



Sounds like science

Part of the British Science Association's National Science & Engineering Week activity pack series. www.nsew.org.uk

BIS | Department for
Business Innovation & Skills



About this pack

Background

The links between science and music are enormously diverse. Endless opportunities exist to explore mutual themes ranging from the physics of sound and acoustics and the psychological effects of music, to the use of music in medicine and the associations between mathematics and music.

Make your own glee club with Sounds like Science

If you have witnessed the current rise in show choir-based American TV taking over the airwaves, you might have thought it a good idea to incorporate this into a science lesson. Why not set-up your own class 'science show choir' and encourage students to perform in front of the class with the things they make in this pack.

The audience

The ideas in this activity pack are designed to be adaptable for a variety of audiences. It may be worth carrying out a pilot test on a sample audience prior to holding your National Science & Engineering Week Event.

Science links

All the activities and challenges can be used to complement the science and music sections of the National Curricula in England, Wales and Northern Ireland, and the Scottish 5–14 Guidelines in Environmental Studies.

Activity 1

Bust Your Windows - how vibrations in fabric, water and air cause sound

Blow up a balloon, hold it against your mouth and speak with your hand on the other side – what can you feel? Let the balloon go – what happens? Pour some rice on the top of a drum, bang the drum – what happens to the rice? Dip a tuning fork in water – what happens to the water? Cover the open end of a large tin with the plastic, hold it in place with a rubber band, pour the salt onto the plastic. Hold the small tin close to (but not touching) the salt. Tap the small tin with the ruler. What happens to the salt?

You will need: balloons, drum, rice, wooden spoon, tuning fork, glass of water, rubber band, large tin, small tin, plastic (i.e. freezer bag/sheet plastic), salt and a ruler.

Challenge: What is the longest sustainable vibration you can make?

Challenge: What is the loudest sustainable vibration you can make?

Challenge: How many natural vibrations can you think of?

Activity 2:

Express Yourself - different materials producing different sounds

Make shakers with different materials inside to make different types of sounds. Try to guess what is in each shaker. Do they make sounds that are high/low loud/soft short/long?

You will need: film canisters or other non-transparent containers shakeable contents e.g. paper clips, beans, rice, sugar.

Challenge: How many shakers can you recognise?

Challenge: Can you make a shaker that is very difficult to recognise?

Activity 3:

Wild Thing - animal sounds

Make animal noises using voices and instruments.

Challenge: How many animal sounds can you make?

Challenge: How are the sounds being made?—can you think of musical instruments that use the same technology?

Challenge: Can you think of music written to sound like animals?

Try these:

- Make a goose horn

You will need: square of thin card 10cm x 10cm with a 1x1cm tab at one corner—ensure edges are very straight (see diagram), pencil, some tape

- Roll the card tightly around the pencil leaving the tab end until last.
- Tape into a tube.
- Bend the tab firmly over the end of the tube.
- Suck through the other end of the tube.



- Make a chicken can

You will need: tin can/plastic cup, string.

- Make a small hole in the base of a tin can or plastic cup.
- Thread string through with and knot on the inside.
- Wet your fingers and run them down the string to produce a chicken noise.



- Make cricket sounds

You will need: jar lids/flan tins/similar.

1. Gently push down in the middle of the upturned lid.

- Make owl sounds

Cup your hands together and bend your thumbs slightly to create a mouthpiece – blow steadily.



- Make peacock sounds

Stretch a blade of grass between your thumbs, clasp your fingers together and blow steadily.

- Make snake sounds

You will need: sealable container/tube rice.

- Fill the container with the rice.
- Turn the container over and over

Activity 4

Bohemian Rhapsody – change the note.

Partially fill a jar or bottle with water – strike or blow across the top. How does the sound change when you add more water? Make a straw oboe; how does the length of tube affect the sound?

You will need: glass jars and different coloured water, wooden spoon, plastic drinking straws.

Challenge: Can you make an instrument that will play a scale?

Try this: Making a straw oboe

You will need: plastic drinking straws

- Cut the straw into an arrow shape and blow gently.
- Altering the length of the straw changes the pitch.

Activity 5:

Call Me – sound carries.

Make a telephone system using cups and string or funnels and piping. Can you go round corners? (The funnel and pipe version doubles up as a stethoscope).

You will need: rubber hosepipe lengths, plastic funnels, plastic cups and string.

Challenge: How long can you make your telephone connection?

Challenge: Can you make a telephone exchange?

Activity 6:

Stormy Weather – sound effects.

Make instruments to imitate the weather

Rainmaker: sealed tube with rice or similar inside and sealed ends.

Wind: whizzing hoop through the air

You will need: cardboard tube, rice, paper.

Thunder-clapper:

You will need: 1 square of card and 1 square of paper- both the same size, some glue.

