Sound science

Discover the power of vibrations with these three noise-making activities.

Paper-cup-and-string phone

Chat to your friends through a piece of string.

What you will need:

- Two paper cups
- Sharp pencil
- String
- Scissors

1 Poke a hole in the bottom of each paper cup with a sharp pencil.

2 Cut about three metres of string and thread it through the holes, so that the paper cups lie base-to-base. Tie a knot in each end to stop the string passing back through the holes.

3 Ask a friend to hold one of the cups to their ear. Hold the string tight and talk into the other cup. Then, switch round. The two of you can now have a conversation through your cup phones.

How does it work?

When you talk into the paper cup, the energy of your voice vibrates the air, creating sound waves that travel outwards through the air. Sound waves going into the cup bash against the base, making it wobble back and forth. These vibrations, in turn, pass down the taut string, into the other paper cup and eventually into your friend's ear. To take the experiment further, try using a longer string. How far can you go until the system stops working?

Xylophone water jars

Play a tune using a wooden spoon and some bottles of water.

What you will need:

- Five empty glass jars or bottles
- Water
- Food colouring (optional)
- Striker (such as a spoon)

1 Fill each of your jars or bottles with different amounts of water. Don't fill any of them over halfway. If you like, you could add a different food colouring to each one to make your xylophone look colourful.

2 Place your jars on a table or another flat surface. Arrange them in order of water level, from the lowest amount of water to the highest. Then, give them each a sharp tap with a spoon. Which ones give higher sounds?

3 Try altering the levels of water in each container to change the pitch (how high or low a sound is). See if you can tune your bottle xylophone. Can you turn these sounds into a song?

How does it work?

When you tap an empty glass container it makes a high-pitched clink. Adding water to the jar or bottle makes the resulting sound drop in pitch. Pitch is how high or low a note sounds. Adding water makes the container heavier, so the vibrations are slower, and this results in a lower note. The more water, the lower the pitch, and the less water, the higher the pitch. This is exactly how a wooden xylophone works – longer, heavier bars give lower notes and shorter, lighter bars create higher notes.

Straw panpipes

Make a musical instrument out of paper straws and a lollipop stick.

What you will need

- Two lollipop sticks
- Paper straws
- Pencil
- Ruler
- Scissors
- Glue
- Ribbon

1 Place a lollipop stick on a flat surface and arrange the straws at 90° to the stick.

2 Starting with the second straw in the line-up, cut 1 centimetre off the bottom end. Continue up the line, cutting off a further centimetre each time. So, the third straw is 2cm shorter than its full length, the fourth straw is 3cm shorter and so on.

3 Make sure the tops of the straws are all level, then glue your lollipop stick near the top. Stick another lollipop stick on the other side, then decorate with ribbon. Now you can play your panpipes by blowing across the top of a straw.

How does it work?

Panpipes have been around for thousands of years. When you blow across the tops of a straw, you vibrate the air inside, setting up a sound wave inside it. The shorter the straw, the shorter the sound wave and so the higher the note. Longer straws create lower-pitched notes.

PIPPA HOUNSLOW · ALAMY · REX SHUTTERSTOCK