



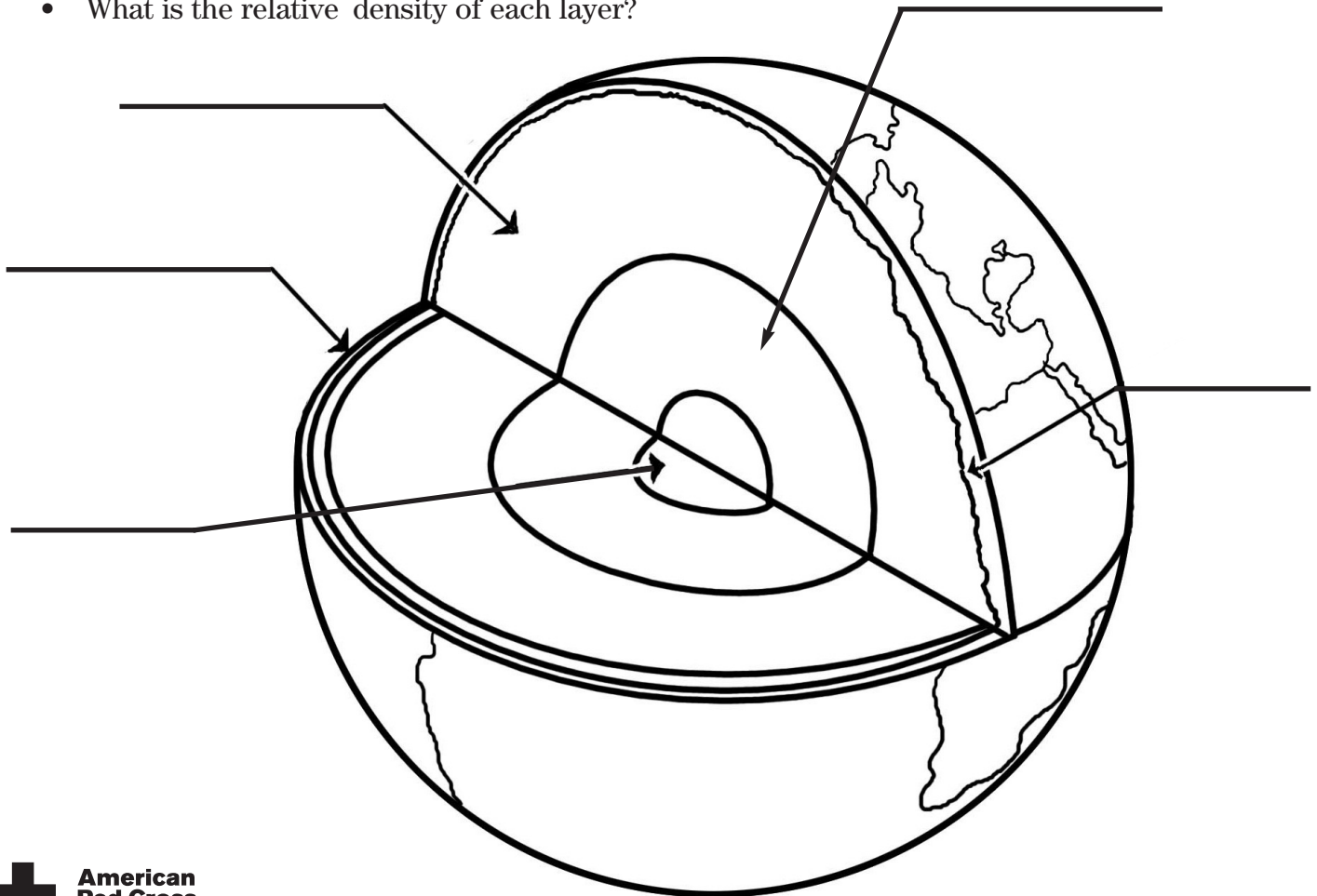
Seismic Picture of the Hidden Earth

Page 1 of 1

Name _____

Directions: Learning about the makeup of the earth helps us understand our changing planet. Research and label each of the layers of the earth shown in the drawing. Then, answer the questions. To start, visit Into the Earth by the U.S. Geological Survey at <http://wrgis.wr.usgs.gov/docs/parks/pltec/index.html#into>.