- Fold the card and paper in half diagonally.
- Slide an open end of the folded paper inside the folded card.
- Glue the outer paper edges onto the inner card edges.
- Fold the whole thing in half along the card's crease with the paper inside- so that it just pokes out.
- Hold the bottom (unglued) corner of the card and swipe down through the air quickly.

Challenge: What other sound effects can you make?

Activity 7:

Knock on Wood - how echoes work.

Clap 2 wooden blocks together while standing near a solid wall. Walk backwards while clapping—How far do you have to go before you can hear an echo? (You have to be far enough away to hear the sound and its echo separately—usually 10–15m)

You will need: a wall, 2 wooden blocks.

Activity 8:

Living in a Box - reflection of sound.

Line a large box with different materials and make a noise inside the box. How does the type of lining affect the sound that is heard? How do different sounds change with different linings?

You will need: Large cardboard box or similar. Selection of lining fabrics i.e. cotton wool, carpet, paper etc.

Challenge: Find a lining that makes the sound very quiet and muffled.

Activity 9:

Instrumental - sound recognition.

Identify people, places, things and activities just from their sound? Is it easier if you have pictures to match the sounds against? Make a tape of different instruments/household/workplace sounds or blindfold people while they identify live sounds.

You will need: tape player or blindfold

Challenge: How many people can you recognize by their footsteps?

Challenge: Can you recognise sounds when made quieter or louder than usual? i.e. very loud tissue crinkling or very quiet pneumatic drill.

Activity 10: Loud and Clear - amplification.

Make a kazoo:

You will need: 1 cardboard tube, square of waxed paper, 1 square of paper, some glue.

- Cut a square of waxed paper about 3cm larger than the end of a cardboard tube.
- Wrap the paper round the end of the tube.
- Use a rubber band to hold it in place.



Hum a tune into the open end of the kazoo. What happens to the kazoo? What happens to the sound of your voice? Amplify sounds using tuning forks placed on different materials in different shapes.

You will need: cardboard tubes, rubber bands, waxed paper, tuning fork, various materials/objects.

Challenge: What is the best amplifier you can make/find?

Challenge: Find out how decibels are measured?

Activity 11: No Air - sound in a vacuum.

Put an alarm clock set to go off in 5 minutes in a bell jar. Use a vacuum pump to remove the air from the jar. What happens in 5 minutes time?

You will need: alarm clock, bell-jar, vacuum pump.

Challenge: Why is this important for working in space?

Activity 12: Poker Face - how sound changes in your head.

Hang a metal coat hanger from each end of a long piece of string. When the hangers clash what sound do they make? Now hold the string up to your ears. What does it sound like now?

You will need: 2 metal coat hangers, long string.

Activity 13: Don't Stop Believin' – how sound changes through conductors.

Listen to the same sound through different materials. How does the quality and volume of the sound change?

To make headphone sachets you will need: a pair of clean, thin socks, a selection of filling materials, headphones and a tape-player.

- Put the same material (i.e. rice) in each sock so that the toes are full.
- Use the rest of the sock to attach to the headphones so that the toe of each sock lies against the ear phone.
- Put the headphones on with the filled part of the sock between the ear and the headphone.

Challenge: Which material changes the sound the least/most?

Activity 14:

Shout!

How many different sounds can you make? e.g. whispering, shouting, singing, whistling, humming, clapping, stamping, clicking your fingers

Challenge: Can you improvise/compose music using only your body and voice?

Challenge: Have a town crier contest. Who is the loudest and clearest?

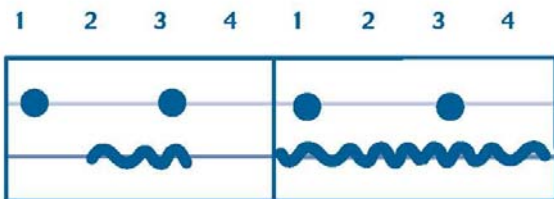
Activity 15:

Rhythm is a Dancer.

Allocate groups of people with a specific movement to each instrument i.e. jump for a cymbal, pace for a drum beat, twist for the duration for a tambourine rattle. Play a rhythm on the various instruments—you could draw it out on a number line.

To make a number line you will need: a selection of instruments e.g. drums, tambourine, triangle, cymbal.

- Draw a grid with 1 horizontal line for each sound (different colours may help).
- Draw equally spaced vertical lines to mark sections of time (e.g. 4 beats). (You could write the numbers of the beats along the top).
- Use a symbol for when to play on each instruments line (e.g. a dot for a short sound, a squiggle for a long sound like a tambourine rattle).



Challenge: Can you make a piece of music using fractions to create a rhythm?

Activity 16:

Rhythm is Gonna Get You.

