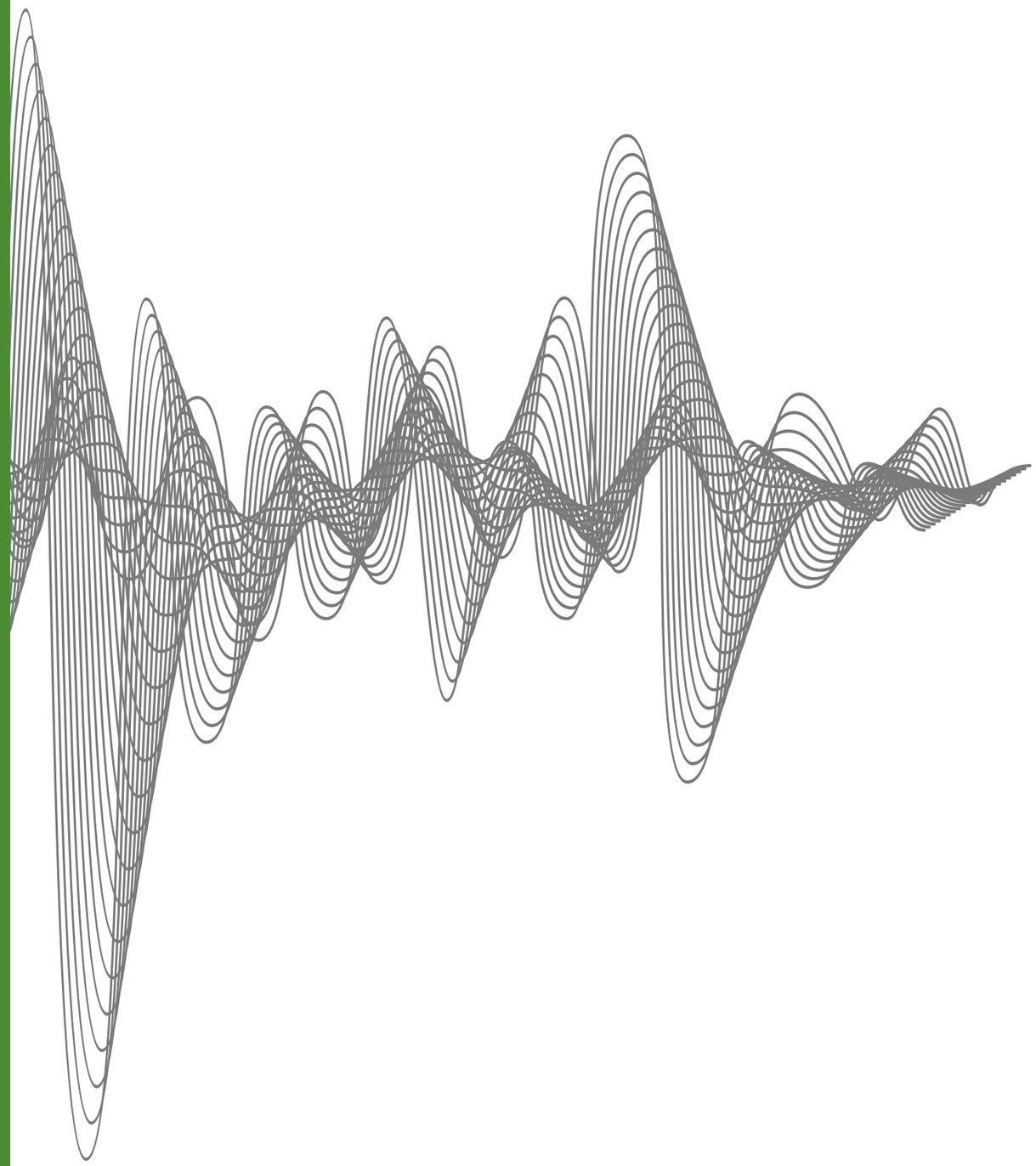


SOUND

Key concepts

- Sounds are made by something vibrating.
- Vibrations from sounds travel through a medium (solids, liquids, gases) to the ear.
- The pitch of a sound depends on the features of the object that produced it.
- The volume of a sound depends on the strength of the vibrations that produced it.
- Sounds get fainter as the distance from the sound source increases.