- What is the relative thickness of each layer?
- What is the relative temperature of each layer?
- What is the relative density of each layer?





Making a Mobile

Page 1 of 2

Name _____

Directions: Scientists often create models in order to clarify information. Follow the steps below and use the diagram on the next page to make a mobile of the earth's inner structure.

Materials:

- Construction paper in multiple colors
- Scissors and glue
- Markers
- Needle and strong thread

Step 1: Use the scale diagram on the next page to cut rings of construction paper in different colors to represent the layers of the earth.

Step 2: Use markers to color the upper crust of the lithosphere.

Step 3: On each layer or on flags glued to the layers, write the name of the layer and other interesting facts about its composition, temperature and state.

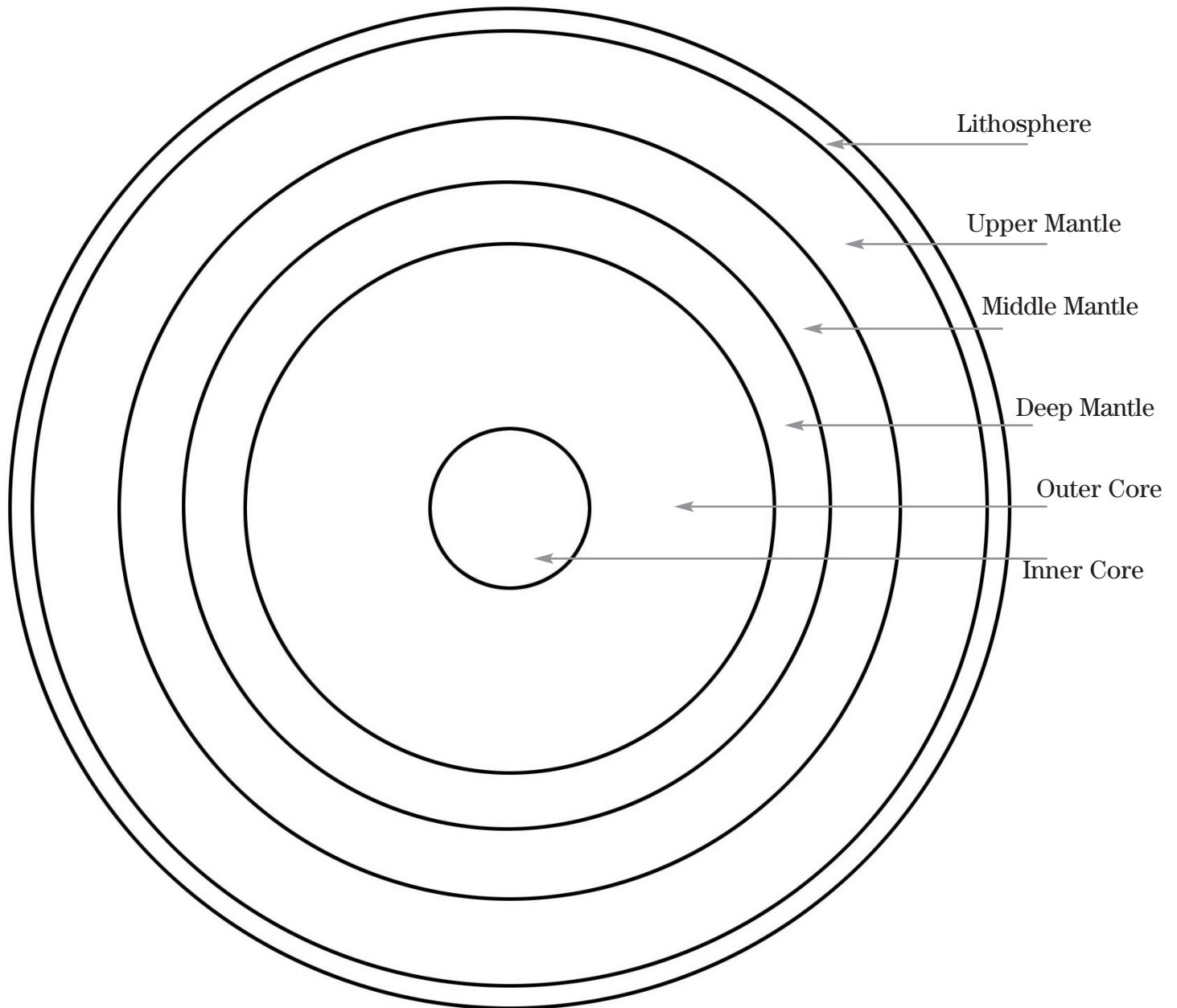
Step 4: Use a needle and strong thread to attach the layers, allowing for a little space between each so that the layers will hang loosely as a mobile.





