Hurst Hill Primary School Knowledge Organiser

Hurst Hill Primary School
Learning Together

Science	Sound	Year 4	Summer 2	Physics

Knowledge	
How can I prove that sounds are vibrations?	**Pattern Seeking** A sound is a thing that can be heard, and the object that produces a sound is known as a source. Sounds are made when an object vibrates: these vibrations, even though you can't see them, lead to vibrations in the air close by, which travel to the ear and make the eardrum vibrate. Messages are sent to the brain, which recognises the vibrations as sounds. Using this information, is there anything you could use that would make sound waves visible to prove that they are caused by vibrations? For example, could a tuning fork be used?
Can sound travel in space?	**Ideas Over Time** https://www.youtube.com/watch?v=L_FAPeaZT0g Because there is no air in space, it is a vacuum. When an object vibrates, the air around it vibrates too. This vibrating air can also be known as sound waves. Using this information, can you predict what will happen when a ringing alarm clock is placed in a vacuum? Why do you think this?
Does sound travel at the same speed in a liquid?	**Research** Sound has to travel through a medium to produce sound waves, such as air, water, glass, and even more solid materials like stone and brick. This is why you can sometimes hear your neighbour's loud music playing from the other side of a wall! Apart from water, what other liquids do you think it would be possible to use as a medium for sound? Do you think the viscosity (thickness) of the liquid will make a difference? Why/why not?
Which material is best to use for muffling sound in ear defenders?	**Comparative Testing** To prevent sound waves from reaching the eardrums, a material needs to be placed over the ear to muffle (or absorb) the sound. Some materials are better at muffling sound than others, so how can this be investigated? What types of material do you think would be best? Why? What variables do you have to consider for this to be a fair test? How will you record your results?
How did Alexander Graham Bell use his understanding of sound to improve communication?	**Ideas Over Time** Alexander Graham Bell (1847-1922) https://www.youtube.com/watch?v=JsRt5lBdBfE Scottish inventor, scientist and engineer.
Which instrument makes the highest/lowest pitch sound? Why?	**Identifying and Classifying** High pitch sounds (like the squeak of a mouse) are created by short sound waves, whilst low pitch sounds (like the roar of a lion) are created by long sound waves. The number of times a second that the sound wave cycles is measured according to its frequency. Every family of instruments in an orchestra has high and low pitched instruments. For example, the trumpet is one of the highest pitched brass instruments, whilst the tuba is one of the lowest pitched. Generally speaking, the smaller an instrument, the higher the pitch, and vice versa.
Which instruments can I make with a high or low pitch? How?	**Comparative Testing** [See **Which instrument makes the highest/lowest pitch sound? Why?**]. Based on what you have learnt, which family of instruments would be the easiest to replicate? Why? What materials could you use? Apart from the size of each instrument, what other things do you need to consider? How will you record the pitch of your instruments and compare them?
Is there a link between the amount of liquid in a bottle and the pitch it makes?	**Pattern Seeking** The more liquid that a bottle contains, the lower the pitch it will generate when someone blows across the top. Equally, the less liquid that a bottle contains, the higher the pitch will be. This is because when someone blows across the top of the bottle, the air molecules vibrate and produce sound waves. Using this information, what does this tell you about how a sound wave, and therefore the pitch that's created, is affected by the empty space in the bottle?
How do the vibrations of an instrument change when the volume it's played at changes?	**Identifying and Classifying** When a sound is created by a little amount of energy, a weak sound wave is produced, which doesn't travel far. Because of this, it only makes a quiet sound. A vibration created by lots of energy makes a powerful sound wave, which therefore makes a loud sound. The volume of a sound is measured in decibels, whilst the strength of the sound wave itself is measured according to its amplitude.
What happens to the sound I am making if I get further away from you?	**Identifying and Classifying** The closer you are to the source of a sound, the louder it will be. Because of this, the further you are away from the source of a sound, the quieter it will be.

Key vocabulary

Amplitude	A measure of the strength of a **sound wave**.
Decibel	A measure of how loud a sound is.
Electricity	A form of **energy** that can be carried by wires and is used for heating, lighting and providing **power** for a range of devices.
Energy	The **power** from **sources** such as **electricity** that makes machines work or provides heat.
Frequency	A measure of how many times per second a **sound wave** cycles.
Medium	Something that makes it possible to transfer **energy** from one location to another.
Pitch	How high or low a sound is.
Power	**Energy**, in particular **electricity**, that is obtained in large quantities from a fuel **source** and used to operate lighting, heating and machinery.
Sound waves	Invisible waves that travel through air, water and solid objects as **vibrations**.
Source	Where something comes from.
Transmit	To pass from one place or person to another.
Travel	How something moves around.
Vibrations	Invisible waves that move quickly.
Volume	How loud or quiet a sound is.

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Physics is the science that understands the nature and properties of energy and matter.

Statutory requirements

Pupils should be taught to:

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.