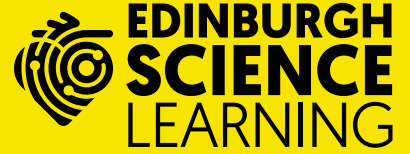


# GENERATION SCIENCE



With support from



*Actual Investors*

# Ella's Wobble



Created with support from



Sound | Noise | Vibration

# WITH SPECIAL THANKS TO OUR PARTNERS

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Cruden Foundation, The Davidson (Nairn) Charitable Trust, Falkirk Community Schools Charity, The Hugh Fraser Foundation, Jimmie Cairncross Charitable Trust, The Murdoch Forrest Charitable Trust, New Park Educational Trust, SSE Drumderg Community Fund, Stewart Investors, Tay Charitable Trust, Thistledown Trust, W M Mann Foundation, William Coull Anderson Trust, William Grant & Sons, our Catalysts and all those who wish to remain anonymous

# Welcome!

## ...TO GENERATION SCIENCE 2022

### ELLA'S WOBBLE

*Generation Science* has been providing unique science experiences to schools across Scotland for over 30 years. Traditionally in-person experiences, the last few years has seen us broaden our horizons with a greater focus on supporting the teachers, as well as the pupils, to deliver unique, hands-on, fun experiences within the classroom.

Our *Generation Science* workshop boxes contain EVERYTHING – the equipment, instructions and digital links – you need to run your very own *Generation Science* experience in the classroom.

This STEM based lesson is built around the Curriculum for Excellence and includes links to videos of our expert science communication presenters, engaging activities and support resources packages.

Thank you for your ongoing interest and support of what we do and we hope you enjoy this experience as much as we enjoyed creating it.

Lastly, but by no means least, a huge thank you to our generous sponsors for their continuous support in helping to make all of this possible. Enjoy!

**The Generation Science Team**

# CONTENTS

- 5 How to Guide
- 6 Before the workshop
- 8 During the workshop
- 11 After the workshop

## BOX CONTENTS

**Please note, this kit contains materials which are not suitable for children under the age of three. All materials should be used under teacher guidance and supervision.**

### WORKSHOP KIT

- 1 x ukulele
- 1 x tambourine
- 1 x slide whistle
- 4 x storage tubs

### WORKSHOP CONSUMABLES

- 70 x cardboard tubes
- 70 x paper circles
- 35 x cardboard discs
- 175 x wooden beads
- 35 x matchsticks tied to lengths of string
- 4 x rolls of eco-tape
- 35 x pieces of cloth



# MAKE A MOVE: BEFORE THE WORKSHOP

## DETAILS

**Target age group:** Pre-school nursery (3+ years), P1-P3

**Minimum time required:** 60 minutes

## AT A GLANCE

*Ella's Wobble* is a storytelling workshop exploring the science of sound. It aims to capture pupils' interest and imagination using puppets and musical instruments to encourage them to explore the science of sound using shared experiences and hands-on activities.

Pupils will:

- Create musical instruments using simple materials.
- Explore the concept of sound as a vibration.
- Share responses to questions about the science of sound.
- Investigate how pitch can be changed.

## SESSION OVERVIEW

*Ella's Wobble* follows the story of a little girl who has lost her wobble (voice). Through this immersive, storytelling adventure, pupils will explore how sound travels, discover why some sounds are high and some are low and even create their own musical instruments.

The session is delivered via a series of **pre-recorded videos**, after which pupils will **answer questions** or **carry out activities**:

<b>1. INTRODUCTION AND ECHOES</b>	<b>Video</b>	Introduction to the storyline and exploration of echoes.
	<b>Activity</b>	Pupils feel for the vibration produced by their voice and discuss where they might experience an echo.
<b>2. MAKING A SEAGULL SQUAWKER</b>	<b>Video</b>	Ella meets a seagull.
	<b>Activity</b>	Pupils make their own seagull squawker.
<b>3. MAKING A SQUIRREL SHAKER</b>	<b>Video</b>	Ella meets a squirrel.
	<b>Activity</b>	Pupils make their own squirrel shaker.
<b>4. EXPLORING PITCH</b>	<b>Video</b>	Ella meets a ptarmigan and explores pitch.
	<b>Activity</b>	Pupils create their own animal orchestra using the instruments they've made.
<b>5. TYPES OF INSTRUMENTS</b>	<b>Video</b>	Exploration of how different instruments make sound.
	<b>Activity</b>	Pupils answer questions, discuss and explore different instruments they are familiar with and how they make sound.