Making a Mobile

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

MAKING A MOBILE
Masters of Disaster® Earthquakes, Level 3
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Earth as an Egg

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Name _____

Directions: Can you use an egg to illustrate a cross section of the inside of the earth and explain the movement of the earth's plates? Follow the steps below to make and describe your model.

Materials:

- Hard-boiled egg
- Plastic knife
- Small bowl of water
- Paper towel

Procedure:

1. Use the knife to cut the egg in half. Examine the layers. What parts of the earth's structure are represented by the shell, the white and the yolk?

2. What does the thin membrane under the shell represent?

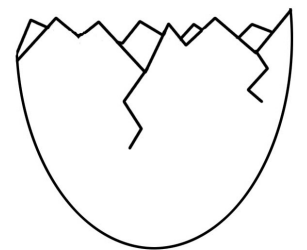
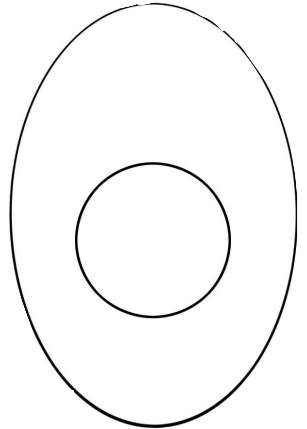
3. Lightly tap one half of the egg on a hard surface. The shell will break into fragments that represent earth's tectonic plates. Carefully lift two of the larger fragments and drop some water underneath them. Now, you can slide those fragments, or plates, more easily.

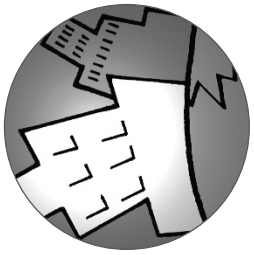
Describe your observations as you answer the following questions:

- Do the plates slide smoothly when pushed alongside each other, but in opposite directions? If not, where do they catch?

- What happens if you push the two plates together—head-to-head?

Challenge: Describe how the fragments of the egg shell illustrate some basic points about plate tectonics and earthquakes.



