

Earthquakes: A Phenomenal Force

Nicole L. Betts
Henderson Elementary School

INTRODUCTION

To ensure that the students are actively engaged and provided with ample opportunities to demonstrate their conceptual understanding and scientific processing skills, I have decided to design and teach each lesson that I have created on the same conceptual framework as the 5E's scientific instructional method and model. This instructional model encourages both teachers and students to actively engage themselves in the scientific process while exploring and evaluating learning outcomes and activities. The initial teaching strategies for the 5E's Instructional Model are as follows:

- Engage-** Initiates the learning task.
- Explore-** Provides students with a common base of experience with in which current concepts, processes, and skills are identified and developed.
- Explain-** Focus's students' attention on a particular aspect of their engagement and exploration experiences, and provides opportunities to demonstrate their conceptual understanding, process skills, or behaviors.
- Elaborate-** Challenge and extends students' conceptual understanding and skills.
- Evaluate-** Encourages students to assess their understanding and abilities and provide opportunities for teachers to evaluate student progress.

(Trowbridge and Bybee)

UNIT BACKGROUND

Myths about Earthquakes

The first area, which we will discuss, will be the many myths about earthquakes and their causes. Exposing my students to the many myths surrounding the causes of earthquakes will enable them to understand and see how little people knew about earthquakes at one point in history. I will teach my students that before people knew much about science, they would try to make sense of the world around them by telling each other stories. The stories they told are what we now call myths. Many people from many different cultures told their own myths about how and why there were earthquakes. A good example of one myth is that created by the Hindu people of India. The Hindu's believed that the earth rested on the head of an elephant, and the elephant sat on the back of a tortoise. When one of these animals moved, the earth shook and made an earthquake.

The Greeks also created a myth about gods called Titans who went to war with another group of gods led by Zeus. One of the Titan gods was named Atlas. The Titan gods won the war, and because of this, Zeus punished Atlas for fighting against him. Atlas's punishment was that he had to hold up the earth on his shoulders forever. Atlas was very strong and able to do this, but sometimes he got a little uncomfortable and had to move the load on his shoulders around so that he would be more comfortable. When he did this the earth shook and made an earthquake.

Myths like the ones told by the Hindu's and the Greeks were also used long ago to explain why natural disasters such as earthquakes occurred. I will use these myths to discuss culture with

my students and geography by having students identify the location of the person or person's who created these myths. Each student will then be expected to be able to identify the country or countries on the map in which the myth originated.

Causes of Earthquakes

During the implementation of my unit, students will explore the causes of earthquakes. At this point I will discuss with my class the nature and origin of earthquakes. We will create a working definition of what an earthquake really is. During this time my students will learn that an earthquake is a sudden movement of the earth caused by the abrupt release of strain that has accumulated over a long period of time. In other words, it is a sudden shift or movement of the earth's crust that causes earthquakes. When the earth's crust shifts, it releases energy. The waves of the energy that is released go in many directions. By the time these waves reach the surface, they begin to shake the ground, and it is that shaking that we know as an earthquake. The location on the surface of the Earth where this energy is first released is known as the epicenter. The epicenter is the point on earth's surface that is directly above the focus on Earth where the energy of an earthquake is first released. We will discuss as a class how earthquakes happen along "fault lines" in the earth's crust. These faults are breaks in the crust of the earth where movement between two adjacent blocks has occurred. Most faults capable of generating earthquakes are located at the boundary between earth's tectonic plates. Tectonic plates are large blocks of lithosphere (the outer mechanical layer of the earth consisting of the crust and outer mantle). The sudden release of energy during the movement of these plates causes the earth to tremble during an earthquake.

Students will also learn through several hands-on experiments how earthquakes can be felt over large areas although they usually last less than one minute. We will talk about the seismic waves that are created by earthquakes and how earthquakes are measured and studied. Because geography plays a major role in where earthquakes occur; geography will be emphasized in my unit as well.

