

## ***Design Challenge: Seismograph Teacher's Notes***

4<sup>th</sup> Grade PSI

### **Purpose:**

- During this activity, students will design a seismograph with supplied materials. • This activity incorporates the following skills: critical thinking, working as a team, presenting to a group and giving/receiving feedback.

### **Standards:**

- ESS3.B: A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts.
- ETS1.B: Testing a solution involves investigating how well it performs under a range of likely conditions.

### **Teacher's Notes:**

- The materials supplied in this lab are based on a seismograph design from this PBS Kids activity:  
<https://www.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.seismometer/making-a-seismometer/>  
However, feel free to supply any additional materials that you think would be beneficial. As an option, allow students to bring in materials from home. • Do not show the video to the students prior to them creating their own design. You want them to make a design on their own.
- Teamwork is necessary for this lab. Circulate as the students work to ensure that all students are being given the opportunity to contribute to their team. • When you test their seismograph, shake their table in a few different directions. • An important skill used in this lab is giving and receiving feedback from your peer group. While students will enjoy receiving positive feedback, it may be more difficult for them to accept criticisms of their design. Discuss with your students beforehand that criticism does not mean that the student is “bad”. Help them to understand that criticism is something that enables scientists to make positive changes and to constantly move forward.

### **Answer Key – 10 points**

Analysis – Answers will vary. Award up to 2 points per question.

Presentation – 2 points for presenting the group's idea to the class.

**Design Challenge: Seismograph** Name: \_\_\_\_\_ 4<sup>th</sup> Grade

PSI Score: \_\_\_\_\_ / 10 points - - - - -

- - - - -

**Activity/Lab Question:**

How does each part of a seismograph allow it to gather information about seismic waves?

**Before You Begin:**

What is a seismograph?

---

---

---

---

How do seismographs minimize damage caused by earthquakes?

---

---

---

---

---

---

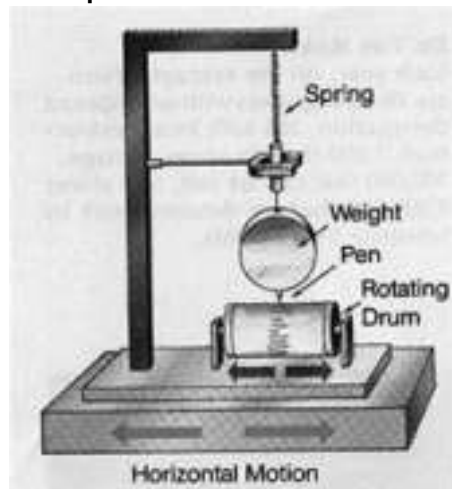
---

### **Purpose:**

During this experiment, you will investigate how the components of a seismograph allow it to gather seismic information. You will use supplied materials and attempt to build your own seismograph.

### **Background:**

Although there is a variety in how seismographs look, they all have the same basic components.



Source: U.S. Geological Survey

- The base of the seismograph rests firmly on the ground. This allows it to move along with ground movement.
- A weighted object is able to hang freely from the device. As the base moves along with the ground, the weight will remain stationary.
- A pen is located at the bottom of the weighted object. This allows movement to be documented.
- Paper that moves at a steady rate is located underneath the pen and weighted object. As the ground moves and the weighted object remains stationary, the movement is documented on the paper.

**Materials (per group):**

- Cardboard box
- Plastic cup
- 1 cup rocks or gravel
- Marker
- String
- Clay
- Scissors
- Paper

**Procedure**

1. Your job is to create a seismograph using the materials provided. Think about how you can create each component of a seismograph. Draw your group's plan below.

2. Have your teacher approve your plan by checking in the box below.

This group is ready to start building!

3. Build your seismograph. As you build, you may come across obstacles that you did not anticipate. Write down any changes you make to your initial design plan in the data box.
4. When you are ready, your teacher will test your seismograph.
5. Make any changes that you think necessary for your seismograph to function better.
6. Each group will present their finished seismograph to the class. Remember: Giving and receiving critical feedback about your work is an important aspect of making progress. If a classmate has a criticism about your design, this does not mean that your design is bad. It simply means that they are offering an idea that will make the design *even better* than it is now.
  - a. When it is your turn, describe how each component helps the seismograph to function properly.
  - b. When it is other group's turns, listen attentively and then give feedback about their design. What did you think was positive about their design? Do you see any possible issues with their design?

**Data**

Record a list of any changes you made to your original design plan in the box below. Describe why you made the change.

Design Change	Explanation

## Analysis

1. What obstacle did you come across as you were building that you did not think of when you designed your seismograph?

---

---

---

---

2. Describe the most important design change that you made.

---

---

---

---

3. Was your seismograph successful in gathering data? Why or why not?

---

---

---

---

4. If you were to do this activity again and were able to use any materials, describe on thing that you would do differently?

---

---

---

---