaller earthquakes, especially the ones that occur within 48 hours of the initial earthquake.

2. If necessary, construct Primary Shaker Tables or shaker boards before the lab

begins. The Primary shaker table can control the different intensities better, but the shaker board is a more correct analog because it can shake in many directions. If your class is familiar with lab procedures, we recommend the shaker boards. Directions are given below. Make enough tables for the students to work in groups of 2 or 3. Here are directions:

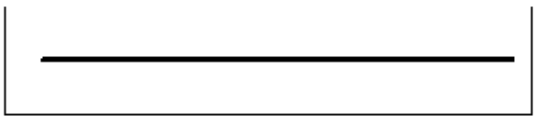
HOW TO CONSTRUCT A PRIMARY SHAKER TABLE

The primary shaker table is an inexpensive but very useful tool for demonstrating weak, moderate, and strong earthquake damage to children. It is called a primary shaker table because it can move in only one direction. It is thus not a fully correct analog to the many directions of motion in a real earthquake. However, the primary shaker table is an excellent visual tool to help small children can understand that earthquakes vary in both intensity and damage.

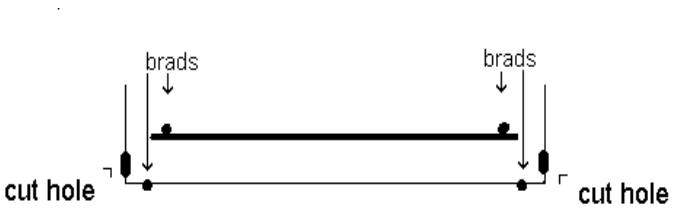
Materials: 8 long stemmed brads or nails
4 strong, thick rubber bands
marbles
cardboard box with lid
string
plastic container lid

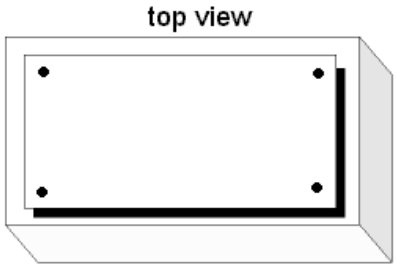
Directions:

a. Cut a section from the cardboard box lid so that it will fit inside of the cardboard box as shown in the picture below.

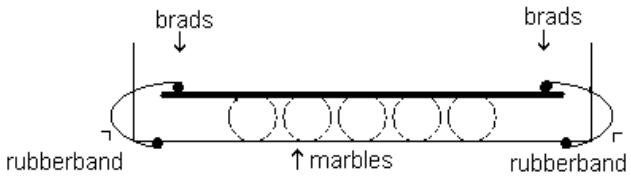


b. Take 4 brads and insert them from the inside of the cardboard box so that the stems fall outside of the box. Insert the remaining four brads into the cut lid of the box. Make sure that the brads are not directly on the edge as this will cause the lid to tear when it is pulled.





c. Fasten the rubber bands to the brads inside of the cardboard box. Fasten the other ends of the rubber bands to the brads on the cut lid. Leave the lid inside of the box.



d. Place several marbles in a container top. Put the marbles in their container under the cardboard lid in the box, to allow it to move freely when up or down.

e. Make a small hole in one end of the box. Attach a piece of string to one end of the lid and. insert the opposite end of the string through the hole in the box. This moves the lid. Don't forget to tie a knot at the end of the string where comes out of the box. This will prevent it from going back inside. Your "primary shaker table" is complete.

HOW TO CONSTRUCT A SHAKER BOARD

a. Cut particle board or use a heavy wood into 12 x 18 inches. The thickness should be about 3/4 inch thick.

b. Place the marbles in the plastic top. The marbles will act as ball-bearings in the experiment.

c. Balance the shaker board on top of the marbles. This completes the shaker table

3. Demonstrate how the shaker table or shaker board works to the class. When it is "jolted", it simulates the movement of the Earth's surface (an earthquake). The earthquake creates energy that moves along the surface of the shaker table as waves. Control the "intensity" by how fast you shake the board. Demonstrate to students that a strong earthquake occurs when you shake fast; a weak earthquake occurs when you shake it less violently; a moderate earthquake occurs when you shake it somewhere in between.