Effects of Earthquakes

The second topic we will discuss is the effects of earthquakes. The effects of an earthquake can be minor or severe. Some earthquake victims may experience a small vibration and the windows in their home or office may crack or shake. Others may have a more memorable experience because the ground may shake with a more visible motion and bridges, homes, and building may even topple to the ground. During this time, we will go back in history and take a look at past earthquakes, such as the 1906 and 1989 earthquakes that occurred along a section of the San Andreas Fault. The 1906 earthquake was so devastating that it shook the city of San Francisco and started fires that burned down most of the city.

Prediction and Control

Once we have discussed the causes and effects of an earthquake, I will then discuss the prediction and control of earthquakes. "Japanese and Russian geologists were the first to predict earthquakes successfully, and Chinese geologists have made some very accurate predictions. In 1975 a 7.3-magnitude earthquake near Haicheng in northeastern China was predicted five hours before it happened. Alerted by a series of foreshocks, authorities evacuated millions of people from their homes. Half the buildings in Haicheng were destroyed, along with many villages, but only a few hundred lives were lost" (McGeary, Plummer, and Carlson 175). Although people are being bombarded with unscientific predictions of future earthquakes by self-proclaimed prophets and writers, there has been no real data showing that earth quakes can be successfully predicted on a constant basis. With this in mind, scientists today rely on machines such as satellites that are

used to measure the smallest motion along a fault. Seismologists also use seismometers to record the patterns of ground tremors.

The control of earthquakes is another intriguing and hopefully new idea for the distant future. Currently scientists have only one method of potential earthquake control. The method was discovered on accident when water under high pressure was pumped down into the ground. The pressure of the water was assumed to have reduced.

Seismology

When discussing the idea of prediction, control, and the effects of earthquakes in the classroom, I think it is only fitting to acknowledge the work of the many individuals who work in the field of seismology. Since not many people understand the geological and natural formation of earthquakes, let alone the scientific ideas behind studying them, I believe that the job and expertise of a seismologist is priceless. Many students have never heard of a scientist whose sole purpose is to study earthquakes. Therefore, I will expose my students to the job of a seismologist by introducing them to the instruments that these scientists must use.

Charles Richter (1900-1985)

Dr. Charles Richter was an American scientist who is most well known for his 1935 development of a scale that allowed seismologist to measure how much damage earthquakes caused. This scale is named after its creator and called the Richter scale. The Richter scale ranks earthquakes by how much energy they release. Dr. Richter designed each number on the scale to show an earthquake that releases about 30 times more energy than the number before it. For example, an earthquake that measures at 5.0 on the Richter scale will release about 30 times more energy than an earthquake that only measure 4.0 on the scale. The Richter scale is used to rank earthquakes from all over the world. The strongest earthquake that has ever been recorded using this scale measured a 9.5 on the Richter scale. This great earthquake was recorded in Chile in 1960. The strongest and most severe earthquake in the United States took place in 1964 in Prince William Sound, Alaska. This earthquake measures a 9.2 on the Richter scale.

Magnitude	Typical Damage
1.9 or less	no damage
2.0-2.9	micro damage
3.0-3.9	minor damage
4.0-4.9	light damage
5.0-5.9	moderate damage
6.0-6.9	strong damage
7.0-7.9	major damage
8.0 or greater	great damage

Table 1: The Richter Scale (Delta Science Reader: Earth Movements 14)

Earthquake Safety and Survival

Many students and adults don't realize that earthquakes are not just confined to one part of the world. The probability of an earthquake occurring just about anywhere on Earth is possible. Most people are also surprised to find out that many earthquake injuries are not caused by the quakes themselves. These injuries may be caused by objects in and on buildings that have been dislodged due to the ground shaking. For this reason it is important for students to understand how to take care of themselves during and after an earthquake. Therefore, I will instruct students on how to identify hazards inside of the classroom and their homes that may pose a problem during an earthquake. Students will also learn what they should do before, during and after an earthquake in the event they experience one.

UNIT OBJECTIVES

I believe that children learn better when they are presented with material that is not only hands-on but minds-on as well. I will use this four week unit as an addition to my science and geography lessons that I already teach. Through the implementation of this unit, I hope to cover the following third grade Project Clear science and social studies T.E.K.S. objectives.

