Earthquake Detection

Grades K-4

Overview:

Students interact with multimedia to explore how earthquakes are recorded using seismometers, and then play a game modeling the process.

Targeted Alaska Grade Level Expectations:

Science

[3-4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

[3] SE2.1 The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by identifying local tools and materials used in everyday life.

[4] SE2.1 The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by identifying the function of a variety of tools (e.g., spear, hammer, hand lens, kayak, computer).

Writing

[3] 1.1.2 The student writes about a topic by writing a paragraph on a single topic with two or more supporting details.

[4] 2.1.1 The student writes about a topic by writing a paragraph that maintains a focused idea and includes details that support the main idea.

Objectives:

The student will:

- identify seismic signatures;
- enact wave transmission from earthquake focus to seismometer; and
- briefly summarize earthquake detection and connection to tsunamis.

Materials:

- VIDEO FILE: “Seismometer”
- STUDENT WORKSHEET: “Earthquake Detection”

Whole Picture:

A seismometer, or seismograph, is a tool used to record and measure seismic waves. The point within Earth where the earthquake begins is called the focus. Energy radiates out from this point and is recorded on a seismometer. Seismograms, or "seismic signatures" are the records produced by seismometers that show the ground displacement over time. Through analysis of seismograms, scientists at tsunami warning centers can determine the likelihood that a tsunami will form and issue warnings to communities if necessary.

Activity Procedure:

1. Explain that students will learn about a tool used to detect earthquakes: the seismometer.
2. Display VIDEO FILE: "Seismometer." For younger students, guide the class through the information on the multimedia file. Older students may navigate through the file on their own.
3. Have students line up holding hands. All students close eyes. The first student in line is the "focus" the last student in line is the "seismometer". The first student raises and lowers their hand and the hand of the student next to them, starting the earthquake wave. The second student passes the wave on to the third student who passes the wave on to the fourth student etc. The "seismometer" student shouts "Got it!" when the wave reaches him/her.

Critical Thinking Method: Think-Pair-Share. Ask students to consider a way to play the game to show small earthquakes or large earthquakes. Ask students to pair up and talk about the question. Once they have explored the question, ask students to share their ideas with the class and play the seismometer game with student variations.

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4. Follow up questions may include:
    a. What is the name of a tool that records and measures earthquakes? *seismometer*
    b. What is the name of the record of an earthquakes "signature?" *seismogram*
    c. Do all earthquakes start tsunamis? *no*
5. Distribute STUDENT WORKSHEET: "Earthquake Detection" for completion by students grades 3-4.

Extension Ideas:

- Type summaries on word processors.