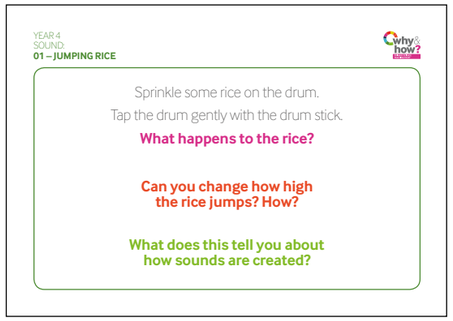
Key vocabulary:

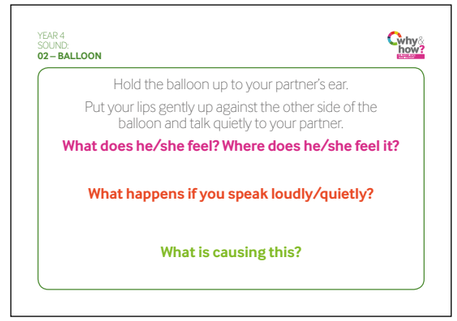
Sound	Gas	Insulation
Source	Pitch	Instrument
Noise	High	Percussion
Vibrate	Low	Strings
Vibration	Volume	Brass
Travel	Loud	Woodwind
Solid	Quiet	Tune
Liquid	Fainter	

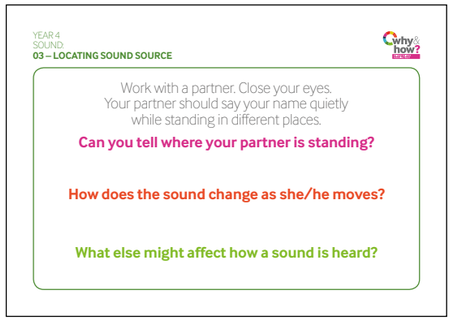
Year 4 – Sound

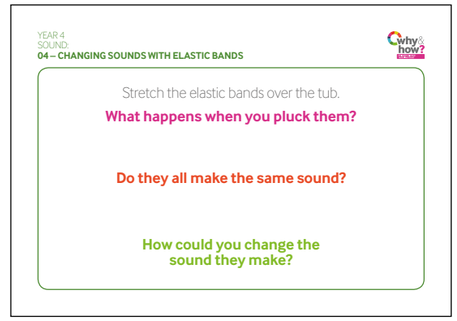
Activity	Resources required	Background knowledge	What to look out for
01	**A drum, a drum stick and some rice.**	Hitting the drum causes the skin to vibrate and the rice to jump. The harder the drum is hit, the bigger the vibration, the louder the sound and the higher the rice jumps. The softer the drum is hit, the smaller the vibration, the quieter the sound and the lower the rice jumps.	Are children using words such as louder/quieter? Do children associate the jumping rice with the vibrating skin, or do they link it directly with the drum stick action?
02	**Inflated balloons.**	Children's voices cause vibrations, which travel through the air to the balloon, through the balloon to the air inside the balloon, back through the other side of the balloon, through the air again and into their partner's ear.	Do children use the words 'vibrate/ vibrations'? Do children know what is causing the vibrations?
03	**None needed.**	Sounds get fainter as the distance from the source increases. Sounds coming from the left will reach our left ear very slightly before our right ear and vice versa. Our ears and brain detect differences in the timing and volume of sounds to help us create a 3D 'sound picture' and accurately place sources of sounds.	Are children using words such as 'louder/quieter'? Do children notice that the sound is fainter as the distance increases?
04	**Plastic tub or box, elastic bands of different widths and lengths.**	Four different factors affect pitch: tension (loose/tight), diameter (thick/thin), length (short/long) and density (e.g. copper v steel). Sounds of low pitch will be produced by thick, loose or long elastic bands. Sounds of high pitch will be produced by thin, tight or short elastic bands.	Are children using the words 'high', 'low' and 'pitch'? Can they spot a pattern in the features of the elastic bands and the sounds made?
05	**Six different glass bottles with a different amount of liquid in each. Something metal to tap the bottles with.**	When you hit the bottle with the spoon, the glass vibrates and these vibrations make the sound. Tapping an empty bottle produces a higher-pitched sound than tapping a bottle full of water. Adding water to the bottle dampens the vibrations created by striking the glass with a spoon. The less water in the bottle, the faster the glass vibrates and the higher the pitch. The more water in the bottle, the slower the glass vibrates, creating a lower pitch.	Are children using the words 'high', 'low' and 'pitch'? Can they spot a pattern in the amount of water and the sounds made? Do children know what is causing the sound?
06	**A metal cooling rack or coat hanger with 50cm of string tied to two corners. Something metal to tap the rack/ hanger with.**	Sound can travel through solids, liquids and gases; however, sound travels differently through each of these media. When we listen to the coat hanger through the string tied to it, the vibrations travel to our ears through the string, not through air. This creates a more direct path and lets more of the sound reach your ears, which is why it sounds different.	Are children using the words 'vibrate/vibration', 'low/high', 'loud/quiet'? Are children talking about sound travelling through different media?

