Year 4: Sound

SCIENTIFIC CONTEXT: Physics

KEY VOCABULARY:

Vibration	A movement backwards and forwards
Sound Wave	Vibrations travelling from a sound source
Volume	The loudness of a sound
Amplitude	The size of a vibration
Pitch	How low or high a sound is
Sound proof	To prevent sound from passing
Vacuum	A space where there is nothing– no particles.
Ear drum	A part of the ear with a piece of thin tough skin stretched out like a drum skin.
Particles	Solids, liquids and gases are made of particles.

Key Questions

1) How is sound made?
2) How does sound travel?
3) How do we change pitch?
4) How do we change volume?
5) What happens to sound when the source moves further away?

As scientists we will:

- 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.

Working Scientifically:

- Use straightforward scientific evidence to answer questions or to support their findings,
- identify differences, similarities or changes related to simple scientific ideas and processes,
- ask relevant questions and use different types of scientific enquiries to answer them,
- record findings using tables and bar graphs.

Notable Scientist: Alexander Graham Bell

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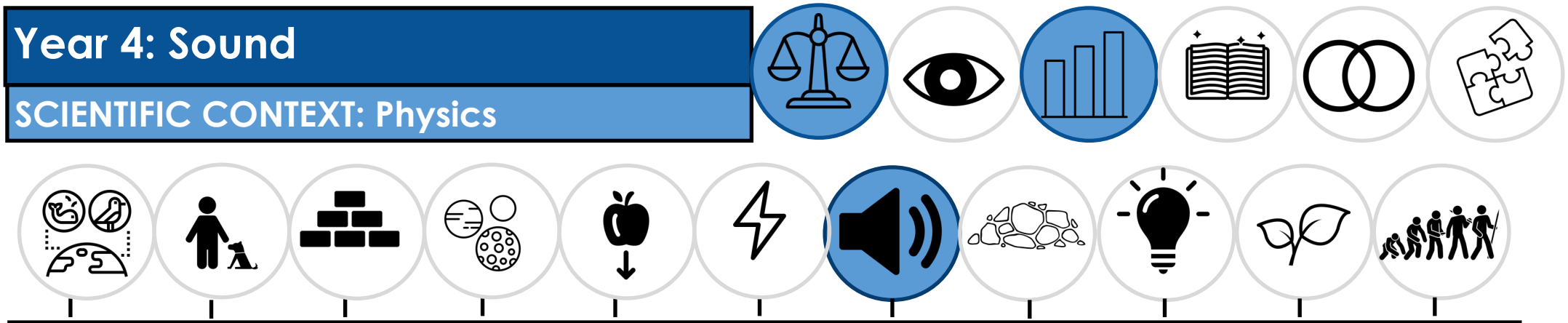

What I need to know:

A sound produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively. Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.

Opportunities for science capital:

School of Noise: Science of Sound workshop

Workshops with *Working Science*

Part of science capital includes scientific media consumption- documentaries, reports etc. So, I have added a couple of links which give daily science news for children. Checking in on these every now and then would be beneficial to help children see science in the wider world.

https://www.sciencenewsforstudents.org/

https://www.sciencejournalforkids.org/

Assessment:

By the end of this topic, pupils will be able to explain how sounds are made, associating some of them with something vibrating; explain that vibrations from sounds travel through a medium to the ear; describe patterns between the pitch of a sound and features of the object that produced it; describe patterns between the volume of a sound and the strength of the vibrations that produced it and explain that sounds get fainter as the distance from the sound source increases.

When working scientifically, pupils will be able to: use straightforward scientific evidence to answer questions or to support their findings; identify differences, similarities or changes related to simple scientific ideas and processes; ask relevant questions and use different types of scientific enquiries to answer them and record findings using tables and bar graphs.

Year 4: Sound

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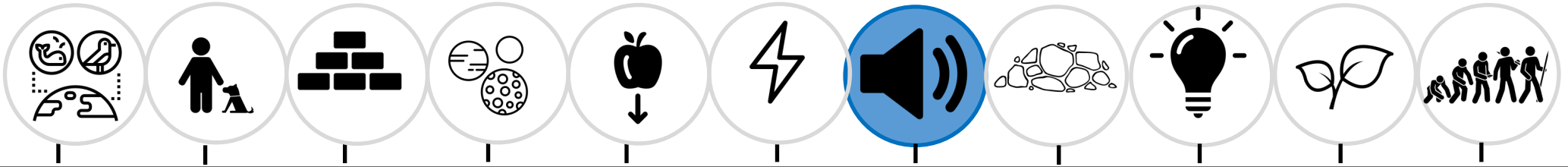

Theme 1: How is sound made?

Starter:

KWL including key questions and linking to prior knowledge.

Hook– what's going on?

https://explorify.uk/en/activities/whats-going-on/rice-and-rhythm

Main:

Substantive knowledge

All sounds are caused by vibrations. Without a vibration there is no sound. These vibrations travel out from the sound source in all directions.