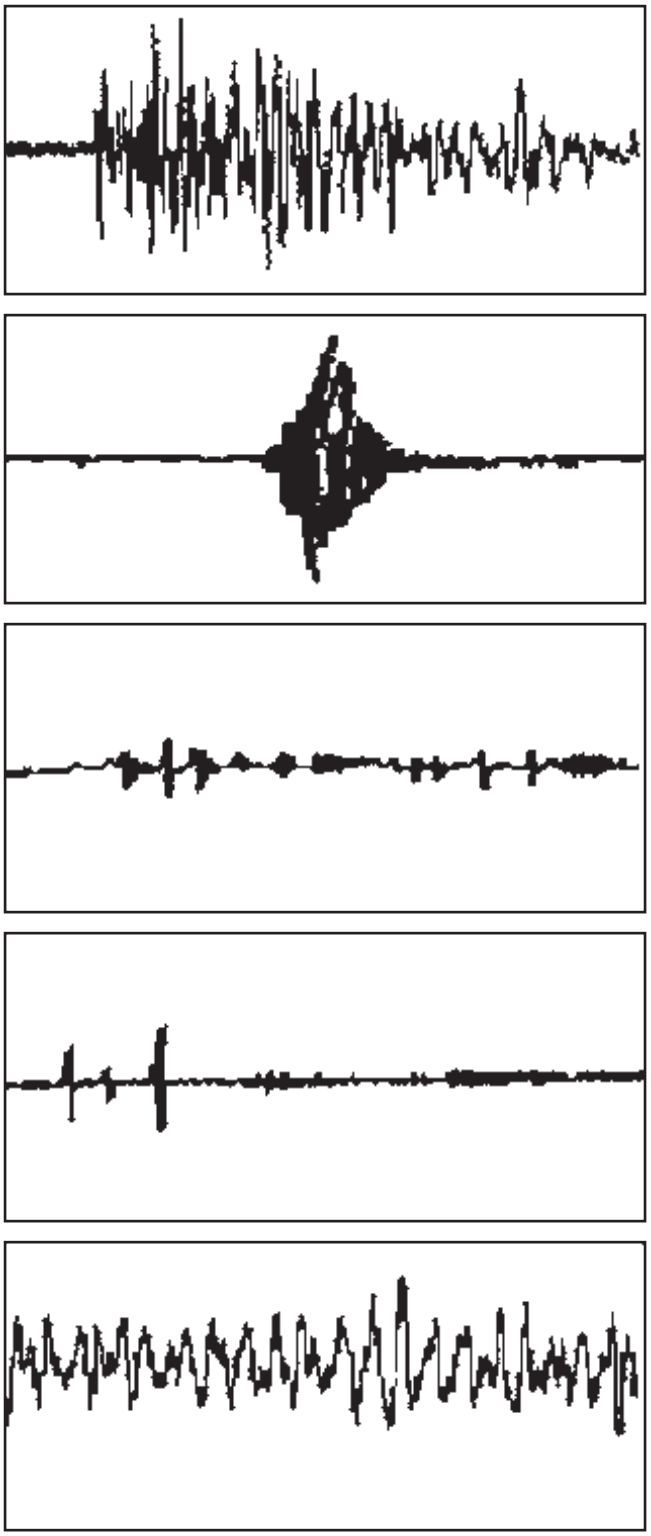
Lesson Information Sources:

Brantley and Topinka, 1984, *Volcanic Studies at the David A. Johnston Cascade Volcano Observatory*, Earthquake Information Bulletin, March-April 1984, v.16, n.2

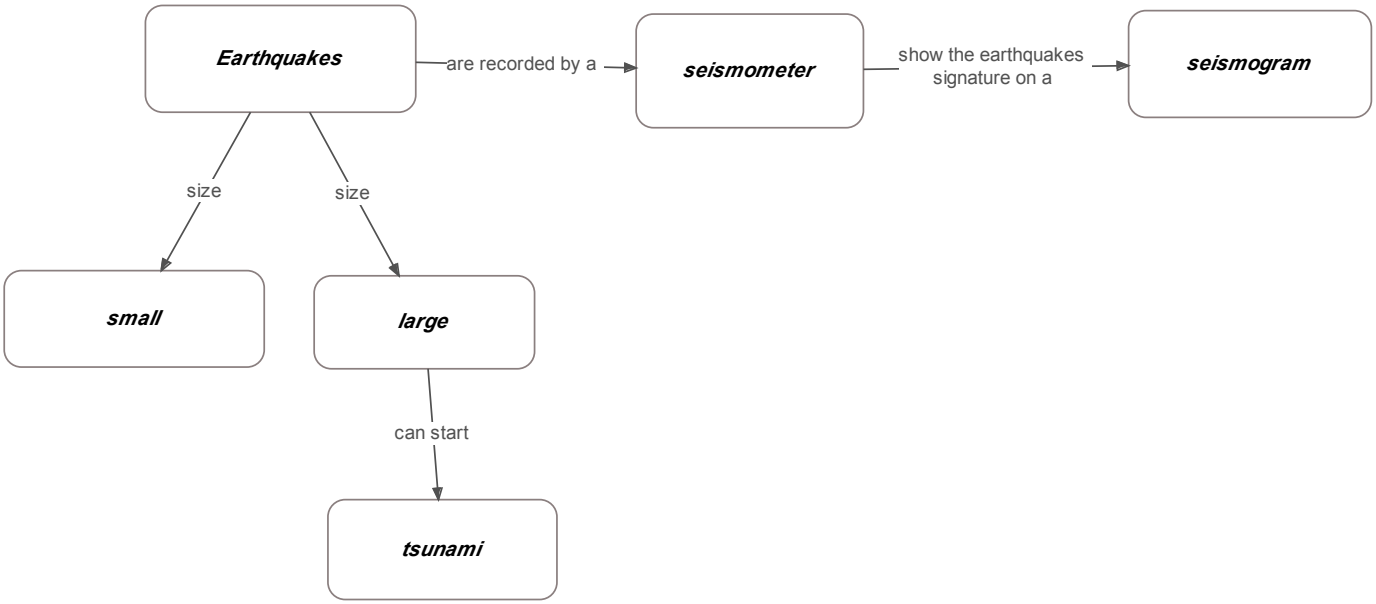
US Contribution to the Indian Ocean Tsunami Warning System. (2006). *Fact sheet: How do seismometers contribute to a tsunami warning system?* Retrieved Feb. 5, 2009 from http://apps.develebridge.net/usiotws/page04seismic.html