## KEY LEARNING OUTCOMES

Pupils will be able to represent their current understanding as they:

- Identify that sound is a vibration.
- Repeat that an echo is produced when sound bounces off surfaces.
- Recognise that different animals produce different sounds.
- Express that we can use different materials to produce different sounds.
- Recall that 'pitch' is the word used to describe whether a sound is high or low.
- Relate that a high-pitch noise is produced with fast vibrations and a low-pitch noise is produced with slow vibrations.

## CURRICULUM LINKS

*Ella's Wobble* complements the following experiences and outcomes:

**SCN 0-11a:** Through play, I have explored a variety of ways of making sounds.

**SCN 1-11a:** By collaborating in experiments on different ways of producing sounds from vibrations, I can demonstrate how to change the pitch of the sound.

**TCH 0-12a:** Within real and imaginary settings, I am developing my practical skills as I select and work with a range of materials, tools and software.

## TEACHER BACKGROUND INFORMATION

### Sound and vibration

Sounds are made when something vibrates, or wobbles. These vibrations create a sound wave which travels to our ears where we hear it. The sound wave causes the air [or other material] around it to start to vibrate and the vibration travels through the air [or other material] by being passed from one particle to the next. When it finally reaches our ear, it hits and vibrates our ear drums. The brain then converts this vibration into a sound we hear.

### Echoes

An echo is a bouncing sound. We get echoes in any place where a sound [wave] can bounce off a hard surface and the vibration can travel back to our ears. The hard surface also needs to be to the right shape for the sound to bounce back in the direction of our ears.

### Pitch

'Pitch' is the word used to describe whether a sound is high or low. Pitch is a measure of how fast or slow the vibration of the sound wave is. If the number of vibrations happening every second is low [or slow], then the sound will be a low note or a deep sound. If the number of vibrations happening every second is high [or fast], then the sound will be a high note.

## EQUIPMENT

### For the class:

- Ukulele
- Tambourine
- Slide whistle
- Scissors\*
- Access to water (either a tap or small bowl/cup for wetting cloths)\*

### For each pupil:

- 2 x cardboard tubes
- 1 x cardboard circle with a hole in the centre
- 1 x length cotton string with small wooden stick tied to the end
- 1 x small piece (approx. 3cm x 6cm) J-cloth
- 2 x paper circles
- 5 wooden beads
- 5 x pre-cut lengths (approx. 15cm) of eco-tape or a roll of eco-tape per table/group

Please note all items marked \* are not supplied in the *Generation Science* 2022 kit. If you are unable to source these, please get in touch with the *Generation Science* team. A full list of the box contents is available on page 4.