Follow main lesson sequence:

https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00309

Disciplinary knowledge

Choice of practical activities (same link as above)

- Shrieking balloons
- Dancing popcorn,
- Quaking duck cup

Plenary/ assessment:

Disciplinary knowledge

Working scientifically objective: using straightforward scientific evidence to answer questions or to support their findings.

Once pupils have carried out the practical activities, ask them to record in their books their observations and use this observation to answer the question, how is sound made? (e.g. the popcorn danced on top of the speaker because the vibrations of the sound source made the sound and also made the popcorn dance.

Stem sentences could be used for those needing support.

Year 4: Sound

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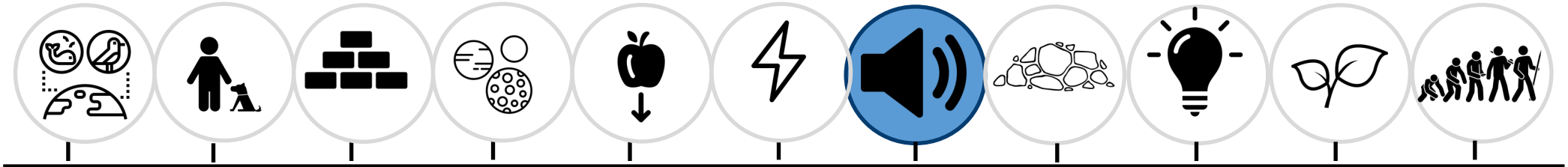

Theme 2: How does sound travel?

Starter:

Recap: explain to an alien how sound is made.

Complete starter activity, modelling sounds waves: https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00310/activities/starter

Main:

Substantive knowledge

Watch video: https://www.tigtagworld.co.uk/film/how-do-sounds-travel-PRM00033/

After watching the clip, sum up that sound energy travels in waves from its source through a range of different mediums, including solids, liquids and gases. Sound is unable to travel through a vacuum, as there are no molecules to vibrate and carry the sound energy.

Ask children, can we hear sound in space? Allow children to discuss in pairs and then watch clip: https://www.tigtagworld.co.uk/film/why-is-there-no-sound-in-space-PRM00030/

Compression waves with a slinky demonstration.

https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00310/activities/practical/ACTVTY00435

Plenary/ assessment:

Disciplinary knowledge
Comparative test
Working scientifically objective: Identify differences, similarities or changes related to simple scientific ideas and processes

Today we are acoustic engineers.
Explore how to use a string telephone. Discuss how this works; vibrations in air, vibrations in string, the cup amplifies the vibrations, vibrations travel to ear.
Provide a range of pots (yoghurt pots, paper/plastic beakers, polystyrene cups etc) and different types of string/wool.
In groups, ask children to investigate what makes the best string telephone, supporting with questioning as necessary.
Give time for the children to reflect, making notes in their books independently (e.g. in a table format writing observations about each cup they test) and test their designs so that they can be modified and improved.
After the investigation, children demonstrate their telephones to the class and explain why their telephone is/is not good.
Discuss how their research has informed their design – detailing improvements they have made and reasons for making those improvements.
Full TAPS plan: String Telephones

Year 4: Sound

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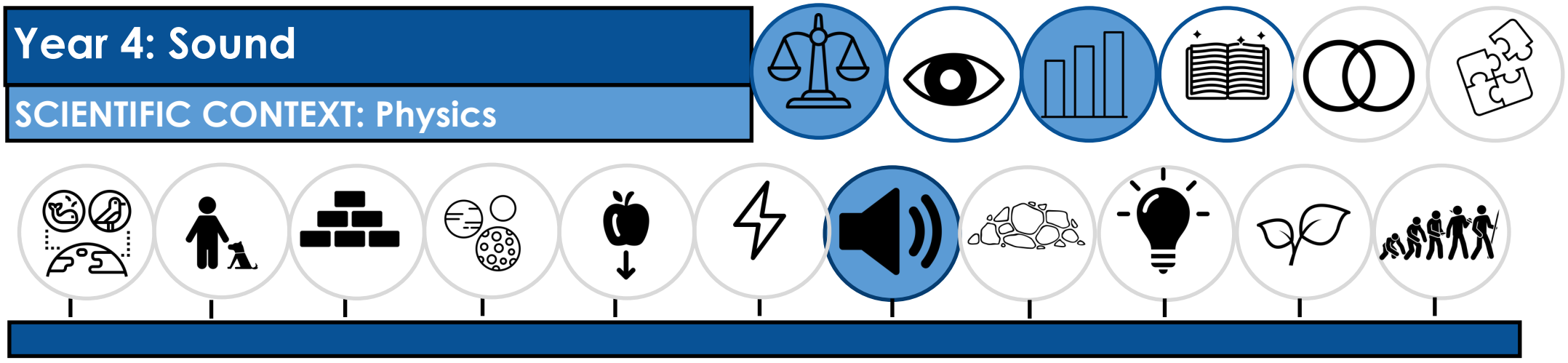

Theme 3: Patterns in pitch

Starter:

Recap: Last lesson, last topic, last year– create a table of questions questioning children's prior learning from various topics and previous year.