Answers:

1. *rockfall*
2. *earthquake*
3. *volcanic tremor*
4. *storm*
5. *weather (rain, wind)*



6-12:



13. Answer should be a summary of the information contained in the concept map above.

Name:_____

Grades K-4

Earthquake Detection (Grades 3-4)

Student Worksheet (page 1 of 2)

Match the seismogram to its source.

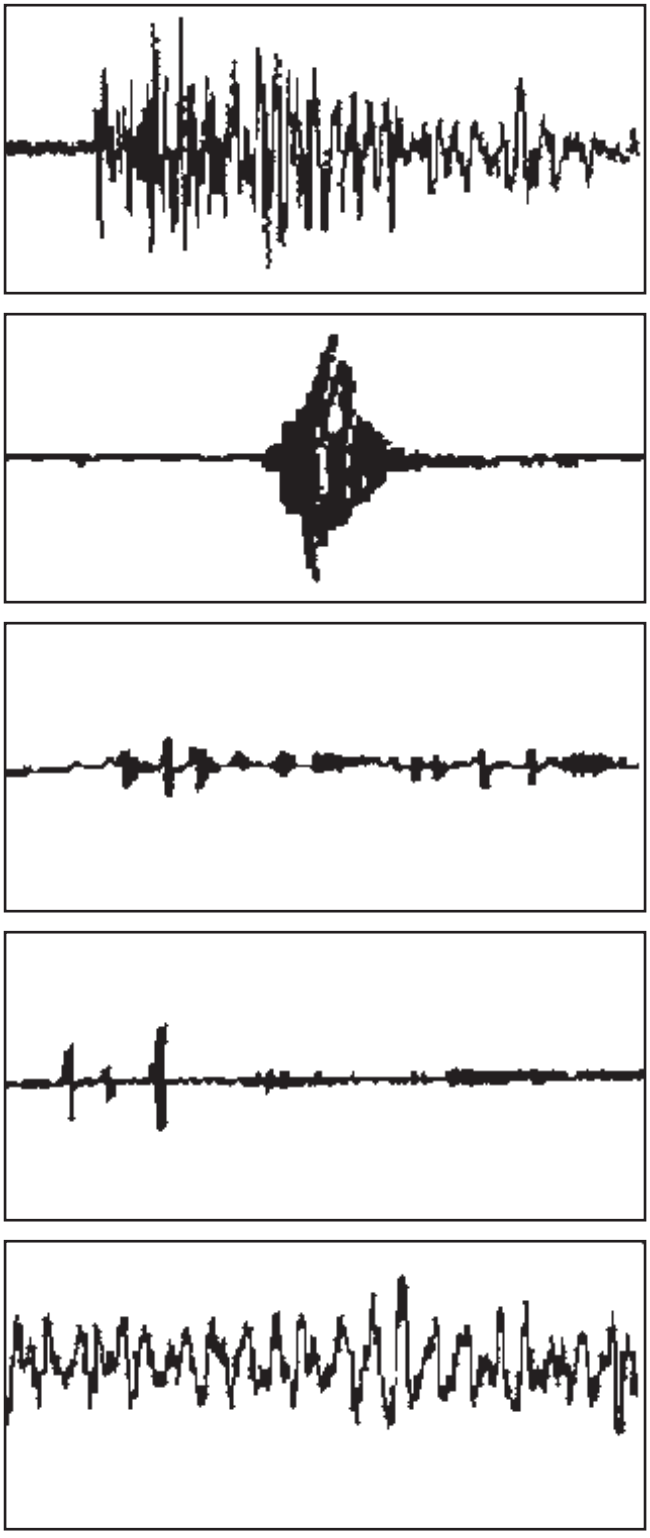
