

Sound and pitch

A guide for group leaders

Hello to you, the group leader!

These notes come from the website www.scienceteachingalive.com They are designed to help you run a special kind of science teacher group meeting.

This kind of meeting is about helping teachers to feel comfortable with doing practical work, and organising their own lessons so that their students do the activities.

These notes assume that your participants know quite a lot about the topic, and now they want to make it interesting and exciting for their students. On the website you will find Teachers' Notes that give teachers information about this topic.

Also on the website there's the skeleton of a student worksheet that your group can develop.

Some personal preparation for the workshop

Watch the video right through.

Get together the materials that Brian uses and make the simple equipment he demonstrates.

The video camera did not pick up the real sound of the equipment very well, so test each little instrument yourself to hear what it sounds like.

Then look at Activity 2 and make a sound-box like that. Check that you can change the tension in the string, and change the length.

Try to get a guitar – either a guitar like the one you see in the video or the home-made kind, e.g. made from an oil-can.

Suggestions for your workshop programme

A. Welcome and introduction

After the usual welcome and admin discussion, tell everyone what you hope the workshop will produce. Remind them that a workshop means participation; in workshops things get **produced** – the thing might be a new understanding, or an issue resolved, or a physical thing made or a document written. They have to produce, not just listen.

Here are two products that could come out of this workshop (you have to decide on this):

- 1 A small instrument that uses one or more strings to make musical notes.
- 2 A plan for a lesson in which students do the investigations in Activity 1 and 2

B. Prepare the group to watch the video

Tell the group that they are going to do some investigation of vibrating strings themselves and make a string instrument. They should listen especially to the way Brian explains the idea of variables, namely the length, tension and thickness of the strings.

In the section **4:57** to **6:00**, Brian talks about the way the variables of length, tension and thickness affect the note that one gets from a guitar. (The thickness of a string is actually a measure of the string's weight per centimetre; thick strings tend to be heavy strings).

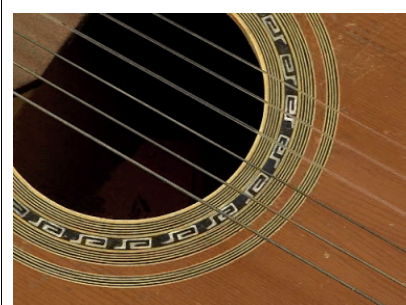
Figure 1 Brian presses a string down at this point, so that only the part nearest his left hand can vibrate. In this way he changes the length of the vibrating string.



Figure 2 A guitar has tuning knobs that allow you to adjust the tension of the string. As you twist the knob, it pulls the string tighter.



Figure 3 A guitar has six strings, each one of different thickness. The thick strings are wound with wire to make them heavier.



For the next part of the workshop, you'll need copies of the Teachers' Notes. There you find two activities for primary school students, around Year 5 or 6. Ask the teachers in your group to do them and then decide how suitable they are for children that age and older.

E. When people have completed each activity, ask them to evaluate the activity

Could they use these activities with their primary school children?

Could they use this activity for secondary school students too?

Making musical instruments can be a good craft activity. However, we also want the children to learn some science from it. That is why we go looking for the variables that control the pitch of a note.

Keep tension and length constant and vary the thickness/weight of the string (Activity 1)		Keep thickness and tension the same, and vary the length (Activity 2)		Keep thickness and length the same, and vary the tension (= the tightness) (Activity 2)	
Thin, light string gives a	high pitch	long string	low pitch	String at low tension
middle weight string gives a	middle pitch	mid-length string	String at mid-tension
thick, heavy string gives a	low pitch	short string	String at high tension

F. Now move to the final product of the workshop – a student worksheet.

Download the worksheet-starter from the menu on the website. Teachers will want to take a copy of the worksheet you produce in the meeting, so try to have a photocopier available, or provide pens and sheets of blank paper.

What to prepare

Items	Where to get them
Computer with a large screen, or else a data-projector.	This depends on the school or the facilities in the area where you run the workshop.
Mains electricity to run the computer and projector.	Sorry if this sounds obvious, but in some places you have electricity for only certain hours of the day.
Copies of the Teachers' Notes and copies of the Student Worksheet-starter - enough for each teacher	School photocopier?
Boxes of different sizes: big, thick ones, thinner ones, shoe-boxes, plastic lunch-boxes	Ask a supermarket to keep some for you. Cereal boxes, washing-powder boxes, copier-paper boxes
Strings of different thickness, including fishing-line of different thickness. Try to get some thin steel or copper wire	Supermarkets, stationery shops, for string . Sports-goods shops for fishing line. Hardware or electrical-goods shops for wire.
Rubber bands of different thickness	Flower-shops use thin rubber bands. The Post Office uses thick rubber bands. Stationery shops sell rubber bands of different thickness and lengths.
Sticks; some thick and stiff, some thin and bendy to make bows.	
Tools for making instruments: <ul style="list-style-type: none">• big kitchen scissors and craft knives (blades) for cutting cardboard• tool for piercing holes in cardboard plastic and thin tin-plate (like cold-drink cans)• pliers for cutting or fastening wire• package tape for fastening parts of the instrument together	