

Sound: vibrations, pitch and volume

Lesson at a glance

Open with a quick listen for classroom sounds, then one shared pluck of a pre-strung rubber-band box. Name vibration, pitch and volume from the demo, then pupils predict on the Investigation Journal before trays open. Groups explore a rubber-band guitar and a ruler twang, then run two short fair tests: ruler overhang for pitch, pluck strength for volume. They finish the journal page and share what the wobble, pitch and volume evidence showed.

Learning objectives

- Explain that sound is caused by vibration
- Change pitch and volume deliberately on a simple homemade instrument and describe what was changed

Before the bell: prep

Day before: one tray per group of 3–4 with a small cardboard/tissue box, 2–3 elastic bands of mixed thickness, and one 30 cm plastic ruler. Pre-stretch bands on every box and on one teacher demo box. Print the Investigation Journal page. Clear a table-edge overhang space per group.

Materials

Item	Qty	Per	Source	Low-cost substitute
small cardboard box or empty tissue box	1	group	classroom	a sturdy takeaway container or plastic lunchbox with elastic bands stretched across
elastic bands (mixed thickness if possible)	3	group	classroom	hair ties that stretch, or rubber bands from post and packing
30 cm plastic ruler	1	group	classroom	a sturdy strip of thick card of similar length
Investigation Journal page	1	pupil	provided printable	plain paper with headed sections for predict, observe, conclude

Safety watch-point

Elastic bands stay on the boxes: no shooting across the room. Rulers stay low over the table edge. Use the freeze signal so groups can hear their own trials.



Teaching moves

- **Getting Started:** Keep it light: take three or four fast sound answers only. End with one clean pluck of the demo box so the whole class shares the same sound, then set the box aside but leave it visible. Do not hand out trays or name pitch and volume yet.
- **What is a sound?:** Talk from the three ideas rather than reading them out. Point back to the demo box when you name vibration. Model the full inquiry cycle once with the ruler (Test A path): shorter overhang, same flick strength, higher pitch and a faster blur. Keep the conclusion spoken so pupils do not copy it onto their predictions. Head off 'louder means higher' every time you model.
- **Question and predict:** Trays stay closed. Hold up the box for one pluck and the ruler for one gentle flick so both stems make sense, then put both down. Leave the two board stems visible and circulate for a because clause on each. Predictions are never wrong; the reason is the bit that matters.
- **Explore the instruments:** Agree a freeze signal before trays open. Run short 45–60 second trial bursts, then freeze-and-listen so groups can hear one clean sound. Stagger half the room if noise climbs. Circulate with: What is wobbling? Did you change one thing only? Close with freeze, hands off, trays ready for the two tests.
- **Investigate pitch and volume:** Stop exploring cleanly. Lock the path: Test A everyone on the ruler (change overhang only, same flick); Test B everyone on one band (change pluck strength only, same tightness). About 4–5 minutes each including a one-line jot. If a group changes two things, pause and redo one clean trial.
- **Observe and record:** Expand light jots into full journal rows. Coach concrete lines: less hanging over sounded higher; harder pluck sounded louder; band looked a thicker blur when plucked harder. Keep faster blur with pitch changes, not with louder plucks. If they write only a conclusion, ask for one thing they saw, heard or felt first.
- **What did the evidence show?:** Take two or three groups per question and revoice into clear science language. Draw out: less overhang or tighter band → higher pitch; harder pluck → greater volume; wobble and sound stop together. Link briefly to fretting a guitar string or covering tin-whistle holes. Pack away on the freeze signal before the summary.
- **What you covered:** Run the five summary bullets, then one spoken-only prompt: What is one thing you would keep the same next time to keep a sound test fair? Instruments should already be packed; finish any stray kit quietly while pairs share.

What it should show

Less ruler overhang (or a tighter band) sounds higher; more overhang or a looser band sounds lower. Harder pluck or flick sounds louder without raising pitch. The band or free ruler end is visibly or tangibly vibrating while the sound lasts and stops when the wobble stops. Odd pitch results usually mean the flick strength changed between trials; redo from the same gentle flick.

Misconceptions & interventions

- **Pupils think louder is the same as higher:** ‘I plucked harder so it went up.’ Replay Test B on the same band: gentle then hard pluck with tightness fixed. Ask which stayed the same (pitch) and which changed (volume). Keep the two words on the board as separate columns.
- **Pupils change overhang and flick strength together, then cannot tell what raised the pitch.** Pause the group and ask what would make the comparison unfair. Have them redo one clean trial changing only the overhang, same flick.
- **Pupils think sound can happen without anything moving:** ‘It just makes a noise.’ Ask them to watch or feel the band or ruler while it sounds, then the moment it stops. Link: when the wobble stops, the sound stops.

Differentiation

Emerging	Developing	Proficient
• Accept a shared spoken prediction captured on one journal page, and a labelled sketch of the ruler overhang or band as the observation row. • Offer board sentence starters: I predicted... I changed... I noticed...	• Push for a clear because clause on both stems and a one-line vibration note (saw blur / felt wobble) after each test. • If both jots are done early, allow one extra clean trial of the test they found less clear.	• Ask them to critique a neighbour’s trial: which variable stayed the same, and was the test fair? • Stretch share: link their ruler or band finding to fretting a guitar string or covering holes on a tin whistle. Same pitch idea, different instrument.

Cross-curricular hook

Link to Music: fretting a guitar string or covering tin-whistle holes shortens the vibrating length and raises pitch.