

## Lesson 2 · living-things

# The Heart and Lungs: How the Body Responds to Exercise

## Lesson at a glance

Open by having 5th-class pupils go still and feel their heartbeat, then pose the testable question: does exercise change pulse and breathing? Pairs predict on their Investigation Journal page, then count resting pulse and breaths (15 seconds  $\times$  4), do one minute of step-ups or jumping jacks, and re-count straight away into four labelled boxes. The data-recorder interactive pools every pair's numbers and charts breaths-after. Close with a display-only science-talk on the heart and lungs as one oxygen-delivery team.

## Learning objectives

- Turn a wondering about exercise into a testable question and make a prediction
- Measure pulse and breathing rate carefully in beats and breaths per minute, before and after exercise
- Describe how the heart and lungs work together as an oxygen-delivery team that speeds up when we move

## Before the bell – prep

No kit beyond the Investigation Journal page and a clock — but clear a safe exercise area and move bags aside before the bell. Load the fair-test-timer and data-recorder on the IWB and check the 15-second and one-minute timers work. Note in advance any pupil who shouldn't exercise (asthma, injury) so you can pair them as counter rather than singling them out on the day.

## Materials

Item	Qty	Per	Source	Low-cost substitute
stopwatch	1	group	school kit	use the fair-test-timer on the IWB for the whole class together
step or low sturdy block for step-ups	1	group	school kit	do jumping jacks or step-ups on the spot with no block, lifting knees high
Investigation Journal page	1	pupil	classroom	none needed

## Safety watch-point

Clear the exercise area of bags before pupils move. Anyone with asthma, injury or feeling unwell is the counter, not the mover. Stop and sit down anyone who feels light-headed.

### Teaching moves

- **Our Question and Our Prediction:** Run a think-pair-share and take two or three predictions aloud, revoicing the reasoning ('pulse goes up because the body works harder'). Tell pairs they may choose step-ups or jumping jacks, but both partners must do the same one — a genuine choice inside the same fair test. Pupils write their prediction on the Journal page; don't confirm anyone yet.
- **How the Heart and Lungs Work as a Team:** Read the on-screen table together and physically point at each row, pausing for a pupil to reword it, so terms land one at a time. Pin the unit once and hold it everywhere: always count 15 seconds and multiply by 4. Head off the worry that a faster pulse is dangerous — it's the body sensibly delivering more oxygen.
- **Watch How to Measure: A Worked Example:** Demonstrate the full cycle on yourself or a calm volunteer, thinking aloud at every beat: predict, find the pulse, drive the fair-test-timer for 15 seconds, count once, multiply by 4, write it. Point at the worked numbers on screen ( $18 \times 4 = 72$ ) as you say them. Stress: count each thing once, not twice — the first count straight after exercise is the truest.
- **Measure, Move, Measure Again:** Pairs work from the four labelled boxes; use the IWB timer for shared 15-second counts and the one-minute exercise. Walk the room and watch for pupils averaging or counting twice — re-voice 'count once, straight away'. Anyone who shouldn't exercise is the counter. Stop anyone light-headed and sit them down.
- **Pool the Class Results:** Drive the data-recorder on the IWB, adding a row per pair across the four per-minute columns. Show the chart of breaths-after as one bar per pair. As pairs call numbers, glance for any raw 15-second count slipping in under a per-minute heading and fix it on the spot.
- **What Did We Find Out?:** Run the display-only science-talk: did pulse and breathing go up? Why do both speed up together? Draw out the big idea — muscles needed more oxygen, so lungs pulled air faster and the heart pumped it round faster, working as one team. If two pairs chose different exercises, ask whether the pattern matched.

### What it should show

Expect both pulse and breathing rate to rise clearly after one minute of exercise — a resting pulse around 70–90 climbing well above that, with breaths similarly up. Both rise together because the muscles demand more oxygen. A pair showing little or no change usually counted too slowly to start, or measured after a pause when the pulse had already dropped — re-run with the count starting the instant exercise stops.

### Misconceptions & interventions

- **Pupils think a pounding, faster heart after running means something is wrong or unhealthy.** — On the read-through of the table, name it directly: a faster pulse is the body working sensibly to deliver more oxygen to the muscles. Link it back to their own after-exercise numbers — everyone's went up, and everyone is fine.
- **Pupils write the raw 15-second count as their answer instead of multiplying by 4.** — During the worked example, point at  $18 \times 4 = 72$  on screen and say the rule aloud. Spot it during pooling on the data-recorder — a stray number near 18 under a per-minute heading — and have the pair multiply it before it goes in.
- **Pupils think the heart and lungs are separate systems that just happen to both speed up.** — In the closing science-talk, trace the link out loud: lungs pull in oxygen, heart pumps it to the muscles — they are one delivery team, which is why they always speed up together.

### Differentiation

Emerging	Developing	Proficient
<ul style="list-style-type: none"> <li>• Pair with a strong counter and assign the pulse on the neck if the wrist is hard to find.</li> <li>• Pre-write the per-minute boxes and let them focus only on the 15-second count, with you multiplying by 4 alongside them.</li> </ul>	<ul style="list-style-type: none"> <li>• Ask 'why do you think it went up by that much?' and have them point to the biggest jump in the class table.</li> <li>• Have them check their partner's multiplication before each number goes on the page.</li> </ul>	<ul style="list-style-type: none"> <li>• Sketch a second prediction for what would happen after two minutes of exercise.</li> <li>• Critique the fair test: what stayed the same for every pair, and what would make it unfair?</li> </ul>

### Cross-curricular hook

Tie to the Maths Data strand — pupils read the class bar chart of breaths-after and compare resting versus after-exercise numbers across the room.