Science

SCI.3.06.B The student knows that forces cause change.

B. Student will identify that the surface of the earth can be changed by forces such as earthquakes and glaciers.

Social Studies

SS.3.04.A Describe the variations in the physical environment including climate, landforms, natural resources, and natural hazards.

SS.3.05.A Use cardinal and intermediate directions to locate places on maps and globes.

SS.3.05.B Use a scale to determine the distance between places on maps and globes.

SS.3.05.C Identify and use the compass rose, grid, and symbols to locate places on maps and globes.

This unit will also serve as a review for earth science materials that my students have learned and I have already implemented in my classroom.

Unit Vocabulary

Vocabulary plays a very important role in developing a student's reading comprehensions skills and his or her ability to communicate effectively at a higher level. With this in mind, I have created daily vocabulary list for my students to read, comprehend and implement through out the learning process of this unit. The vocabulary words introduced to students will be actively included in the lessons. I have listed several of the expected vocabulary words to be used during the implementation of this unit.

earthquake	culture	legend	myth	focus
fault	epicenter	waves	North America	Africa
South America	Asia	Europe	layer	plate
mantle	core	crust	seismic waves	hazard
Richter scale	seismometer	lithosphere		

IMPLEMENTATION

Week One

Many students enter third grade with some basic conceptual knowledge of earthquakes. They know that earthquakes can be dangerous and that when an earthquake occurs, the ground will shake. However, most of these same students do not fully understand what actually causes an earthquake or why the ground moves when an earthquake occurs. Week one of my unit has been designed to introduce the students in my class to earthquakes.

During lesson one I will introduce my students to the term Earthquakes. I will explain that although earthquakes have been happening on Earth for millions of years, scientists have just begun to understand what causes them for less than 30 years now. Most of the people who experienced earthquakes in the past created their own explanations as to why earthquakes occurred to help the people in their culture understand the reason why this natural disaster happens. The explanations these people created are known as myths or legends. I will discuss the creation of myths and legends from different cultures around the world. Groups of four students

will be given several myths from around the world to read that explain why earthquakes occur. They will then be given a world map. I will have them to place an X or dot on the countries from which they have read Earthquake legends or myths.

After a brief class discussion I will direct the students in creating their own myths about an unexplained event such as why volcanoes erupt or why some parts of the world have more earthquakes than others. Each student will be required to write no less than one paragraph and illustrate at least one event from the myth they have created. For those students who have trouble with this writing assignment, I will give them a pre-written prompt that I have created. In their myths each student will be expected and directed to write about how they think or use to think earthquakes occurred.

I have entitled lesson two “What Is an Earthquake?” This lesson will allow my students to receive a concrete definition as to exactly what an earthquake is. I will begin lesson two by reading pages 4-10 of the book *Earthquakes* by Franklyn M. Branley. After reading these pages students will create a KWL chart. In section one of the chart, they will write what they already know or think they know about earthquakes. In section two they will then write at least three things they would like to know or learn about earthquakes. Section three will be the last section the students will complete after all lesson have been taught. Students will be expected to share some of the things they have written in boxes one and two of his KWL chart. I will ask the class what the word “quake” means. After taking several answers if no one has given me the correct answer I will tell them that to “quake” means to shake. I will then go on to explain to the class that an earthquake is considered to be sudden, rapid shaking of the Earth that is caused by the release of energy that is stored in rocks beneath the Earths surface.

K (What I know about earthquakes)	W (What I want to know about earthquakes)	L (What I learned about earthquakes)