## PREPARATION

### Before the workshop:

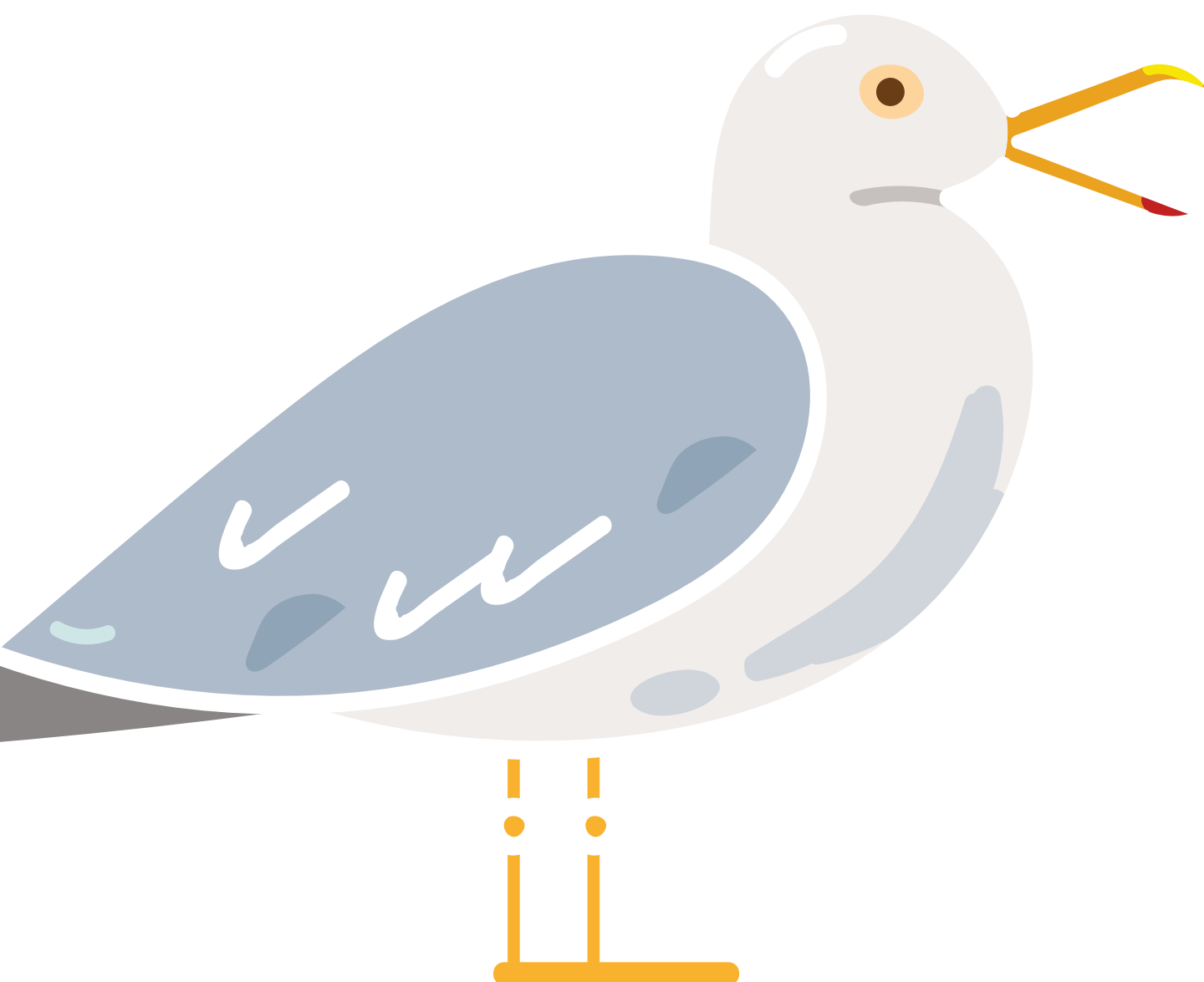
- Read the welcome booklet fully to prepare you for the workshop.
- Check you can access the videos via the link supplied and that you can play them on your computer.
- Practice making the instruments featured in the session so that you are familiar with them.
- Practice playing the seagull squawker – it can be a little tricky sometimes!
- Try playing the ukulele, tambourine and slide whistle so that you can demonstrate them to the class if you want.
- Set your classroom up so that there is a space for all pupils to sit and watch the videos together.
- Decide on a method of distributing all the 'making' materials to your pupils – we suggest using a tray at each table with enough materials for the group of pupils working there to select what they need.

# ELLA'S WOBBLE: DURING THE WORKSHOP

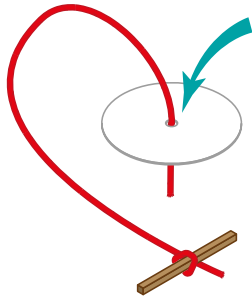
## LESSON PLAN

Details of the individual activities can be found below with diagrams where necessary. You can use this section to help you lead the class during the workshop.