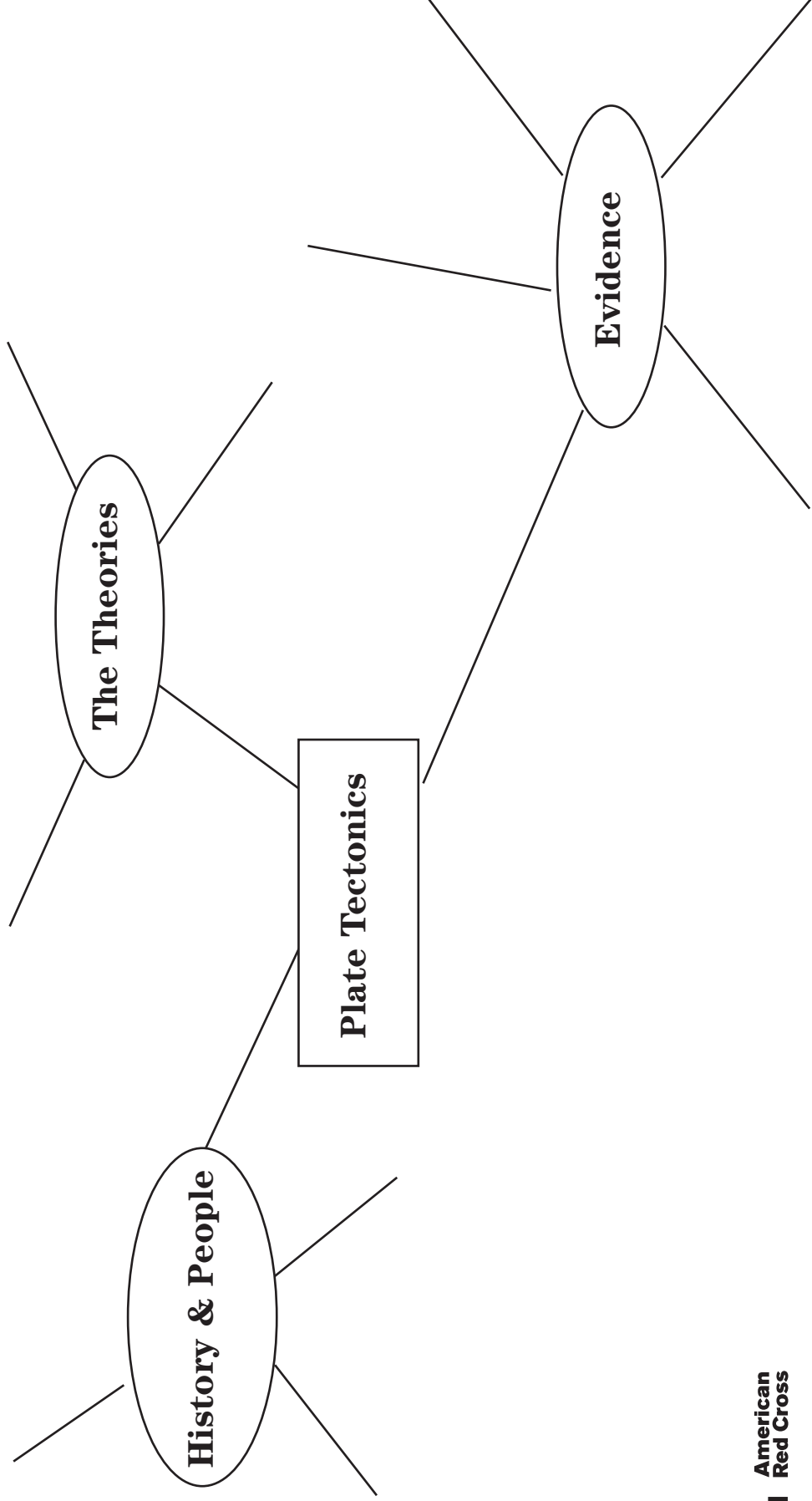


Mapping the Facts

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Name _____

Directions: Since 1912, when Alfred Wegener first introduced the concept of plate tectonics, many scientists have added to and found evidence of the theory. Use the mind map below to help organize and share the information you discover as you research.



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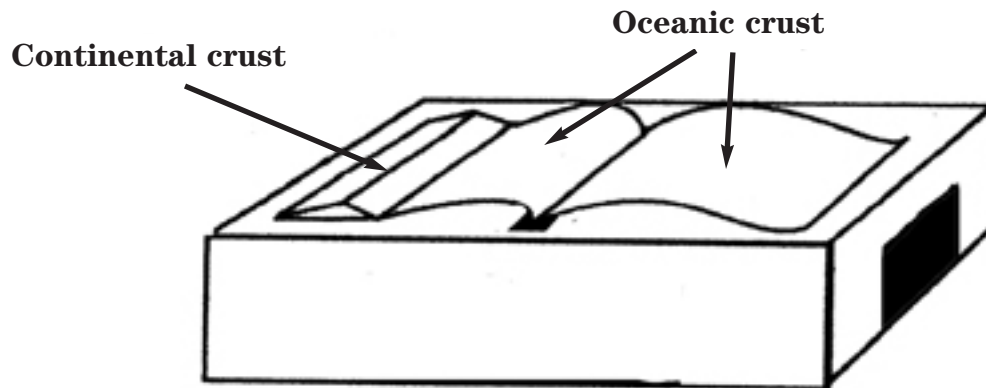


Plate Tectonics in a Box

Page 1 of 3

Name _____

Directions: The earth's tectonic plates converge, diverge or just slip by each other. To explain concepts that we cannot see, scientists often build models. Follow the steps below to illustrate "tectonics in a box."



Note: An excellent resource can be found at the U.S. Geological Survey's Web site at <http://pubs.usgs.gov/gip/dynamic/understanding.html>.

