

## EARTHQUAKE CLASSROOM ACTIVITIES

# Detecting earthquake vibrations

Seismometers detect the vibrations produced by earthquakes. This activity shows you one way to detect vibrations and display them on a computer screen.

If the ground moves underneath a mass that is not fixed down, the mass will tend to stay where it is and let the ground move underneath it: seismometers just measure this relative motion, and it is more convenient if we can record and display this motion on a computer screen.

### Teachers' notes

Students will use a metal ruler, magnet, coil and sound-editing software to detect vibrations.

### Resources needed

Each group will need:

- a simple vibration detector with extension lead
- computer with suitable sound-editing software installed

### Learning objectives

Students will:

- recognise that a seismometer is an inertial device which allows us to observe the relative motion of the ground underneath a suspended mass
- observe how a magnet and coil can be used to 'translate' a vibration into a visual trace on a computer screen, and so make a vibration detector

### Preparation

Before tackling the activity, it may be helpful to include a brief overview of other ways of detecting earthquakes (e.g. balanced balls, pendulums with a pen on the free end) and their uses and limitations.

You may also find it useful to take screenshots and place them in a document for class discussion.

It is important to check that the software is already installed on the computer(s) you plan to use and to confirm any further set-up details before you use this activity in class.

You can find details of how to download and use Audacity (free, open source software) at Mindsets: [Downloading and using the Audacity software](#).



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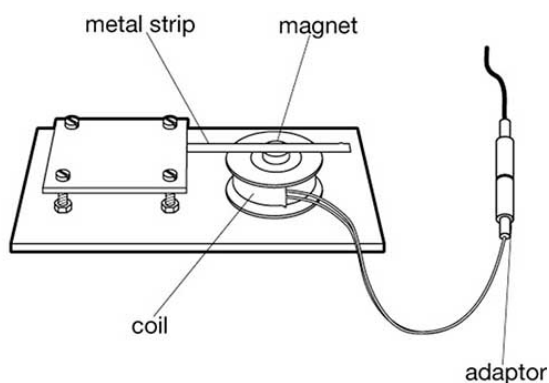
## Warning!

The strong forces produced by supermagnets can cause injury or damage to other equipment or to the magnets themselves. You must follow any additional safety information provided by your teacher before you begin this activity.

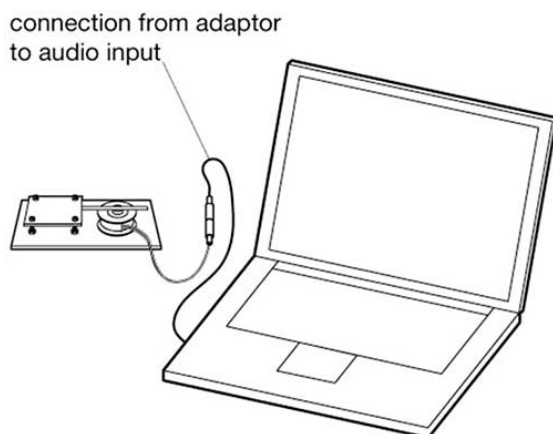
## Task instructions

Each group will need:

- 1 Connect the coil of the vibration detector to the input socket on the adaptor. Plug the adaptor output lead into the microphone input of a computer.
- 2 Open the sound-editing software: when you are ready to start, you should be able to see a single input channel on the screen.
- 3 Tap the bench sharply; sketch what you can see on the screen.
- 4 How is the pattern you see similar to a seismogram?
- 5 Tap again, but further away. Make another sketch next to the first one, to show the difference.
- 6 Tap the bench sharply, then tap it more softly. What difference does this make?
- 7 How is your vibration detector different from a real seismometer?
- 8 How are the vibrations you detected the same as those from an earthquake? How are they different?



**Figure 1** You can build a simple vibration detector using some blu tack, metal ruler, magnet and coil. You will need to connect a 3.5 mm jack plug adaptor to the coil so that you can connect it to the microphone socket of a laptop or PC. BGS ©UKRI



**Figure 2** Connect the vibration detector to a laptop or PC via the microphone socket. BGS ©UKRI