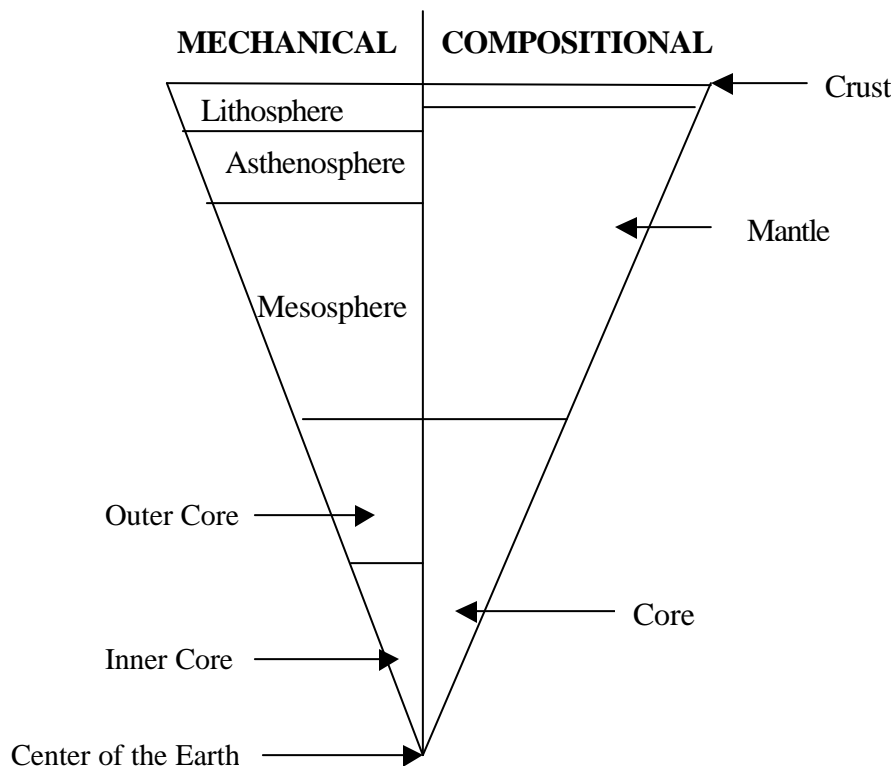
In small groups of three to four students, the entire class will model and demonstrate what happens during an earthquake. Each group will be given a small metal pan filled with Jell-O, a metal spoon or wooden ruler, three paper cups of different sizes, paper plates and small cardboard boxes. It will be the job of each group to construct the model of a building on top of the Jell-O mold in the pan. When each group has completed the constructing of their models, they will then use the spoon or ruler to tap the sides of the Jell-O mold, increasing the force that they apply to the Jell-o mold each time. After five minutes I will stop the students and ask them to comment on what they observed during this experiment. Students will then be instructed to answer the following questions:

- What do the plates, cups, and boxes represent?
- What moves?
- What happened to your building?
- What would have happened if people were in or near the buildings?
- How would they feel?

After I have completed lessons one and two my students and I will then discuss why earthquakes occur and where they often happen. Taking into consideration that this lesson can be

complicated for third graders, I will teach lesson three in two parts. During Part 1, I will introduce my students to the crust, mantle, and core (the basic compositional layers of the earth), and the lithosphere, asthenosphere, and mesosphere (the main mechanical layers of the earth). I will begin this lesson by asking the class what they think the Earth is like below its surface. As students respond and share their answers, I will write the following vocabulary words on the board: crust, lithosphere, mantle, outer core, inner core, center of the earth. Using an apple for my model of the Earth, I will first cut several apples in half and then give each group of students its own half of an apple. I will use my model to give students a visual picture as to how the earth's layers work. The crust of the earth would only be the skin of the apple. The white or fruit portion of the apple would represent the mantle, and the seed or shell in which the seeds are encompassed would serve as my outer core.

Once I am satisfied that all of the students have understood what I have just showed them, I will tell the class that they are going to create a model of a slice of the Earth, from its surface to the center. I will give each student a sheet of paper that has been precut in slices. I will then model for the students as to how they should divide their paper. Each student will be asked to use the vocabulary words from the chalkboard to label each section of their diagram. I will describe each layer, and have the students color the area from the base of the lithosphere to the surface yellow, and color the area from the base of the crust blue.