Materials:

- Scissors
- Shoebox
- Several sheets of plain paper
- 1 sheet of cardboard
- Markers
- Tape

Build the Box:

Step 1: Slice a narrow slit in the top of the box, long enough and thick enough for two pieces of paper to slide through.

Step 2: Cut a large square in one of the short sides of the box, large enough for you to put your hand through.





Plate Tectonics in a Box

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Demonstration of Divergent Plates

1. Write “Oceanic Crust” across each of two sheets of paper.
2. Slide the sheets of paper, words facing each other, through the slit, more than halfway into the box.
3. Now, slowly push the paper up through the slit. The papers will fall to either side of the box, revealing the words “Oceanic Crust.”

How does this illustrate what happens when tectonic plates diverge?

Demonstration of Convergent Plates: Oceanic and Continental Plates

1. Write “Oceanic Plate” on one sheet of paper. Cut two 1-inch strips from the cardboard. Fold them in half lengthwise. Then, tape the strips across the top third of a second sheet of paper. Write “Continental Plate” across the cardboard folds.
2. Slide the ends of the papers, words facing each other, into the slit, about one-third down.
3. Now, putting your hand in the side opening, slowly pull down the papers through the slit. What happens when the folded strips of “continental plate” get near the slit? What happens to the “oceanic plate”?

How does this illustrate what happens when oceanic and continental plates converge?





Plate Tectonics in a Box

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Demonstration of Convergent Continental Plates

1. Cut four 1-inch strips from the cardboard. Fold them in half lengthwise. Then, tape two strips across the top third of each of two sheets of paper. Write “Continental Plate” across the cardboard folds.
2. Slide the ends of the papers, words facing each other, into the slit, about one-third down.
3. Now, slowly pull the papers down through the slit. What happens when the folded strips of “continental plate” get near the slit?

How does this illustrate what happens when continental plates converge?

Demonstration of Transform (Lateral) Plates

1. Cut one sheet of paper in half lengthwise. Cut four 1-inch strips from the cardboard. Fold them in half lengthwise. Cut the strips to fit the width of the paper. Tape four folded strips across the top third of each of the two halves of paper. Write “Continental Plate” across the cardboard folds.
2. Slide one sheet of paper, words and “landmasses” facing inward, into one side of the slit, about one-third down. Slide the other, words and “landmasses” facing inward, into the other side of the slit.
3. Now, slide one paper sideways toward the other. What happens when the landmasses touch?

How does this illustrate what happens when continental plates slide by each other?





Building a Seismograph

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Name _____

Directions: A seismograph measures the magnitude of the seismic waves that shock the earth during an earthquake. Follow the steps below to build your own seismograph and demonstrate how it works.

Materials:

- Ring stand
- Cardboard oatmeal container (drum)
- Metal spring, at least 4 in. (10 cm) long that can support a heavy weight
- Pen
- 2 rubber bands
- White paper strips cut to fit around oatmeal container
- Glue
- Weight
- Gelatin, rectangular pan, materials for building simple structures (stackable or interconnecting blocks, etc.)

Procedures:

1. Wrap the paper around the oatmeal container and glue the edges.
2. Put a hole in the top and bottom of the container and put the upright pole of the ring stand through the holes. Secure in place by wrapping rubber bands around the pole at the top and bottom of the container.
3. Suspend the spring and the attached weight from the end of the ring stand. The weight should hang about 1 to 2 inches (2.5 to 5 centimeters) from the base of the ring stand.
4. Attach the pen to the weight, letting the point of the pen touch the paper on the oatmeal container.
5. Shake the structure that the ring stand is on, while a partner turns the drum. The pen will show the waves created by the shaking on the drum's paper covering.





Building a Seismograph

Page 2 of 2

Try these demonstrations:

1. Make a rectangular pan of hard-gelled gelatin and set the seismograph on the gelatin. Shake the gelatin. Is the wave created on the gelatin similar to or different from the wave created when the seismograph rests on a hard surface such as a table? How do you explain that?
2. While the seismograph is sitting on the table, vary the shaking from gentle to quite hard. CAREFUL! Don't shake the table so hard that the seismograph falls! How does the wave record on the drum change? How do you explain that?
3. Try building some simple structures and setting them on the table near the seismograph. Shake the table gently. Did your structures fall? How big were the waves recorded by the seismograph? If necessary, rebuild your structures trying to make them more stable. Increase the power of the shaking gradually until the new structures fall. Set up a competition. The structure that is the most stable according to the seismograph wins. Repeat this experiment on the pan of gelatin. Is it easier or harder to build a stable structure resting on gelatin? Explain.