Play the number game: each person is allocated a number. Everyone claps in time to create a rhythm and the first person says their own number followed by a different number. The second person now says their number followed by someone else's and so on. If you break the rhythm, miss your go or say

"a number that is already out – you are out."

Challenge: Create a rhythm track using scientific words i.e. bi-ol-o-gy, phys-ics, chem-ist-ry, math-em-at-ics.

Activity 17:

Give up the Funk – how music affects us.

Play 3 or more different types of music. Vote on which pieces make you feel happier/sadder/more excited. Discuss why the music make you feel differently i.e. major/minor, fast/slow, loud/soft.

Challenge: Note down all the music you hear in a day, where you heard it and how it made you feel. Discuss with others why certain types of music are played in certain places i.e. shops, on film soundtrack etc.

Activity 18:

Secret Sounds – harmonics.

Stretch a string so that it is taut. Pluck or bow the string to produce a note. If you hold the string in the middle and pluck again what happens to the sound?

You will need: String.

Challenge: Use a cello or other stringed instrument to find the harmonics along a string.

Activity 19:

On The Radio – making a speaker.

You will need: 1 paper cup, 1m of thin wire with an enamel coating, sandpaper, masking tape, 3 round ceramic magnets, 1 marker pen, 2 wires with alligator clips at each end (20 gauge wire-optional see below), 2 twist ties and a portable radio with removable speakers or a signal generator.

- Wrap the thin wire around the pen. Leave a tail at each end.
- Use the sandpaper to remove the coating from these sections.
- Push the wire together to form a tight coil.
- Remove the pen.
- Tie the twist ties around the coil.
- Tape the coil to the bottom of the cup.
- Attach an alligator clip wire to each end of the wire.
- (Tune the radio to a good strong signal, then unplug).
- Remove speaker wire from the connectors at the back of the radio
- Attach the other ends of the alligator clip wires to the speaker connectors (use the 20 gauge wire between the connectors and clips if appropriate).
- Stack the magnets on top of the coil.
- Plug the radio/ signal generator in.

Challenge: Can you make the speaker louder/clearer by changing some of the materials?

Activity 20:

Chirpy chirpy, cheep cheep – onomatopoeia.

Challenge: How many words can you think of that sound like the thing they describe?

Challenge: Can you invent new words for things that don't already have an onomatopoeic description?

Long Term Projects

Project 1:

Compose yourself.

Compose and perform a piece of music using Science as a theme.

Project 2:

Thank you for the Music.

Research how different instruments make their sounds. Present your results in a poster. (Different groups could research different instruments—brass woodwind etc.) Use your findings to design and make musical instruments.

Project 3:

More than Words.

Research the science of human speech – how do the tongue teeth and palate work together to form different sounds? Why do different accents pronounce letters differently? How do the Scots say Loch, the Welsh say Llandudoch, the Irish say Lough.

Project 4:

Walk on the Wildside.

Learn to recognise bird and/or animal sounds. Carry out a wildlife survey in the local park/nature reserve. (The RSPB produces a CD that may be useful see www.rspb.org.uk)

Project 5:

The Show Must Go on.

Put on a production (theatrical/musical) about the science that you have been studying. For an NSEW Activity Pack that can help you with this, download “Rockin’ Crystals” from the NSEW website www.nsew.org.uk.

Project 6:

Ear we go, Ear we Go.

Research how ears and hearing works and how different ears are adapted to different environments? Produce a model showing how sound is processed by ears.

Thank you for using Sounds Like Science!

We hope you enjoyed the activities within this pack. To help us to continue to provide new activity packs, we'd like to ask you to tell us a little about what you did for National Science & Engineering Week.

Please take a few minutes to fill in this form. If you used this activity pack for NSEW, send in this completed form and we will send you a National Science & Engineering Week Certificate.

Organisation: _____

Address: _____

Postcode: _____

Tel: _____

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Email: _____

Which dates did you do National Science & Engineering Week activities on? _____
What did you do?

Please make any comments about this activity pack, National Science & Engineering Week and/or other possible topics for future packs (feel free to continue on a separate sheet of paper).

Tick this box to be added to our mailing list. This will keep you up to date with NSEW, including grants, resources and activities. Your contact details will not be passed onto third parties.

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If you enjoyed these activities and would like to do more then why not register for CREST ★ Investigators and receive a pack of further activities and investigations?

CREST ★ Investigators is a UK-wide award scheme that enables students to solve scientific problems through practical investigation. The activities focus on thinking about, talking about, and doing science. The activities develop students's scientific enquiry skills in an enjoyable context with links to the National Curriculum where appropriate.

For more information on how to register and receive your Crest ★ Investigator packs, visit our website at www.britishtscienceassociation.org/creststar or call 020 7019 4943.