

Student Name: _____

Grade: _____

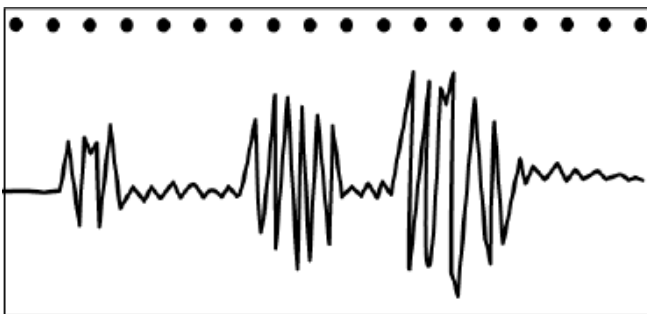
Physical Geology 101 Lab Earthquake Assessment

Introduction & Purpose:

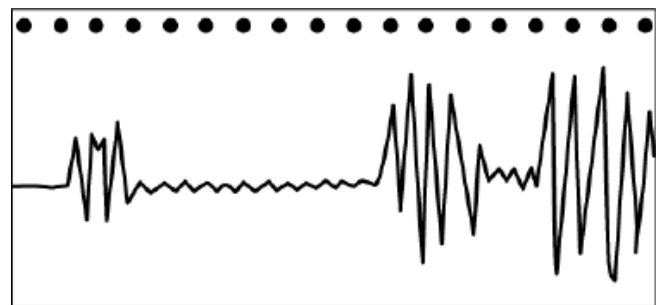
The purpose of this laboratory exercise is to become successful at applying concepts and techniques of seismology for locating earthquake epicenters, measuring magnitudes, evaluating ground surface stability, measuring active faulting with aerial photography, and assessing seismic hazards. This lab has five parts: Part I is a 10-question pre-lab that must be completed prior to the start of the lab. Part II is a laboratory earthquake model simulation; Part III is a fault displacement analysis exercise of a segment of an active fault using aerial photography; and Part IV is a computer-Internet virtual courseware interactive activity designed to learn how to measure and assess earthquake epicenter locations and magnitudes. Finally, Part V is a reflection of your learning experience during this lab.

Part I. EARTHQUAKE PRE-LAB ACTIVITY: Answer questions 1 through 10 using the information supplied in your lab manual and in the pre-lab below. Complete Part I prior to the start of the lab.

1. What type of active geologic structures do earthquakes occur along? _____
2. What is the difference between an earthquake's focus and its epicenter?
3. Each increase of 1 on the Richter Scale means an increase of _____ times in the ground motion and about a _____ times increase in the amount of energy released.
4. The amount of energy released from the focus of an earthquake is called its:
 - a. intensity
 - b. vulnerability
 - c. magnitude
5. Look at the following seismographs and determine the difference in arrival times between the P- and S- waves. Note the dots on the seismogram represent minutes.



Graph A



Graph B

Graph A: P-S interval is _____ minutes

Graph B: P-S interval is _____ minutes

6. Which one of the above seismographs was located closest to the epicenter of this earthquake? A B (Circle your answer)

How did you determine your answer?

7. Fill in this chart with data collected from the following web link: <http://earthquake.usgs.gov/earthquakes/eqarchives/year/eqstats.php> as described in the instructions below. For each year, write in the magnitude of the most frequent earthquakes experienced worldwide and in the United States. **NOTE: Ignore the category of "No Magnitude" on the chart.**

YEAR	WORLDWIDE	UNITED STATES
2000		
2001		
2002		
2003		
2004		
2005		
2006		
2007		
2008		
2009		
2010		

Given the 10-year period in the chart above, answer the following questions:

8. What magnitude earthquake is most common worldwide? _____
9. What magnitude earthquake is most common in the United States? _____
10. What is the typical damage to be expected from the average earthquake? Refer to the chart of earthquake effects in the pre-lab activity.
 - a. Worldwide _____
 - b. United States _____

Part II - Earthquake Model Simulation

Part I. is a hands-on laboratory model simulation of how surface structures behave on various earth sand substrates - 1) unconsolidated versus 2) consolidated versus 3) water-saturated earth material. This activity follows the layout and instructions found in your **lab manual on page 292 under the section Part 16A**. Follow the instructions and answer the 11 questions. The instructor will furnish you with plastic cups, sand, "surface structures", and an earthquake generator device for this activity.

Questions 1-11:

1. Answer: _____
2. Answer: _____

3. Answer: _____

4. Answer: _____

5. Answer: _____

6. Answer: _____

7. Answer: _____

8. Answer: _____

9. Answer: _____

10. Answer: _____

11. Answer: _____

Part III - Measuring and Analyzing Displacement on an Active Fault Using Aerial Photography

Part II is designed to familiarize you with how geologists investigate the movement of an active fault by examining aerial photographs. This activity comes out of your lab book, which is found on page 298 Part 16C. Follow the instructions on page 304 and answer questions 21a,b,c; 22 & 23. Use the aerial photograph found in Figure 16.8 on page 305.

21a. Answer: _____

21b. Answer: _____

21c. Answer: _____

22. Answer: _____

23. Answer: _____

Part IV - Measuring and Analyzing an Earthquake's Epicenter Location and Magnitude

Part III is a virtual courseware computer activity that will be accessed online over the Internet at the following website link: <http://www.sciencecourseware.com/eec/Earthquake/> These online activities are designed to help you learn the concepts and techniques for measuring and analyzing the location of earthquake epicenters and estimating earthquake magnitudes. I believe that these sets of web-based, interactive exercises nicely compliment the activities in your lab book.

Before you begin the program, make sure that your computer system has the proper requirements to run the activities. This interactive online program consists of several components: 1) Images of earthquake destruction; 2) Tutorial; 3) Demonstrations; 4) Travel Time activity; and 5) Epicenter and Magnitude Activity. The online components that will be assessed and graded by me only include the Epicenter & Magnitude activities. However, it is very helpful to check out the demonstrations, tutorials, and travel time activity #4 prior to doing activity #5. You must successfully complete these exercises, and a 5-question quiz at the end, in order to receive a passing "certificate". Note that you must save and print out the completion certificate page before you quit the program. **Again, make sure to save and print out the "certificate" when you finish.** Include the certificate with your lab.

Part V - Earthquake Laboratory Reflection

Directions: Write a 120 word minimum reflection of the lab activity, explaining its purpose, the methods used, the results obtained, and a brief personal reflection of what you enjoyed and learned about doing this lab (3 points possible). Answer the following 3-point question reflection set on a separate sheet of paper:

- 1) *What was the purpose of this lab? What did you actually discover and learn during this lab?*
- 2) *What did you enjoy most about this lab? Also, what was challenging or thought-provoking?*
- 3) *What are your constructive comments about the design and execution of this lab? What's good? What's bad? Offer suggestions for making the lab better.*