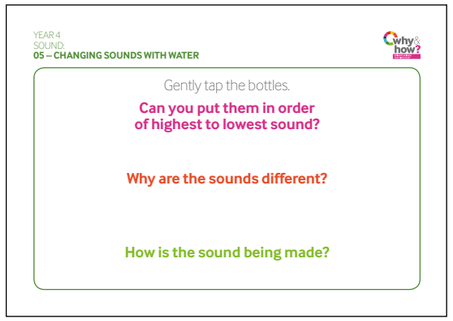
LESSON ACTIVITY CARDS:

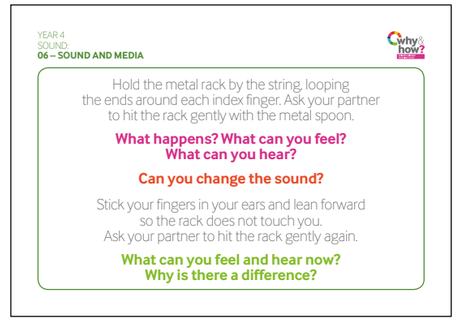






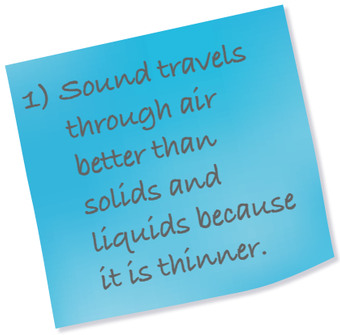


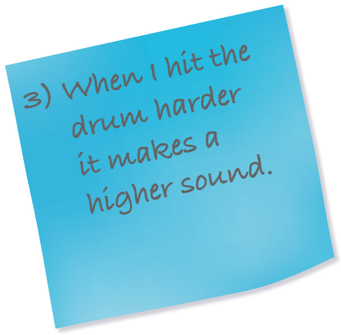




All the activity cards and supporting pictures needed for all activities can be downloaded from the PSTT website once the resource has been purchased

CHALLENGING MISCONCEPTIONS:





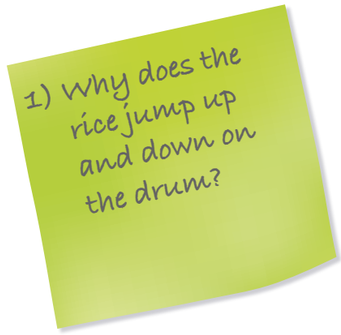
1) Children think sound cannot travel through solids and liquids or that it travels better through air.

