

The heart and lungs: how the body responds to exercise

Lesson at a glance

Pupils find their own pulse, then meet heart and lungs as one oxygen-delivery team. Pairs turn the wonder into a testable question, choose step-ups, high-knee marches or star jumps, and predict. After a modelled 15-second $\times 4$ method on the fair-test-timer, the class runs one shared minute of activity, averages two pulse and breathing readings before and after, and records on the Investigation Journal. Results pool on the data-recorder; a display-only talk links the rise to oxygen demand.

Learning objectives

- Turn a wonder about exercise into a testable question with a clear measurement
- Measure pulse and breathing rate per minute before and after exercise, averaging two readings
- Explain that the heart and lungs work as one oxygen-delivery team that speeds up when we move

Before the bell: prep

Push desks back for floor space. Print the Investigation Journal page. Open the fair-test-timer (stopwatch) and data-recorder on the IWB. Set out a low PE bench or step for step-up pairs. Practise finding a volunteer's pulse before the bell.

Materials

Item	Qty	Per	Source	Low-cost substitute
stopwatch or classroom timer	1	group	school kit	the fair-test-timer on the IWB shared by the whole class, or a teacher phone stopwatch
low step or PE bench for step-ups	1	group	school kit	high-knee marches or star jumps on the spot (no step needed)
Investigation Journal page	1	pupil	provided printable	ruled paper with headings for resting and after averages

Safety watch-point

Anyone dizzy or uncomfortable sits out the activity and keeps the timer role. No race pace. Press gently on the neck, never hard. Supervise step-ups on a low bench only.

**Teaching moves**

- **Getting Started:** Ask every pupil to place two fingers on wrist or neck for about ten seconds only: no counting yet. Help anyone stuck onto the carotid or radial spot. Ask: what do you think happens to your heart and lungs when you run or jump?
- **Heart and lungs: one team:** Talk through pulse, breathing rate and the oxygen-delivery team in your own words, keeping sample numbers to hand. Stress that lungs fill the blood with oxygen and the heart delivers it: one team, not two separate systems.
- **Question and predict:** Model the testable-question shape aloud, then let pairs pick one safe activity and write it into the journal stem. Pin the unit once: every count is 15 seconds $\times 4$ = per minute. Accept any honest prediction; share a few activity choices.
- **How we measure:** Demonstrate on the fair-test-timer: sit still, count 15 seconds, $\times 4$, second reading, average (add and divide by 2). Repeat for breaths (one chest rise = one breath). Name the pitfalls: rough timing, forgetting $\times 4$, raw counts under a per-minute label, pressing too hard on the neck.
- **Investigate: rest, activity, re-measure:** Run one whole-class activity minute on the IWB timer: all movers together, partners supporting timing. Resting counts first (board timer keeps the class in step), then after counts immediately so the rise still shows. Circulate for finger placement and $\times 4$. Anyone dizzy sits out and keeps the timer role.
- **Record on your journal page:** Give quiet minutes to finish four per-minute averages in-lesson. Spot-check: a '18' under per minute is almost certainly a forgotten $\times 4$. Fix it to 72. Each pair nominates one mover's clean set of four numbers for call-out.
- **Pool the class results:** Open the data-recorder with columns for pair, resting/after pulse, resting/after breathing. Brisk one-pass call-out of four numbers only. Show the bar chart and talk the table: which pairs show the biggest pulse rise, and did breathing rise for most too?
- **Make sense of the evidence:** With the filled table still up, draw out that most pulse and breathing rates rose. Name observation vs inference: '80 to 120' is what we saw; 'heart sped up to deliver oxygen' is what we think it means. Treat flat results as useful data, not failure.

What it should show

Resting pulse often sits roughly 70–100 beats per minute; after one minute of activity both pulse and breathing commonly rise. Exact numbers vary: the pattern (both go up) is the learning. Impossible readings (e.g. 20 or 200 bpm) usually mean a missed $\times 4$ or rough timing; re-count calmly once. A flat result often means gentle effort or a long pause before re-measure.



Misconceptions & interventions

- **Pupils think the heart and lungs work separately: ‘the heart does blood, the lungs do air’.** Point back to the chest diagram and re-voice the team: lungs put oxygen into the blood, the heart pumps that blood to the muscles. Ask which of their own numbers rose together.
- **Pupils write the raw 15-second count as if it were beats or breaths per minute.** Hold up the journal column header ‘per minute’ and run one count aloud: ‘18 in 15 seconds. Times 4 is 72 per minute.’ Fix the cell before pooling.
- **Pupils think a prediction that didn’t match means they got the science wrong.** Say predictions are never wrong: evidence decides. Ask what the class table actually shows and whether the oxygen-delivery idea still fits.

Differentiation

Emerging	Developing	Proficient
• Pupils who should not exercise stay full scientists as timer and recorder for their partner. • Sit with a pair and co-count one 15-second pulse on the board timer, then coach the $\times 4$ together before they continue alone.	• After recording, ask why both rates rose: prompt the oxygen-delivery team in their own words. • Compare their pair’s rise with one neighbouring pair’s four averages and note which change was larger.	• Critique fairness: what stayed the same (15 s count, $\times 4$, one-minute class timer) and what still varied between pairs. • Separate observation from inference on their journal set: which numbers are facts, which sentence is what we think they mean.

Cross-curricular hook

Tie to Maths Data and Measures: pupils average two readings, pool class rates, and read the rise from the class results table.