

**Subject:** Physics

**Key Stage:** This experiment is suitable for a variety of levels and can be adapted accordingly

**Topics covered:** Sound

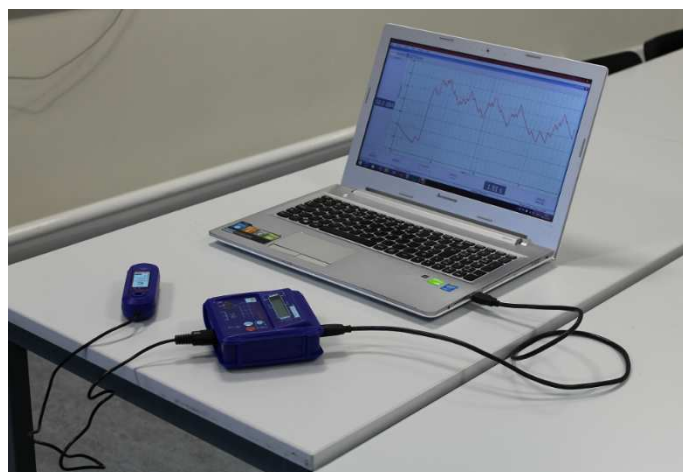
## Investigating Sound

This is a very simple investigation but is a really fun way to encourage students to think creatively and solve problems independently.

**What you will investigate:** how to measure the loudness and constancy of sound.

**Equipment:**

(All the equipment and software you need can be purchased from [www.sciencescope.uk](http://www.sciencescope.uk))



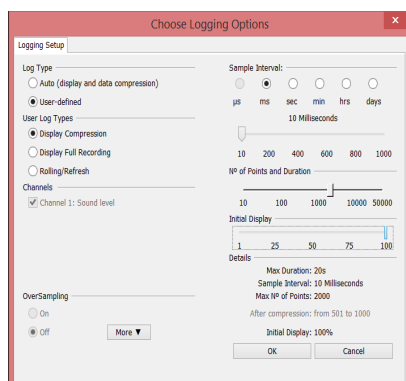
- Logbook ML
- Logbook Graphing Software
- Sound Sensor (although there is an inbuilt sound sensor in the ML it can't detect sound level below 50 dB so you need to use the external sound sensor for this investigation)
- Projector

**Getting started:**

1. Plug the sound sensor into channel 3 of the ML (this overrides the internal sound sensor) and the ML into your computer.
2. Set the sound sensor to range 1.
3. Connect the computer to the projector and display the sound readings on a big screen.
4. Click on the channels you don't need (light and temperature) to remove them from the display.
5. Divide the class into groups of about 5 students.

