

MAKE A TONOSCOPE

Use your tonoscope to investigate how sound waves work.

Overview



Do you want to see the sound waves made by your voice? Make this simple tonoscope using a tube, plastic bag, some sugar or salt and a straw.

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This page will print, but looks a little funky. Click the button for a PDF version which looks a bit better.

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What you'll need

- A cardboard tube or toilet roll inner
- A straw
- A thin plastic bag (sandwich bag, banana bag...) or clingfilm
- A teaspoon of sugar or salt
- Scissors
- Sticky tape
- Sharp pencil or pen
- Sticky tack or crunched up tissue
- A flat surface

What to do

Step 1



Make a hole in your tube about 1cm from the base with your sharp pencil. Put your sticky tack or rolled up tissue inside the bottom of your tube and then push your pencil in to make the hole.

Duration

Step 2



Now cut a square of plastic from your bag or clingfilm. This needs fit over the top of your tube with about 2 cm of extra plastic all the way around.

Step 3



Stick one side of the plastic to the side of your tube using sticky tape. Then stick the opposite side of the plastic to the of the tube, making sure the plastic covers the open end of the tube.

Step 4



Now stick the bag to the tube at two more points. Then secure the plastic to the tube by wrapping tape all around. Make sure you don't leave any gaps.

Step 5



Put your straw into the hole at the bottom of your tube. Sprinkle a small amount of salt or sugar evenly over the plastic.

Step 6

Duration

20 minutes or so.

Suitable for...

Age 3 and up.

Safety notes

You know your children better than anyone, and you should judge whether they're ready for this activity. You might want to think in particular about:

- Supervision: the activity involves small parts, so there's a choke hazard.
- Take particular care when poking sharp pencils through card.
- Watch small children with sharp scissors.
- The sugar or salt in this activity will make a mess!

Careers Link: Audiologist

If you enjoyed investigating sound, you may like to be an audiologist when you are older.

Audiologists are healthcare professionals who are specialists in human hearing. They work with patients from newborn babies to the elderly and help people

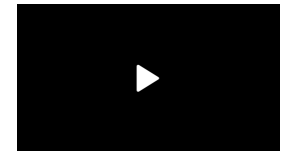


Put the tonoscope on a flat surface and make a noise with your voice into the tube. Watch what happens to the grains of sugar or salt on the plastic!

elderly and help people who have hearing, balance or other ear related problems. They may be involved in screening for hearing loss or fitting hearing aids.

Audiologists are **observant, communicative** and **patient**.

Clinical audiologist Lynzee tells us more about what she does in the interview below.



Things to discuss

- What happens to the grains when you make a loud noise?
- What happens to the grains when you make a quiet noise?
- What happens when you make a high pitched sound (like a squeal)?
- What happens when you make a low pitched sound (like a growl)?

How it works

Whenever you speak or make a noise, your larynx (voice box) vibrates and moves the air around it in your throat and mouth. We call those air vibrations sound waves. Put your hand gently on your throat and make a noise with your voice. You should be able to feel your larynx vibrating in your throat. Sound waves travel through the air and into your ear, where they are sent as nerve signals to your brain so you can hear. To find out more about how this works, watch this [BBC Operation Ouch](#) video.

When you use your tonoscope, the vibrations of your voice travel along the straw into your tube. The sound wave then travels through the air inside the tube and hit the plastic covering the top of the tube, making it move.

The louder the noise, the bigger the vibration produced. When you make a loud noise, your grains will jump higher when they vibrate, and lower if you make a quieter sound.

The higher pitched the noise, the faster the vibration produced. If you make a high pitched noise, your grains will move faster, and a lower pitched noise will make them move slower.

Other things to try

Use a balloon to make sounds louder



What to do:

Blow up and tie your balloon. Hold the balloon close to your ear and tap lightly on the other side.

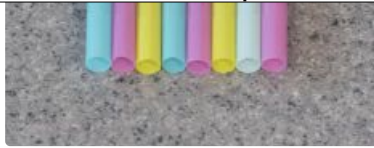
What is happening?

You should be able to hear a loud noise even though you are tapping lightly. This is because when you blow up the balloon you put more air molecules into the balloon. The air molecules in the balloon are closer together than ordinary air. This means the air in the balloon is a better conductor of sound waves than the ordinary air around you and so you heard a louder noise.



Use straws to investigate pitch





Collect 8 drinking straws. If they are the bendy type, cut off the bend and use the straight part of the straw. The first straw will need no cutting. Cut about 2 cm off the end of the next straw, 4 cm off the third straw, 6 cm off the fourth straw and so on until all 7 straws have been cut. Lay a piece of clear tape on the table, sticky side up, and arrange the straws on the tape from longest to shortest, with the tops of the straws all lined up with each other. Wrap more tape around the straws to secure them together. Blow over the top of the straws.

Which straw makes the highest pitch noise?

Which straw makes the lowest pitch noise?

Why do you think this is?

What is happening?

The pitch of a sound corresponds to the fast the sound wave is vibrating (the frequency): the higher the frequency, the higher the pitch. The shorter the straw, the higher the frequency of the sound wave and the higher the pitch. The longer the straw, the longer the frequency of the sound wave and the lower the pitch. To find out more about pitch, [click here](#) and watch this video.