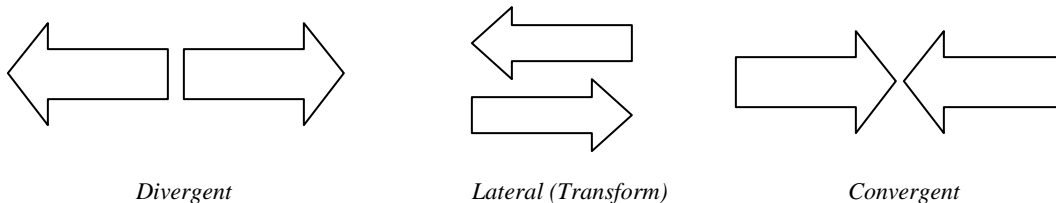
Part II of lesson three will begin with my showing the students a transparency of an epicenter map that has been marked with its plate boundaries. I will ask students what type of relationship they see between the earthquakes and the plate boundaries. I will especially point out to students the arrows on the plate boundaries map. By doing this it will allow them to see which directions each plate is moving. Making sure that each student understands the material that is being taught, I will explain that each plate has a name. Showing each student the twelve plates located on the map, I will explain that some experts have only identified seven of the plates while others have counted as many as twenty.

Pointing out the arrows that indicate movement, I will explain that there are three types of plate movement. These movements are referred to as divergent, lateral (or transform), and convergent. I will have the class to focus their attention on me as I demonstrate the movement of these plates using my hands. Each type of plate boundary will be demonstrated in the following way.

Divergent Plate Boundary - I will begin with my palms pressing against each other and slowly being pulled apart. Students will learn that this is the type of plate movement that happens on the floor of the Atlantic and Pacific Ocean. As the plates move apart, melted rock, or magma rises from the upper mantle to fill the spaces. A good example of divergent plate movement can be found by taking a look at the mid-Atlantic ridge, where the North American and Eurasian plates are moving apart.

Lateral (Transform) Plate Boundary - I will begin with my hands side by side. Then I will slide one forward and the other back, so that both of my hands pass each other. A good example of Lateral plate movements can be seen along the San Andreas Fault in California.

Convergent Plate Boundary - I will begin by modeling for students my hands with my knuckles facing each other. Then I will slowly bring my hands together while one hand slides under the other one. Most converging plate boundaries form in high mountains such as in the Andes and Himalayas.



In lesson four we will discuss the physical results of an earthquake. During this lesson I hope to teach my students that earthquakes do cause changes in the Earth's surface as well as give them a small amount of the historical background of some cities and towns that had to come face to face with an earthquake. I will begin this lesson with a review of the previous day's concepts. Students will review that the earth's surface is made up of plates, and that those plates have been shifting and moving over millions of years. I will tell my students that earthquake movement does not occur just as the edges of the plates, but sometimes can occur within the middle of the plates. I will instruct my class to quickly review and recite all seven continents to me and mark them on the map that is attached to their desk. We will use hand movements to demonstrate and perform the types of fault movement that result in an earthquake. The first type of fault movement we will demonstrate will be normal faulting. By making our hands into fist and pressing the flat edges of our fingers together. We will pretend to release pressure by letting one hand drop about 4 cm. Once this has happened, the straight fingers and knuckles of the other hand will resemble a fault cliff. The second type of movement will be an up movement and will resemble reverse faulting. Pressing their knuckles and fingers together tightly, without releasing any pressure one hand will move up 4cm. The last and final movement will be a lateral movement that resembles lateral or transform faulting. Each student will press the sides of his or her hands together. As the students release the pressure, they will be instructed to slide their hands together side by side using a jerking motion.

Week Two

During week two of my unit I will discuss prediction and control for the next three lessons. In lesson one of week two I will conduct a lesson that focuses on teaching students that earthquakes have different strengths; thus, they will also cause different amounts of damage. I will have the

students to construct a model to simulate earthquakes and earthquake damage using a pile of paper plates, cups, and small boxes. I will use the materials I just mentioned to create a tall structure on table or cart. One to two students will be chosen to shake the cart or table gently so that nothing happens to the structure. Students will then observe and record what happened after their classmates shook the table/cart gently. Next they will be instructed to shake the table/cart three more times, each time increasing the force that they use. After each shake we will stop to record and observe our findings. At the end of the activity the students will discuss the following questions in their groups and in a class discussion:

- (1) What cause the building to shake down?
- (2) What caused the table to shake?
- (3) How much energy did they use to shake the table the first time?
- (4) What happened after they did that?
- (5) How much energy did they use to shake the table the final time?
- (6) What happened?

