energy-forces

Sound insulation: making it quieter

Lesson at a glance

Open with shut doors, cushions and thick coats that quieten everyday noise, then name muffle and soft versus hard feel using the four real wraps. Pupils predict on the Investigation Journal which of foam, soft cloth, bubble wrap or stiff card will muffle a shared buzzer best. Run all four listens from one taped line with the class kit, score quiet/medium/loud on the IWB bar-chart interactive, then order quietest to loudest and lightly name sound insulation.

Learning objectives

- Predict and test which wrapping materials muffle a sound best
- Order materials from quietest to loudest using listening evidence

Before the bell — prep

Print the Investigation Journal page. Set one shared front kit: buzzer or ticking timer, box with lid, and four wraps (foam, soft cloth, bubble wrap, stiff card). Tape one listening line on the floor. Ready Quiet/Medium/Loud cards or board icons and set the buzzer volume once.

Materials

Item	Qty	Per	Source	Low-cost substitute
small battery buzzer or loud ticking kitchen timer	1	class	school kit	one phone timer held by the teacher at class-friendly volume while volunteers take turns to wrap
cardboard box with lid (shoe-box size)	1	class	brought from home	large plastic storage tub with a lid
wrapping samples (foam scrap, soft cloth, bubble wrap, stiff card)	1	class	classroom	sock or tea towel, newspaper scrunch, and a cereal-box panel instead of foam, cloth, bubble wrap and card
masking tape listening line on the floor	1	class	classroom	a chair or book as a fixed listening marker
Quiet / Medium / Loud cards or board icons	1	class	classroom	three sticky notes labelled quiet, medium and loud
Investigation Journal page	1	pupil	provided printable	plain paper with headings I predict / what I heard / quietest to loudest

Lesson 23

Safety watch-point

Never hold the buzzer against ears; short beeps only at a class-friendly volume. Stop at once if anyone covers their ears uncomfortably.

Teaching moves

- **Soft things can quieten sound:** Hold up the four real samples while you name muffle and soft/hard feel only. Keep sound insulation as your own label for the close. Do not claim soft wraps win yet — that waits for listening. Model the full cycle once with stiff card: predict, wrap, lid on, listen from the line, observe still quite loud.
- **What do we think will muffle best?:** Show the four samples again. Pupils whisper a material-plus-because to a partner, then jot it on the Investigation Journal before any test. Capture one or two reasons on the board without ranking. Offer blank stems only — never a soft-always-wins model answer.
- **Wrap and listen:** Run one shared kit at the front so the whole class hears the same beeps from the taped line. Volunteers wrap; everyone else rates. Same buzzer, box, lid and spot each time; unwrap fully between tries. Order: stiff card (model) → foam → soft cloth → bubble wrap. Aim about two minutes per remaining wrap; no overlapping buzzers.
- **Record our findings:** You type on the IWB interactive while groups call 1, 2 or 3 for each wrap. Hand-vote if they disagree. Show the bar chart, name shortest and tallest, then pupils jot four short heard codes plus one quietest/loudest line on the journal — prediction is already there.
- **Quietest to loudest:** Lay the real samples in a line or move names on the board. Insist on listening justifications ("cloth was a 1, card was a 3"), not soft-feel alone. Prompt where muffling already happens at school — library cushions, shut PE hall door, cloakroom coats.
- **What did we learn?:** Revoice one pupil sentence linking soft wraps to quieter sound, then offer the label sound insulation once. Honour odd listening data rather than forcing a soft-wins story. Switch buzzers off, return wraps, brief hand wash if foam dust is an issue.

What it should show

Expect foam and thick cloth near 1 (quietest), stiff card near 3 (loudest), bubble wrap often 2. Soft wraps usually muffle more than hard card. If every wrap sounds the same, move listeners closer or use a slightly stronger class-friendly beep. Odd scores often mean the lid was not shut or listening distance changed.

Misconceptions & interventions

- **Pupils think quieter only means stopping the buzzer, or that a thicker-looking wrap must win without listening.** — Stress we judge by careful ear from the taped line, not by how the wrap looks. Point back to the Quiet/Medium/Loud cards after each short beep.
- **Pupils write or share a prediction only after hearing the tests, so original ideas get overwritten.** — Lock the journal prediction before any wrap is tested. If someone waits, ask them to freeze a because now and change it later with a listening reason.
- **Pupils order by soft feel in the hand alone: "cloth is soft so it must be quietest."** — Ask for the number or quiet/medium/loud code they gave each wrap. Re-lay the samples using only what the class heard.

Differentiation

Emerging	Developing	Proficient
• After each beep, let less confident pupils point to Quiet/Medium/Loud cards or the three board icons instead of writing numbers first. • Pair them near the taped line so the shared listen is clear; teacher or partner scribes the four short codes if needed.	• Prompt a because that links soft/hard or thick/thin to what they heard, and a willingness to change the earlier prediction.	• Ask whether two soft layers might change the order and how the class could find out another day — do not add a fifth live try unless minutes remain. • Invite a fair-test critique: what must stay the same (buzzer, box, lid, listening spot) for the comparison to hold.

Cross-curricular hook

Tie to Maths Data: the IWB bar chart of 1–3 loudness scores lets pupils read shortest and tallest bars as quietest and loudest.