SECTION	TEACHER GUIDANCE
<b>Introduction and Echoes</b>	<ol style="list-style-type: none"><li>1. Get your pupils seated in a space they can all watch the screen in.</li><li>2. Play <i>Video 1: Introduction and Echoes</i>.</li><li>3. Encourage pupils to participate in the warm-up as it happens on screen.</li><li>4. Pause the video when instructed and assist pupils in feeling the 'wobble' in their throat, following the instructions in the video. This can be extended by making high and low sounds and feeling the difference.</li><li>5. When you are ready, play the video again.</li><li>6. At the end of the video, discuss with your pupils where they have experienced an echo before and explore what is similar about these places.</li></ol>
<b>Making a Seagull Squawker</b>	<ol style="list-style-type: none"><li>1. Play <i>Video 2: Making a Seagull Squawker</i>.</li><li>2. When the pause screen appears, click pause and move your pupils to their tables/ work spaces before clicking play on the video again.</li><li>3. Assist pupils to make and play a seagull squawker.</li></ol>

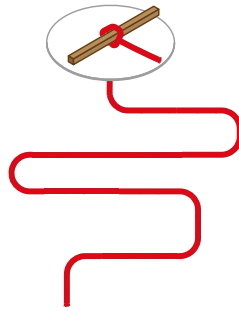


## HOW TO MAKE AND PLAY A SEAGULL SQUAWKER



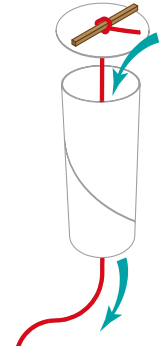
### Step 1:

Take a length of string tied to a wooden stick and thread the loose end through the hole in the cardboard disc.



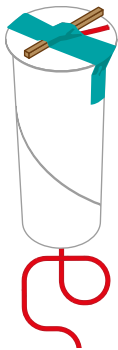
### Step 2:

Pull the string all the way through so that the stick lies against the disc.



### Step 3:

Thread the string through the cardboard tube so that the disc lies flat on one end of the tube.



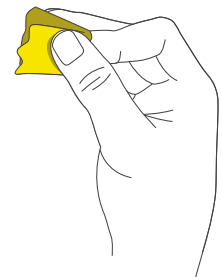
### Step 4:

Use the tape to stick the disc to the tube [make sure that you stick it over the top of the stick so that it is stuck down too].



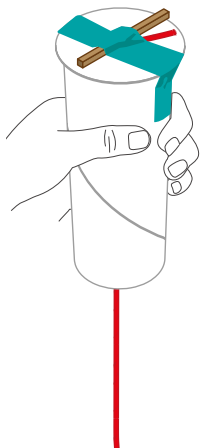
### Step 5:

Take the piece of J-cloth and wet it [you can use a tap, bowl of water etc for this] – it needs to be damp but not dripping.



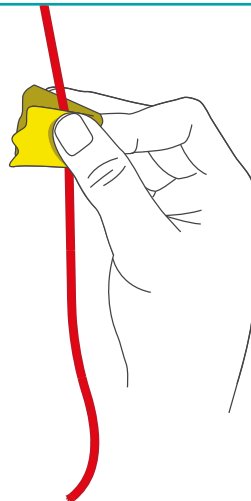
### Step 6:

Pinch the cloth between your thumb and forefinger of one hand.



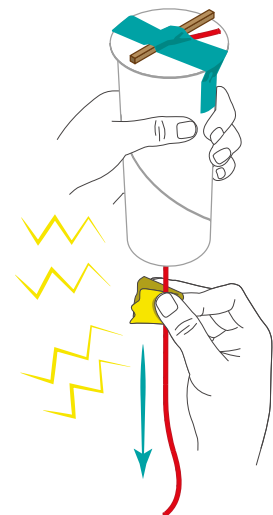
### Step 7:

Hold the tube so that it is like a bell, with the string hanging down loosely.