4. Divide the students into groups. Instruct each group to make a little village on the shaker table. Illustrate to them how to shake the village at the different intensities. Have the students rebuild the village in exactly the same way after each demolition. After each shaking, review what happens to the village. Discuss what happens after a strong, moderate, and weak earthquake. The conclusion should be that the higher the intensity,

the more the damage to the homes. A small earthquake, which most earthquakes are, causes very little damage. You may want to tell the students that earthquakes only cause damage where homes and buildings are not constructed to withstand shaking.

5. Have the students complete the worksheet. Have them decide what the mayor should be concerned about after each mock earthquake. The list includes structures that may need to be evaluated, as well as government agencies to contact. There is room on the lab sheet to include other areas of potential concern, as well as additional agencies to contact. You can look on the Internet or in the telephone book, under "GOVERNMENT" to find the appropriate agencies, which you should write in on the lab sheet.

PLATE TECTONIC CYCLE - HAZARDS (2) LAB

	STRONG	MODERATE	WEAK
HOSPITALS			
COMMUNITY HOUSES			
SHOPPING CENTERS			
COMMUNICATIONS			
AIRPORT			
SCHOOLS			
FEDERAL AGENCIES (i.e., Federal Emergency Management Agency)			
STATE AGENCIES (i.e. State Emergency Agencies)			

PLATE TECTONIC CYCLE - HAZARDS (2)

POST LAB

Students plan for disasters at home and at school.

OBJECTIVES:

1. Reviewing earthquake safety at school.
2. Analyzing earthquake safety at home.

VOCABULARY:

disaster
evacuation
hazard
safety

MATERIALS:

letter sent home to parents

Collapsed freeway, Oakland, CA, 1989

BACKGROUND:

If you reside in an area that is earthquake prone your individual school should have a plan in case of a major disaster. This plan generally outlines evacuation procedures: what to do in case of a major disaster, and what to do in case someone is injured. It may also include plans for caring for students immediately after a major disaster. If your area does not experience earthquakes, your plan may focus on other disasters, such as volcanic eruptions, hurricanes, tornadoes, or floods.

PROCEDURE:

Review your school disaster plan with your students. If your school does not have a plan, you as the teacher can decide what your individual class will do. When you make up a plan, consider the following guidelines:

(1) If indoors, watch for falling plaster, bricks, light fixtures, and other objects. Watch for high bookshelves, and other furniture which might slide or topple. Stay away from windows and mirrors. If in danger, get under a table, desk, in a corner away from windows, or in a supported doorway.

(2) Do not rush for the exits during a disaster. Try and stay in one place and protect yourself, unless instructed to move by an adult. If you must leave the building,

choose your exit as carefully as possible.

(3) If outside, avoid high buildings, walls, power poles, and other objects which could fall. Do not run through the streets. If possible, move to an open area away from hazardous objects.

To involve the student's parents in disaster planning, send a letter home to encourage them to discuss it with their children. Enclosed is an example of a letter. Go over the letter with students in class before they take it home.

If your school does not have a disaster plan, there are many models that you can follow. The Federal Emergency Management Agency (FEMA) of the U.S. Government has information that you can use. Their website, http://www.fema.gov , has many excellent links and outstanding information. Your town, city, or state may also have disaster information.

PLATE TECTONIC CYCLE - HAZARDS (2) POST LAB

DATE

Dear Parent,

We are studying earthquake hazards at school and want students to "think" about any possible dangers there may be at home or anywhere that the students may spend a lot of time. Disasters are an issue we hope we will never have to face. Unfortunately, they happen. However, discussing the dangers before they occur can give children an inner strength and knowledge that may help them cope with a disaster. Parents can lessen the danger to themselves and their families by learning what to do in the event of an earthquake.

Please take the time to record with your child possible areas that one should avoid if a strong earthquake occurs.

If you want more information on earthquake safety and preparedness please consult the following websites: U.S. Geological Survey (www.usgs.gov) or the Federal Emergency Management Agency (http://www.fema.gov.)

_____

My child and I have located the following areas in our home that may cause injury during an earthquake. We have discussed and considered those areas that are unsafe during an earthquake and will remain at a distance from those areas in case of an earthquake.

_____ gas lines (gas can leak and possibly cause fire)

_____ chimney (chimney may become weak and collapse)

_____ large bookshelves or other items not secured adequately to the wall

_____ windows (glass may break and injure anyone in area)

_____ other (list specific safety concerns) _____
_____

PARENT'S SIGNATURE_____

STUDENT'S SIGNATURE_____