

# Introduction to Earthquakes

## Idaho State Standards:

N/A

## Objectives:

To determine the present level of knowledge of students prior to instruction on earthquakes and/or the use of the Idaho Bureau of Homeland Security publication *Putting Down Roots in Earthquake Country*.

## RATIONALE

This activity is designed as an anticipatory set, to introduce the students to earthquakes, and to allow the teacher to see how much the students know about earthquakes and earthquake mitigation.

## FOCUS QUESTION(S):

- If an earthquake happened here, right now, what would you do?
- Can you imagine what your classroom would be like during an earthquake?
- How could you make your classroom and your school a safer place to be?
- How could you make your home safer?

## TEACHING CLUES AND CUES

This activity is best done as an introduction to Unit 1: *Why Should I Care?* However, it may also be used as a review or facts check after using the Bureau of Homeland Security's booklet *Putting Down Roots in Earthquake Country*.

## MATERIALS:

- *Putting Down Roots in Earthquake Country* booklet, one for each student
- Copies of the student worksheet, p. 126 - 127, one for each student
- Teacher Answer Key, p. 128

## PROCEDURE:

### Teacher Preparation

Make copies of the student worksheet, p. 126 - 127

### A. Introduction

Students will circulate within the classroom and ask other students if they know any of the answers to the questions on the student worksheet. If possible, find a different person to answer each of the questions given. In order to complete the worksheet, have students write the name of the person providing the answer to a question in the margin and their answer in the space provided.

### B. Lesson Development

1. Hand out copies of the student worksheet to students.
2. Inform students that the aim of this activity is to find different people, within the class, to provide the answers to each one of the questions.
3. Once they have, write the person's name in the space provided and their answer to the question.

### C. Conclusion

Lead a class discussion on the answers to the questions.

*Student worksheet***Introductory Activity – Earthquakes**

Instructions: Your aim is to find a different person who can answer each of the questions below. Once you have, write the person's name in the margin and their answer to the question.

1. Someone who has stood on a major fault: \_\_\_\_\_ Name of fault: \_\_\_\_\_
2. Someone who has felt the shaking of the ground or a building during an earthquake: \_\_\_\_\_
3. Someone who has personally observed damage from an earthquake: \_\_\_\_\_
4. Someone who can name 3 kinds of tectonic plate boundaries: \_\_\_\_\_  
Name the boundaries: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
5. Someone who knows what the Yellowstone Tectonic Parabola is: \_\_\_\_\_  
What zones make up this parabola? \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_
6. Someone who knows the three steps to take for personal safety during an earthquake: \_\_\_\_\_  
\_\_\_\_\_ These steps are \_\_\_\_\_, \_\_\_\_\_  
and \_\_\_\_\_
7. Someone who can name three types of seismic waves: \_\_\_\_\_  
Name the three types of waves: \_\_\_\_\_, \_\_\_\_\_  
and \_\_\_\_\_
8. Someone who can tell you how many magnitude 8+ earthquakes occur in the world each year: \_\_\_\_\_ How many? \_\_\_\_\_
9. Someone who can tell you when and where the largest historic earthquake occurred in Idaho \_\_\_\_\_ Where: \_\_\_\_\_  
When: \_\_\_\_\_
10. Someone who can tell you when and where the largest historic earthquake occurred in the U.S.: \_\_\_\_\_ Where: \_\_\_\_\_  
When: \_\_\_\_\_

## ADDITIONAL RESOURCES

11. Someone who can name a magnitude scale which is now used more widely than the Richter scale to describe the size of an earthquake: \_\_\_\_\_  
Name the magnitude scale: \_\_\_\_\_
12. Someone who can tell you the difference between magnitude and intensity of an earthquake: \_\_\_\_\_ Intensity is: \_\_\_\_\_  
and Magnitude is: \_\_\_\_\_
13. Someone who can tell you how often magnitude 6.0 earthquakes occur in Idaho? \_\_\_\_\_  
\_\_\_\_\_ How often: \_\_\_\_\_

## ANSWER KEY to Introductory Activities – Earthquakes

1. Answers will vary
2. Answers will vary
3. Answers will vary
4. Divergent, Convergent, Transform
5. The Yellowstone Tectonic Parabola is a region of earthquakes, active faulting, and topographic uplift surrounding the eastern Snake River Plain. It is associated with the Yellowstone Hotspot. The 4 zones are: Intermountain Seismic Belt Zone, Central Idaho Seismic Zone, Western Idaho Seismic Zone, and Lewis and Clark North Idaho Zone.
6. Drop, Cover, Hold on
7. Primary, Secondary, Longitudinal
8. Approx. 1/year
9. Borah Peak 1983, M 6.9 (Note: The 1959 Hebgen Lake earthquake was a M 7.3 but its focus was in Montana even though it was felt and affected Idaho)
10. New Madrid, MO, 1811-1812, three M8 earthquakes. (Note: Some students may want to include the 1964 Prince William Sound Alaska earthquake, M 9.2, since Alaska is part of the U.S.)
11. Moment Magnitude Scale (M<sub>w</sub>) – This scale takes into account the length of the fault that moved or ruptured. It is related to the total energy released in the earthquake. This scale is different from the Richter scale because it takes into consideration the amount of fault surface that slips and not just the energy released.
12. An earthquake has one magnitude, but many intensities. Intensity: is a qualitative measurement and is subjective and is a measurement of the earthquake effects and is expressed as a Roman numeral I-XII. Intensity can be influenced by distance to hypocenter, type of ground material, and strength. Magnitude: is a quantitative and exact measurement of the size of the earthquake (amount of energy released). It is expressed as a number usually from 1-10. In reality the top end of the scale is open. In order for an earthquake of 10.5 to occur would require a fault that circles the Earth to move at once – no such fault exists. The largest earthquake ever recorded was a M<sub>w</sub> 9.5 on May 22, 1960 in Chili. This occurred on a fault that is almost 1,000 (1600 km)miles long. The earthquake ruptured along the entire length of the fault. In the U.S. – Alaska, 03/27/1964 M<sub>w</sub> 9.2, rupture 620 miles (1,000 km), San Andres Fault, San Francisco, CA 04/18/1906 M<sub>w</sub> 7.7 rupture is only 800 miles (1290 km) long 250 miles (400 km).<sup>1</sup>
13. Based on historic data and probability an earthquake of 6.0 could occur approximately every 10 years in Idaho.

<sup>1</sup> Earthquake Country Alliance, “Separating Fact from Fiction,” Southern California Earthquake Center. April 11, 2011. <http://www.earthquakecountry.info/10.5/MajorMovieMisconceptions.html>, accessed June 28, 2011.