Upon the completion of this activity I expect my students to summarize the concept that was learned which would be that because earthquakes have different amounts of energy, when they occur they will cause a different amount of damage.

During lessons two and three of week two I will teach my students that earthquakes can be measured in two different ways. An earthquake can be measured by its effects (the intensity) or by the amount of energy they release (the magnitude). I will introduce my students to the Modified Mercalli scale as a way to measure the effects of an earthquake. We will discuss the meaning of scale numbers, and I will illustrate how this scale helps seismologists determine the effects of an earthquake on the earth's surface. Students will be shown a transparency of the following Modified Mercalli Scale :

I	Only instruments detect it.
II	People lying down might feel it.
III	People on upper floors of buildings will feel it, but may not know it is an earthquake.
IV	People indoors will probably feel it, but those outside may not.
V	Nearly everyone feels it, and wakes up if they are sleeping
VI	Everyone feels the quake. It's hard to walk
VII	It's hard to stand.
VIII	People will not be able to drive cars.
IX	Most foundations are damaged. The ground cracks.
X	Most buildings are destroyed.
XI	Rails are bent. Bridges and underground pipelines are put out of service.
XII	Most things are leveled.

Table 2: Modified Mercalli Earthquake Intensity Scale (NSTA-FEMA 101)

We will then discuss the Richter Magnitude Scale and how it is used to measure the energy that is released by an earthquake. Students will practice creating their own versions of seismogram readings on a blank sheet of paper.

The final lessons (lessons four and five) will cover earthquake safety and survival. In these lessons I will teach my students that every environment contains a potential earthquake hazard that may cause damage, injury, or death during an earthquake. During lesson four students will divide into groups and create a plan as to how they can make the room safer in the event of an earthquake. As students work I will remind them that hazards are things that could possible fall,

spill, break, or cause damage during an earthquake. While students are collaborating in their groups, I will write the following action verbs on the chalkboard:

Move	anchor	relocate	replace	attach	move
eliminate	change	secure	tie down	fasten	

Students will take out time to identify the earthquake hazards in the classroom, and for homework they will create a list of possible hazards from their home. After they have discussed, each group will then come together to create an Earthquake Safety poster. In their posters they will illustrate things that can be done to ensure that their classroom or home will be safe during an earthquake.

Our final lesson will cover earthquake safety when students are outside, inside, and when they find themselves without shelter. Students will learn that if they are outside in the event of an earthquake, they should stay outside and go to an open area away from any hazards. While they are there, they should also make sure that they stay quiet and stay put so that they are able to listen for instructions. When students are inside and an earthquake occurs, they will be instructed to stay inside, take cover immediately under a table or desk, and remain in that safe position for at least 60 seconds or until the shaking has stopped and an adult tells them its okay to leave their shelter. In the event that students are traveling in the hallways at school or they are in a place where no shelter is available, they will be shown how to kneel next to the wall, facing away from the windows. They will bend their head close to their knees, cover the sides of their heads with their elbows and clasp their hands behind their necks. As a closure to this lesson we conduct two simulated earthquake drills in our class. One will be held in the hallway near the classroom, and the other will be inside of the classroom. Once the drills are complete, students will go back to the KWL chart they started when the unit began and complete the last box of the chart.

In conclusion the lessons that I have described above were created to expose and familiarize my students with earthquakes. Below I have included some of the lesson plans and materials that will be needed in order to complete each lesson successfully.

LESSON ONE

Materials

world map (1 per student)
paper
pencil
different myths

Procedures

1. Engage students by asking them if they have experienced or heard of an earthquake before.
2. Explain to students that although earthquakes have been happening on Earth for millions of years, scientists have just begun to understand what causes them for less than 30 years now. Most of the people who experienced earthquakes in the past, created their own explanations as to why earthquakes occurred to help the people in their culture understand the reason why this natural disaster happens. The explanations these people created are known as myths or legends.
3. Discuss the creation of myths and legends from different cultures around the world.
4. Put students in groups of four students and give them several myths from around the world to read that explain why earthquakes occur.
5. Then give them a world map.
6. Have each group place an X or a dot on the countries from which they have read earthquake legends or myths.