Adapted from "On the SafeSide with the Weather Channel."





Earthquake Scenario Cards

Page 1 of 3

Name _____

Directions: You are the producer of a public service spot for television to help educate the public on the steps to take for earthquake safety. Select one of the scenarios below. Then, create a storyboard to illustrate the scenes of the spot with an accompanying script. Your storyboard will include—

- Descriptions and/or illustrations of each scene of the video (at least three).
- The script for the off-camera announcer and/or the on-camera actor or interviewees for each scene.

Scenario 1 Outside the school building

The final bell just rang. You and your friends are walking toward the softball field to check out the game that's going on. It's the final game of the season and many people are in the stands. As you walk through the trees to the open field, the ground suddenly starts to shake and roll.

- How would you react in this scenario to minimize harm to yourself? (Be specific. Where would you go? What would you do?)
- What potential dangers do you need to be aware of as the earthquake is happening?
- What is the first thing you would do after the ground stops shaking?
- What dangers do you need to be aware of in this scenario after the ground stops shaking?
- Would you re-enter the school for any reason in this scenario? Why or why not?





Earthquake Scenario Cards

Page 2 of 3

Scenario 2 On the freeway

It's your friend's birthday. He's having people over tonight for a party, and your aunt is driving you downtown to buy him a present. You are just about to cross the overpass to exit the freeway when you feel the ground start to move and shake.

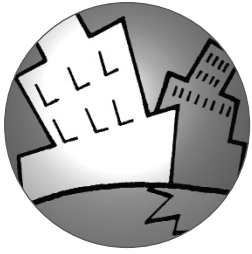
- How would you react in this scenario to minimize harm to yourself? (Be specific. Where would you go? What would you do?)
- What potential dangers do you need to be aware of as the earthquake is happening?
- What is the first thing you would do after the ground stops shaking?
- What dangers do you need to be aware of in this scenario after the ground stops shaking?
- You have your cell phone. Should you report the earthquake to authorities? Under what circumstances would you call the authorities? Should you call your family? Why or why not?

Scenario 3 In class

You're in science lab. Your teacher is reviewing the test he just gave back to the class. You turn to a friend to see what answer she gave to number 7, when all of a sudden you hear a deafening roar and feel the floor start to move.

- How would you react in this scenario to minimize harm to yourself? (Be specific. Where would you go? What would you do?)
- What potential dangers do you need to be aware of as the earthquake is happening?
- What is the first thing you would do after the ground stops shaking?
- What dangers do you need to be aware of in this scenario after the ground stops shaking?
- How would you find out important information from officials in this scenario if there were no electricity?





Earthquake Scenario Cards

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Scenario 4 In a skyscraper

You and your friend are in your mom's office waiting for her to finish work. When she's done, she's going to take you to the movies. You and your friend are looking at the view out of the 32nd-story windows, trying to see if you can find your school. Suddenly, the floor starts to move and things on desks start to topple over.

- How would you react in this scenario to minimize harm to yourself? (Be specific. Where would you go? What would you do?)
- What potential dangers do you need to be aware of as the earthquake is happening?
- What is the first thing you would do after the ground stops shaking?
- What dangers do you need to be aware of in this scenario after the ground stops shaking?
- How would you leave the building when evacuating? (Would you take the elevator or the stairs?) Why?





In the Know

Page 1 of 1

Name _____

Directions: It's important to understand the science of tsunamis in order to understand how to stay safe. Before you begin to learn about tsunamis, complete the K-W-H columns of the chart below to see just how much you already know and what you want to learn. Then, conduct research to complete the L column.

K What I KNOW	W What I WANT to Know	H HOW I can find what I want to learn	L What I LEARNED
		NOAA: Tsunami <i>http://www.tsunami.noaa.gov/</i>	
		USGS: Tsunami <i>http://walrus.wr.usgs.gov/tsunami/index.html</i>	

Note: NOAA=National Oceanic and Atmospheric Administration; USGS=U.S. Geological Survey

