Name _____ Date _____ Class _____

Design a Seismograph

Problem

Can you design and build a seismograph that can record the movements of simulated earthquakes?

Skills Focus

designing, evaluating, troubleshooting

Materials

- large book
- pencil
- pen
- 2 strips of paper
- optional materials provided by your teacher

Procedure

Review the safety guidelines in Appendix A.

Part 1 Research and Investigate

1. With two lab partners, create a model of a seismograph. Begin by placing a large book on a table.
2. Wind a strip of paper about one meter long around a pencil.
3. Hold the pencil with the paper wound around it in one hand. In your other hand, hold a pen against the paper.
4. As you hold the pen steady, have one lab partner slowly pull on the paper so that it slides across the book.
5. After a few seconds, the other lab partner should jiggle the book gently for 10 seconds to model a weak earthquake, and then for 10 seconds to model a strong earthquake.
6. Observe the pen markings on the paper strip. Compare how the seismograph recorded the weak earthquake and the strong earthquake. Record your observations in your notebook.
7. Repeat Steps 1–6 with a new paper strip. Compare the two paper strips to see how consistent your seismograph recordings were. Record your observations.

Part 2 Design and Build

8. Using what you learned from the seismograph model in Part 1, develop your own design for a seismograph. Your seismograph should be able to
   - record vibrations continuously for 30 seconds

- produce a seismogram that can distinguish between gentle and strong earthquakes
- record seismic readings consistently from trial to trial

9. Sketch your design on a sheet of paper. Then make a list of the materials you will need. Materials might include a heavy weight, a roll of paper, a pen, wood blocks, wood dowels, and duct tape.
10. Obtain your teacher's approval for your design. Then construct your seismograph.

Part 3 Evaluate and Redesign

11. Test your seismograph in a series of simulated earthquakes of different strengths. Evaluate how well your seismograph functions. Does it meet the criteria outlined in Step 8? Observe and record any problems.
12. According to your tests, decide how you could improve the design of your seismograph. Then make any necessary changes to your seismograph and test how it functions.

Analyze and Conclude

Write your answers on a separate sheet of paper.

1. What problems or shortcomings did you encounter with the seismograph you tested in Part 1? Why do you think these problems occurred?
2. How did you incorporate what you learned in Part 1 into your seismograph design in Part 2? For example, what changes did you make to improve consistency from trial to trial?
3. As you designed, built, and tested your seismograph, what problems did you encounter? How did you solve these problems?
4. What limitations did factors such as gravity, materials, costs, time, or other factors place on the design and function of your seismograph? Describe how you adapted your design to work within these limitations.
5. Why is it important for scientists around the world to have access to accurate and durable seismographs?

Communicate

Write an advertisement trying to "sell" your seismograph. In your ad, explain how your design and evaluation process helped you improve your seismograph. Include a labeled sketch of your design.