### Step 8:

Place the cloth around the string and pinch.



### Step 9:

Holding the tube tightly in one hand, tug the cloth down the string while pinching firmly [don't pinch too tightly or it won't move].



## Making a Squirrel Shaker

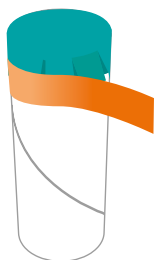
1. Get all pupils to move back to the space near the video screen.
2. Play *Video 3: Making a Squirrel Shaker*.
3. When the pause screen appears, click pause and move your pupils to their tables/work spaces before clicking play on the video again.
4. Assist pupils to make and play a squirrel shaker.

### HOW TO MAKE AND PLAY A SQUIRREL SHAKER



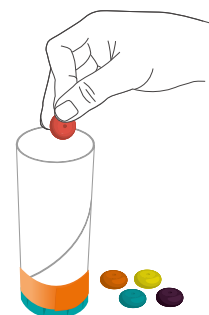
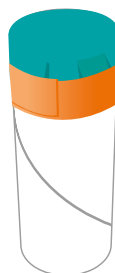
#### Step 1:

Take one paper circle and place it on one end of the cardboard tube. Fold the edges over so that it is wrapped around the end.



#### Step 2:

Use one or two pieces of tape to stick the paper circle to the tube.



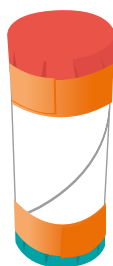
#### Step 3:

Place 5 beads in the bottom of the tube.



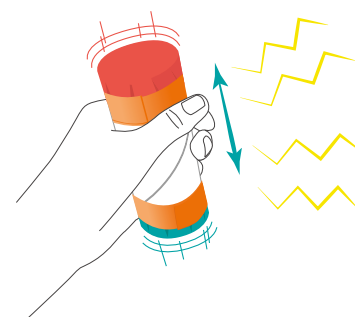
#### Step 4:

Take the second paper circle and use it to cover the open end of the tube.



#### Step 5:

Use the remaining tape to stick the paper circle to the tube.



#### Step 6:

Shake!

### SECTION

#### Exploring Pitch

### TEACHER GUIDANCE

1. Get all pupils to move back to the space near the video screen.
2. Play *Video 4: Exploring Pitch*.
3. Encourage pupils to respond to questions from the video as it plays.
4. Explore the sounds created by the instruments your pupils have made by getting them to play together as an orchestra. Encourage them to try making different sounds by playing quickly or slowly, loudly or quietly.

#### Types of Instruments

1. Play *Video 5: Types of Instruments*.
2. Encourage pupils to respond to questions from the video as it plays.
3. Using the ukulele, tambourine and slide whistle included in the kit assist pupils in exploring how these instruments make different sounds.
4. Explore different types of instruments with your class through discussion.

# MAKE A MOVE: AFTER THE WORKSHOP

## LESSON SUPPORT

This section gives you a list of links to videos and websites that you can use to talk more about this topic. We have suggested whether each link could be useful to watch as a class, for young people to do at home, or as an activity for you prepare. Finally, we have suggested two follow up activities you can do with classroom resources to expand on the learning outcomes.

## FOLLOW-UP IDEAS

### Investigate:

Explore the instruments in a traditional orchestra and classify the instruments on a chart or poster depending on how they make a sound. *#Activity #AtHome*

### Make:

Make straw kazoos like those used in the video. *#Activity*

<https://www.stevespanglerscience.com/lab/experiments/musical-straw/>



### Explore:

Find places in your school or at home that produce an echo – do some experiments as a class to test what sound makes the best echo. *#Activity*