1. rockfall

2. earthquake

3. volcanic tremor

4. storm

5. weather (rain, wind)



Name:_____

Grades K-4

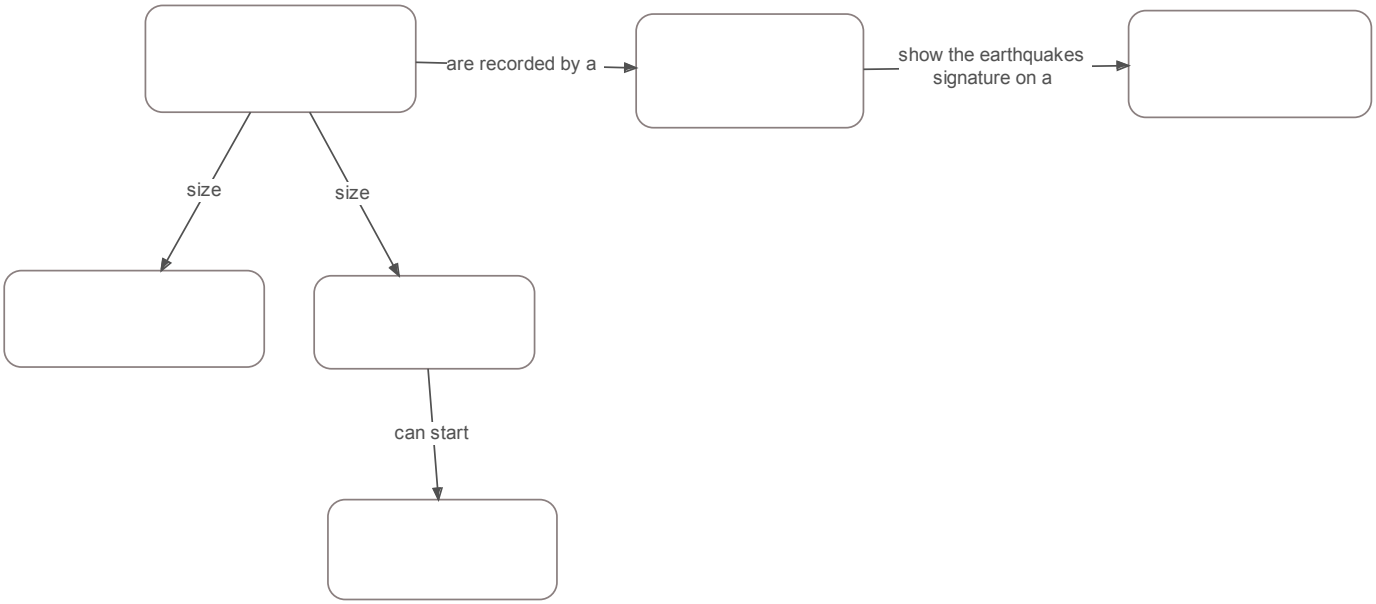
Earthquake Detection (Grades 3-4)

Student Worksheet (page 2 of 2)

Fill in a word from the wordbank.

seismogram seismometer large small

Earthquakes tsunami



Write a summary of the completed map above.