Main:

Substantive knowledge

Explain to the children that in this lesson they are going to be considering how sounds of different pitches are produced. Watch clip: https://www.tigtagworld.co.uk/film/tuning-an-orchestra-PRM00032/

Organise the children into small groups and give each group an elastic band. Remind the children of the safety issues relating to stretched elastic bands.

Ask one child in the group to hold the elastic band between their index finger and thumb. Tell them to carefully stretch the band until it has some tension (but not fully stretched). Ask another child to pluck the elastic band to generate a sound. Everyone in the group should observe the band's movement and notice the change in pitch.

Plenary/ assessment:

Disciplinary knowledge

Pattern seeking

Working scientifically objective: Ask relevant questions and use different types of scientific enquiries to answer them

Today we are acoustic scientists.

Show children some homemade 'musical instruments': elastic bands over shoe box, 'straw flute/pan pipes', 'sound sandwich' (lolly stick and straw harmonica), stretched balloon 'drum skin' over tube, glass bottle containing water to blow or tap. Explore how to play them to make a sound and ask the children to suggest which parts are vibrating.

Ask children to independently record a range of questions that they could investigate, focusing on changing pitch (e.g. How does the width of the elastic band affect pitch?) Record in science books.

Children then work in small groups investigating their questions, considering different ways to alter pitch.

Once complete, ask children to record in their books:

What were the differences between the sounds?

Which sound was the highest/lowest?

What's the pattern?

See TAPS full plan: Pitch

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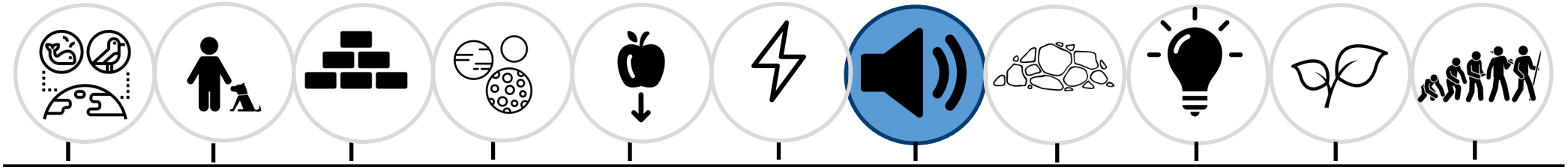

Theme 4: Patterns in volume

Starter:

Recap: https://explorify.uk/en/activities/whats-going-on/bottle-orchestra

Describe what's going on, what pattern can you spot?

Hook: What's that noise? https://www.tigtagworld.co.uk/film/volume-whats-that-noise-PRM00304/

Ask the children if they noticed that the sound became very loud at one point in the film.

Remind the children that sounds are made by vibrations. Explain that in this lesson they are going to consider how vibrations affect the loudness of a sound.

Main:

Substantive knowledge

Explain to the children that the term volume is used to describe a sound's loudness. Quiet sounds have a small volume and loud sounds have a big volume. Play clip: https://www.tigtagworld.co.uk/film/howler-monkeys-PRM00028/

Disciplinary knowledge

Model drawing a table of results, something like:

Plucking strength	Volume on 1-5 (5 being loudest)
Softly	
A bit harder	
Even harder	
Hardest	

Pupils draw their own in books.

Plenary/ assessment:

Disciplinary knowledge

Pattern seeking

Working scientifically objective: recording findings using tables and bar graphs.

In groups, create mini guitars using plastic tubs and elastic bands. As children to run an investigation where they firstly pluck the elastic band softly, then a little bit harder, then a little bit harder until finally they pluck it their hardest. Everyone in the group should closely observe the band's movement. Run investigation and pupils record results in table.

Once complete, model recording results from the table on a bar graph to clearly show the pattern in volume. Children then draw their own on squared paper and put in books.

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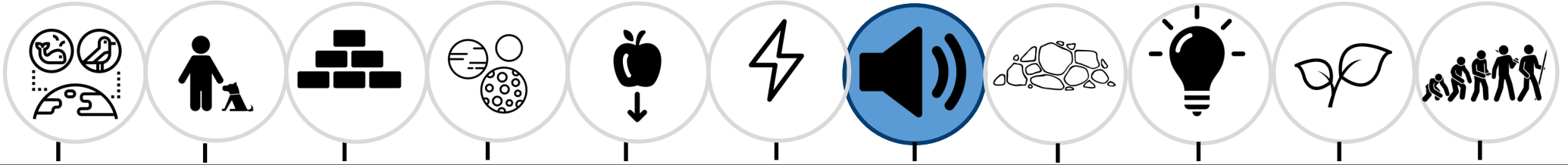

Theme 5: Alexander Graham Bell

Starter:

Concept cartoon Drums

Recognise that sounds get fainter as the distance from the sound source increases: on the playground, teacher (or chosen child) play an instrument as the children slowly move away from the sound source. What did they notice? Record observations on post-it-notes for floor-book.

Main:

Substantive knowledge

Carry out research on Alexander Graham Bell and present findings in an infographic style.

Questions to research:

1) Who was Alexander Graham Bell?
2) His career in science.
3) His legacy.

Plenary/ assessment:

End of unit kahoots quiz

Complete KWL grid