## USEFUL LINKS

BBC Bitesize – Sound and vibration. *#WatchTogether #AtHome*

<https://www.bbc.co.uk/bitesize/topics/zgffr82>



How do instruments make sound. *#AtHome*

<https://www.dkfindout.com/uk/science/sound/making-music>

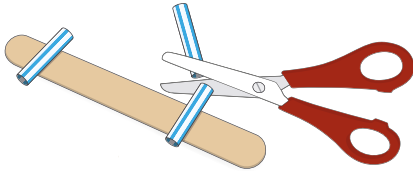
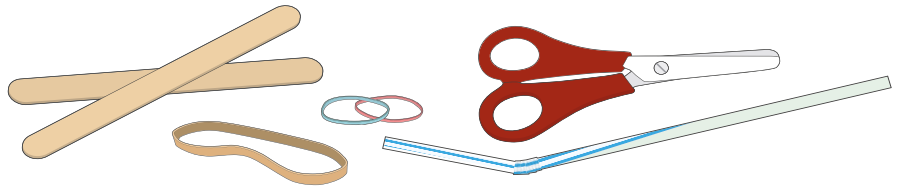


## FOLLOW UP ACTIVITY 1

### HOW TO MAKE A LOLLIPOP PLAYER

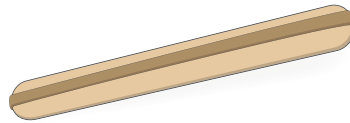
#### You will need:

- 2 lollipop/craft sticks (flat)
- 1 large rubber band
- 2 small rubber bands
- 1 drinking straw
- Scissors



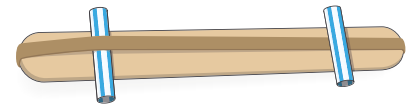
#### Step 1:

Cut two pieces off the straw which are each slightly longer than the width of the lollipop stick.



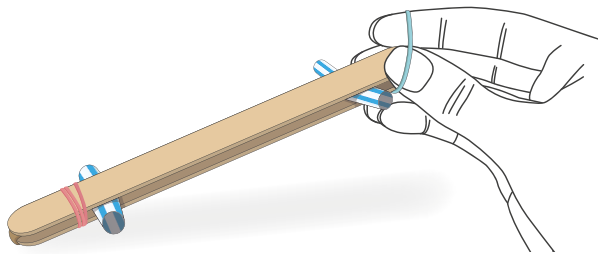
#### Step 2:

Take one of the lollipop sticks and stretch the large rubber band over it lengthways.



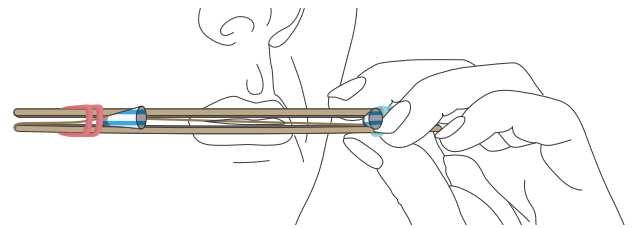
#### Step 3:

Slip one piece of the small straw cut-offs underneath the rubber band, around 2cm from the end of the stick. Place the other piece of straw over the rubber band in the same position at the other end of the stick.



#### Step 4:

Place the other lollipop stick on top of the first so that the straws are sandwiched between. Secure the sticks together at each end using the small rubber bands, but not too tight.



#### Step 5:

To play, hold your Lollipop Player at each end and blow between the lolly sticks, the same way you would a harmonica.

#### Extension

Try moving the piece of straw up and down the lollipop. Does it make a difference to the sound you produce? Blow harder. What does this do to the noise?

#### Explanation

Sounds are produced when objects vibrate. When you blow between the lollipop sticks it causes the rubber band to vibrate and produce a sound. Lots of vibrations happening every second produce high sounds and fewer vibrations happening every second produce lower sounds.

Blowing harder makes the rubber band vibrate more and so produces a higher pitched noise.

