Hearing sound

When sound waves enter your ear, they make a tiny membrane of skin vibrate. These vibrations pass deep into the ear, where they are detected by nerves that send messages to the brain. Sources of sound that are very loud or are close to us make the membrane vibrate more than those that are quiet or far away. If we hear sounds that are too loud, our ears can be permanently damaged.

Ear drum

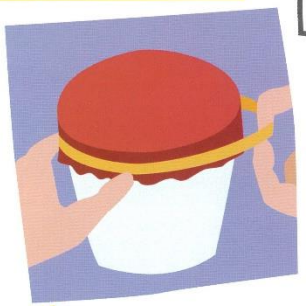
Sound makes a stretched rubber band vibrate, in exactly the way it causes your eardrum to vibrate.

YOU WILL NEED

10

- A BALLOON
- SUGAR (GRANULATED)
- A GLASS OR PLASTIC TUMBLER
- SCISSORS
- AN ELASTIC BAND

1 Cut the balloon and open it out to form a sheet of rubber large enough to fit over the top of the tumbler.



2 Stretch the rubber sheet over the top of the tumbler, and fix it to the tumbler using the elastic band so that the sheet stays taut.

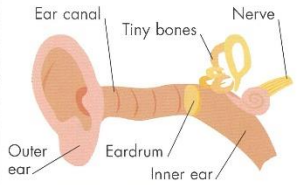
What's going on?

The sound waves hitting the rubber sheet cause it to vibrate, just as when sound hits your eardrum. You can see this because the sugar grains dance up and down.

3 Sprinkle a few sugar grains onto the rubber sheet. Now shout or make other loud noises, close to the rubber sheet. What happens to the sugar?

What's in ear?

When the eardrum moves to and fro, it vibrates three tiny bones (the smallest in your body). The last bone vibrates another membrane, in an organ called the cochlea. The cochlea is filled with fluid and is lined with tiny hairs. The vibrations pass through the fluid, and vibrate the hairs. The hairs are attached to nerves that pass on the information about the vibrations to your brain.



How can you make sugar grains dance?

Cloth ears

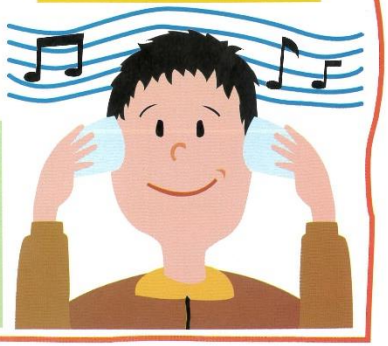
How does the music sound now?

YOU WILL NEED

5

- TWO CLEAN SOCKS
- A CASSETTE RECORDER
- TWO CLEAN, EMPTY YOGHURT POTS

Play some fairly loud music, and hold the yoghurt pots over your ears. The pots absorb some of the sound, and the music does not sound so loud. Squash one sock into each yoghurt pot and hold the pots over your ears once again.



What's going on?

The music sounds quieter because the plastic cups and the socks absorb some of the sound waves, so fewer of them reach your ears. Very loud sounds can damage your ears. People who are regularly exposed to loud noises, like factory workers, wear ear protectors that are specially designed to absorb sound.

LOUD AND QUIET

When a rocket takes off, it makes incredibly loud sounds. If you stood nearby, the sound would hurt your ears. A few kilometres away from the rocket, however, the sound is not so loud. Sound is louder the closer you are to its source, because the sound spreads out as it travels.