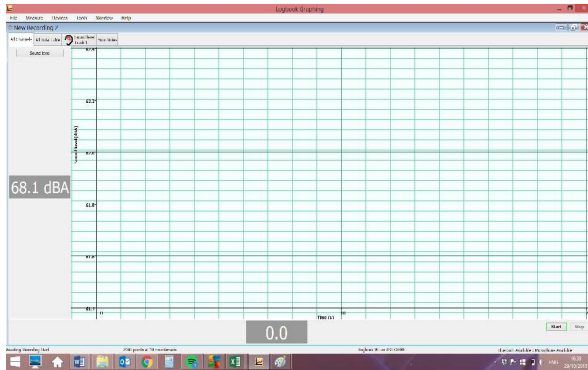
**The Experiment:**

1. Give the groups 5 minutes to think of the best way to make a constant sound at the fixed volumes of 50 and 80 dB.



2. Open Logbook Graphing to set up a recording:

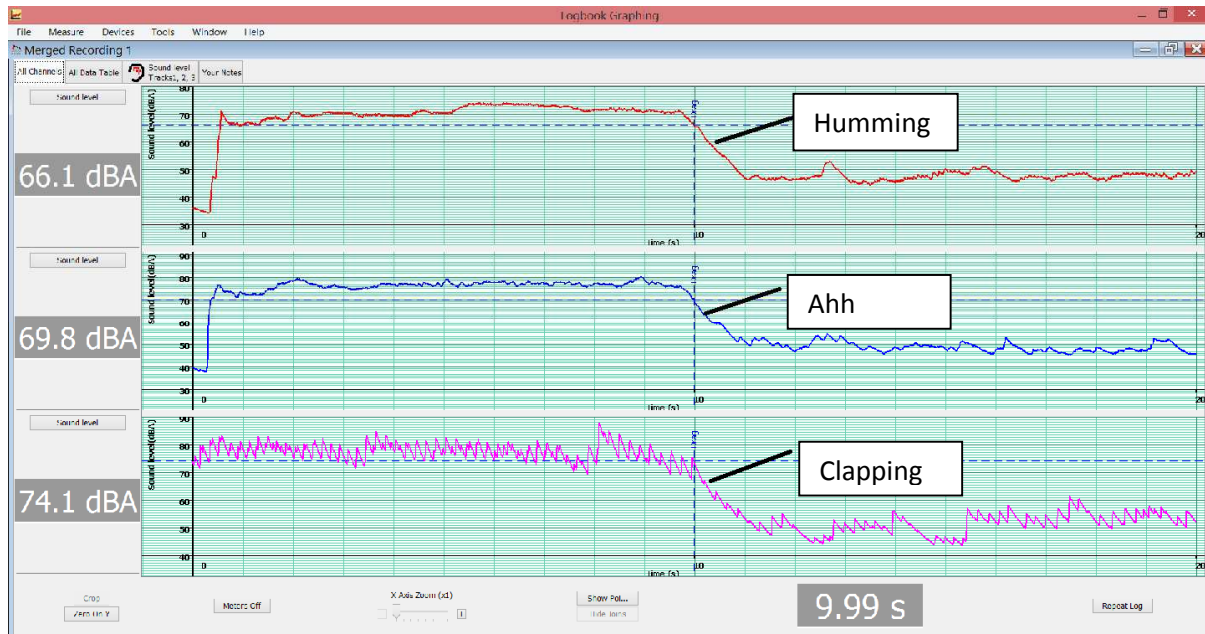
- a. Click on the 'Record Live' option from the quick menu.
- b. The Choose Logging Options menu will appear (see left)
- c. Select 'User-defined' Log Type
- d. Select 'ms' as the interval
- e. Set the number of Milliseconds to 10.
- f. Move the slider under the option 'No of Points and Duration' so that the Max Duration of the recording (bottom right) is 20s.
- g. Set the Initial Display slider to 100.
- h. Click 'ok'.



- i. A blank graph will appear (left). When ready to start recording click the 'start' button in Logbook Graphing.
  - j. To start a new recording click 'repeat log' and then the 'start' button.
3. Go round each group in turn asking them to use their method to make the two sound levels; they should start at 80 dB and then drop to 50 dB after 10 seconds. Ask them to explain why they chose the method they did.
  4. Give the students 5 minutes to think about how they can adjust their method to improve the results (they cannot change their basic method).
  5. Go round the groups again and asking them to make the sound at the two levels again. Ask them to analyse the changes they made and if and how they helped.

### Analysing the results:

You can compare all of the results more effectively by clicking on the 'merge logs' button. The results will display as shown below:



We used three methods, humming, clapping and making the sound 'ahh'.

You can compare the results more easily by selecting the 'Sound Level Tracks 1, 2, 3 tab', which will display all the graphs on one set of axes:



As you can see it is much harder to make a constant sound with the clapping but it is easier to reach 80dB. It was harder to reach 80dB by humming but easier to go as quiet as 50dB. The opposite was the case for making the sound 'Ah'.

Have a general discussion about the differences between the methods suggested and ask students to explain why some are more effective than others.

**Taking it further**

We have made a few suggestions as to ways to make constant sounds but encourage your students to be as creative as possible, for example by using props found around the classroom.