7. Direct the students in creating their own myths about an unexplained event such as why volcanoes erupt or why some parts of the world have more earthquakes than others.

LESSON TWO

Materials

3 paper cups per group
3-4 paper plates per group
small cardboard box
pencil
9x9 metal pan with Jell-O mold
wooden ruler
paper
watch or timer

Procedures

1. Engage students by asking them “What is an Earthquake?” (Accept all responses.) Then read the pages 4-10 of the book *Earthquakes* by Franklyn M. Branley.
2. Have students complete a KWL chart.
3. Ask students to share some of the things they have written in boxes one and two of his KWL chart.
4. Ask the students if they know what the word quake means. (Accept all answers.)
5. After taking several answers, if no one has given me the correct answer, I will tell them that “quake” means to shake. Explain to the class that an earthquake is considered to be sudden, rapid shaking of the Earth that is caused by the release of energy that is stored in rocks beneath the Earth’s surface.
6. Split students in small groups of three or four.
7. Give each group a small metal pan filled with Jell-O, a metal spoon or wooden ruler, three paper cups of different sizes, paper plates and small cardboard boxes. It will be the job of each group to construct the model of a building on top of the Jell-O mold in the pan. When each group has completed the constructing of their models, they will then use the spoon or ruler to tap the sides of the Jell-O mold. Increasing the force that they apply to the Jell-O mold each time. After five minutes I will stop the students and ask them to comment on what they observed during this experiment.
8. Have students to answer the following questions on a separate sheet of paper.
 - What do the plates, cups, and boxes represent?
 - What moves?
 - What happened to your building?
 - What would have happened if people were in or near the buildings?
 - How would they feel?

LESSON THREE

Materials

crayons
white construction paper
markers
pencils

Procedure

1. Review earthquake hazards with students.

2. Remind students of things they can and should do in order to stay safe during an earthquake.
3. Have students to create an earthquake safety poster reminding people of one thing they can do during an earthquake in order to stay safe.
4. On the back of the poster have students to write a brief description of their poster using at least four of the words that have been listed below:

Move	anchor	relocate	replace	attach	move
eliminate	change	inside	tie down	shelter	outside

APPENDIX

Name _____ Date _____

I use-to think...



A large, vertically-oriented rectangular area with a double-line border. The top edge is slightly slanted. Inside this area, there are 20 horizontal lines for writing, starting from the top and extending down to the bottom. The first line is a solid black line, while the others are thin grey lines.

APPENDIX

Name _____ Date _____

Earthquake Math Facts

$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$ E	$\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$ T	$\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$ R	$\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$ K
$\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$ Q	$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$ A	$\begin{array}{r} 4 \\ \times 0 \\ \hline \end{array}$ E	$\begin{array}{r} 3 \\ \times 1 \\ \hline \end{array}$ U
$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$ Z	$\begin{array}{r} 1 \\ \times 1 \\ \hline \end{array}$ H	$\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$ A	$\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$ Y

What is the big word that means the sudden shaking of the earth?

4 8 5 12 1 10 3 9 6 0

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This link is directly affiliated with the United States Geological Survey. In this link you will be able to find several photos of faults and of a large earthquake gallery.
- "The Great 1906 Earthquake and Fire." *The Virtual Museum of the City of San Francisco*.
<<http://www.sfmuseum.org/1906/06.html>>.
From the Museum of the City of San Francisco, this website explores the earthquakes of 1906 through photographs, eyewitness accounts, newspaper clippings and reports from departments and organizations of the time. You can also find information on the 1989 San Francisco earthquake.
- NSTA (National Science Teachers Association). *Tremor Troop: Earthquakes*. Washington, D. C., NSTA, 1988.
This binder consists of an array of lessons and other information concerning earthquakes.

"Recent Earthquakes and Active Volcanoes." *The Virtual Times*. <<http://www.hsv.com/scitech/earthsci/quake.htm>>. This website provided maps and figures of recent earthquakes from around the world.