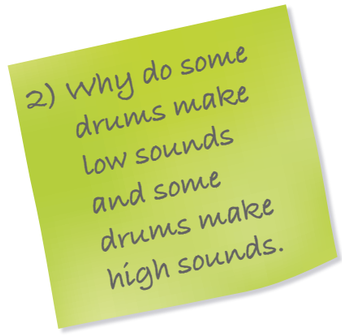
- Use string telephones to compare how sound travels through solids and air by talking to a partner standing at a distance with and without the telephone. Does the distance and length of string make a difference? Could a different material be used in place of string – e.g. metal or plastic wire, elastic?
- Make a hydrophone by carefully cutting the bottom off a plastic bottle. Place the bottle cut-side down in a bowl of water and put your ear up against the hole at the top. Ask a partner to gently tap spoons and other hard objects together under the water. What do you hear? How does it compare to the sounds heard if the same is repeated without the water?

2+3) Children confuse the vocabulary used for pitch and volume.

- Use a data logger to visually demonstrate the difference between loud sounds and quiet sounds. Repeat to show that volume does not change with pitch.
- Show how size (loudness/volume) or speed (pitch) of vibrations change using salt/sugar on baking parchment stretched over a glass bowl and secured with an elastic band. Place a portable Bluetooth speaker inside the bowl and play notes of different volume or pitch via laptop/tablet. Compare the movement of the particles.

QUESTIONS CHILDREN MAY ASK:





1) All sounds are caused by vibrations. There are lots of demonstrations involving careful observation to show that sound is caused by vibrations and that is what causes the rice to jump up and down:

- Children can place their fingertips on their throat and speak. What can they feel? How does this change if they speak quietly/loudly or change the note?
- Show how a tuning fork causes sound against a table top, and then repeat but place the tongs of the fork into a dish of water once struck.
- Twang a ruler placed half on and half off a table. Move the ruler further on/off the table. How do the vibrations change? How does the sound change?

2) Investigate changes in pitch and volume using instruments.

- Use stringed instruments to investigate and observe how the thickness of the string, the tightness of the string and the length of the string can change the pitch of the note. Can children spot a pattern between the thickness of the string and the sound produced? What about the tightness of the string and the sound produced? What about the length of the string and the sound produced?
- Repeat with other types of instrument. In each case, what is vibrating and how is it vibrating, i.e. quickly, slowly, strongly, gently? How can the sound being produced be changed?
- Children could reinforce their understanding by creating their own instruments from paper straws, bamboo, elastic bands, bottles, etc. Instruments should be able to produce sounds of different pitch and volume.

3) Looking at the shape and size of our outer ear, its function and how it compares to other animals, makes an interesting investigation. Our outer ears act as funnels – collecting and directing sound to our inner ear.

- Children could design and test their own ear-like "hearing aids," looking at animal ears for clues about what helps improve the auditory sense.
- Research animals with excellent hearing – how big are their ears, what shape are they and where are they situated? Why is good hearing important to them?
- Do bigger ears make you hear better? Does the shape of the ear matter? Children can make add-on 'ears' out of paper plates. Which size works best? What shape improves hearing the most? How does changing the angle alter what can be heard?

Sprinkle some rice on the drum.

Tap the drum gently with the drum stick.

What happens to the rice?

Can you change how high the rice jumps? How?

What does this tell you about how sounds are created?

YEAR 4
SOUND:
02 – BALLOON

Hold the balloon up to your partner's ear.

Put your lips gently up against the other side of the balloon and talk quietly to your partner.

What does he/she feel? Where does he/she feel it?

What happens if you speak loudly/quietly?

What is causing this?

Work with a partner. Close your eyes.
Your partner should say your name quietly
while standing in different places.

Can you tell where your partner is standing?

How does the sound change as she/he moves?

What else might affect how a sound is heard?

Stretch the elastic bands over the tub.

What happens when you pluck them?

Do they all make the same sound?

How could you change the sound they make?

Gently tap the bottles.

Can you put them in order of highest to lowest sound?

Why are the sounds different?

How is the sound being made?

Hold the metal rack by the string, looping the ends around each index finger. Ask your partner to hit the rack gently with the metal spoon.

What happens? What can you feel? What can you hear?

Can you change the sound?

Stick your fingers in your ears and lean forward so the rack does not touch you. Ask your partner to hit the rack gently again.

What can you feel and hear now? Why is there a difference?