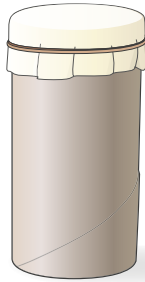
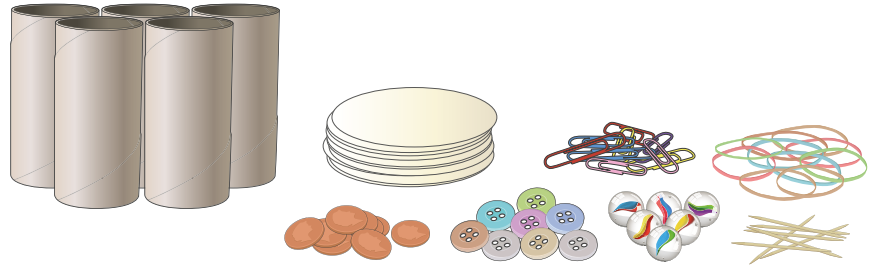
Shorter objects vibrate faster than longer ones and so produce a higher sound. Moving the straw changes the length of the rubber band vibrating and therefore changes the sound.

## FOLLOW UP ACTIVITY 2

### HOW TO MAKE MYSTERY SOUND TUBES

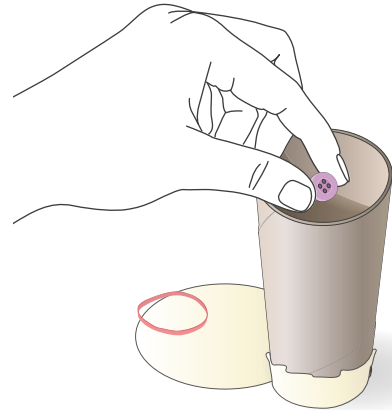
#### You will need:

5 toilet roll tubes or disposable cups  
10 rubber bands  
10 paper or fabric circles  
approx. 3cm wider than the tube tops  
Marbles, Buttons, Toothpicks,  
Paperclips, Pennies



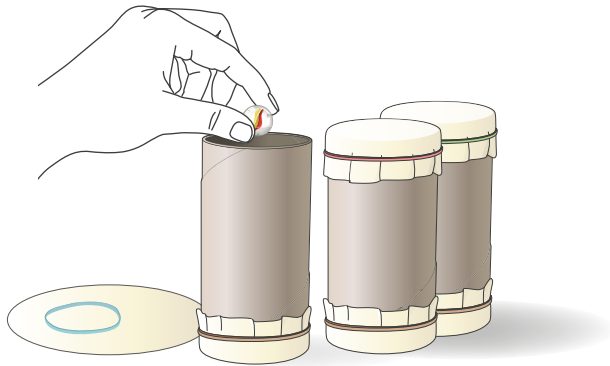
#### Step 1:

Place a paper/fabric circle over the end of a tube. Secure it to the tube with a rubber band.



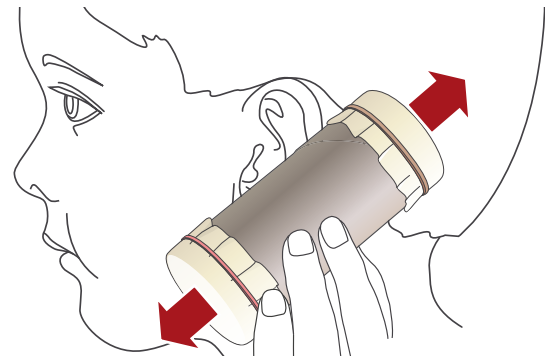
#### Step 2:

Drop a few of the buttons into the tube. Close the top of the tube with another paper/fabric circle and rubber band.



#### Step 3:

Repeat for every tube, putting different objects in each.



#### Step 4:

Mix the tubes up. Give the tubes to a friend and have them shake them. Can they figure out what's inside by how it sounds? If they are struggling, give them a few options to help.

#### Extension

Take a vote on what the tubes contain.  
Draw a picture of what objects you think are inside the tubes.

#### Explanation

Sounds are produced when objects vibrate. The vibration produces a sound wave which travels through the air and into your ear where your brain converts it into a noise. What noise the sound makes depends on the vibration that produced it.

In this experiment, when the tubes are shaken, the objects hit against the sides of the tube and the paper ends causing them to vibrate and produce a noise. The different shapes, weights and materials of the objects each cause a different vibration and so make different sounds.