Lesson 2

living-things

The heart and lungs: how the body responds to exercise

Lesson at a glance

Open by having every pupil find their own pulse on neck or wrist, then pose today's wonder: does exercise change pulse and breathing? Pairs turn that into a testable question, choose step-ups, high-knee marches or star jumps, and predict on the Investigation Journal. Model 15-second counts ×4 for rates per minute, then run one shared minute of activity on the fair-test-timer and re-measure. Pool four averages per pair into the data-recorder and close on the heart–lungs oxygen-delivery team.

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 pair floor space. Print the Investigation Journal page. Open the fair-test-timer (stopwatch) and data-recorder on the IWB before the bell. Optional low steps or PE-bench bottoms for step-ups. Practise finding a pulse on yourself so the demo is clean.

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/recorder role. Steady pace, no races. Gentle fingers on the neck only; pupils who must not exercise never do the one-minute burst.

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Teaching moves

- **Getting Started:** Keep it light: every pupil finds their own pulse for about ten seconds on neck or wrist. Help anyone stuck, but do not start formal measuring yet. Ask what they think happens to heart and lungs when they run or jump.
- **Heart and lungs: one team:** Introduce pulse, breathing rate and oxygen-delivery team from the key-concepts table. Stress they are one team — lungs fill the blood with oxygen, the heart delivers it — and that biologists measure both with numbers the same way the class will today.
- **Question and predict:** Model the stem aloud, then let pairs pick one safe activity and write it into the question on the Investigation Journal. Pin the unit once: every count is 15 seconds ×4 for per minute. Accept any honest prediction; ask a few pairs to share activity and why.
- **How we measure:** On the IWB timer, model sit-still, 15-second pulse count, ×4, second reading, average (add and divide by 2) — then the same for breaths. Name the pitfalls: rough timing, forgetting ×4, writing the raw count as per minute, pressing too hard on the neck.
- **Investigate: rest, activity, re-measure:** Drive one shared one-minute round on the fair-test-timer so all movers start and stop together. Circulate for finger placement, ×4, and quick after-readings. Non-movers stay full scientists as timers and recorders. Re-count calmly if a reading looks impossible.
- **Record on your journal page:** Keep this in-lesson, not homework. Give quiet minutes to finish four per-minute averages from two readings each. Spot-check units — if someone wrote 18 under per minute, coach 18 × 4 = 72. Each pair nominates one mover's four numbers to call out.
- **Pool the class results:** Open the data-recorder with columns for pair, resting/after pulse, resting/after breathing. Brisk call-out: four numbers only, fixed order. Switch on the bar chart and talk resting vs after from the table rows even if the chart shows one series at a time.
- **Make sense of the evidence:** With the filled table still up, draw out that most pulse and breathing rates rose. Name observation vs inference: the number change is what we saw; the oxygen-delivery team is what we think it means. Treat flat results as useful data, not a failed test.

What it should show

Resting pulse often sits roughly 70–100 beats per minute at this age; after the one-minute activity both pulse and breathing commonly rise. The pattern (both go up) is the learning, not exact numbers. Flat difference often means gentle pace, a long pause before re-counting, or a missed ×4. Readings near 20 or 200 per minute usually need one calm re-count.

Misconceptions & interventions

- **Pupils treat the heart and lungs as separate — "only my heart works harder when I run."** — Point at both rising columns on the data-recorder and re-voice the team line: lungs take more oxygen in, heart pumps it faster to the muscles.
- **Pupils write the raw 15-second count under a per-minute heading (e.g. 18 instead of 72).** — On the spot, ask them to multiply by 4 and fix the journal cell before pooling — every column on the board is per minute only.
- **Pupils think a higher pulse after exercise means something is wrong with their body.** — Normalise the rise: muscles needed more oxygen, so the oxygen-delivery team sped up on purpose — that is healthy working, not damage.

Differentiation

Emerging	Developing	Proficient
• Pair with a confident timer; teacher table co-counts the first 15-second pulse and models the ×4 on paper before they continue alone. • Pupils who should not exercise stay full scientists as timer and recorder for their partner only.	• Prompt a second look at their two readings before averaging: "Are both counts close, or should you re-do one calmly?" • Ask why both pulse and breathing changed, using the oxygen-delivery team phrase in their own words.	• Fair-test critique: what stayed the same (15 s count, ×4, one-minute class timer) and what still varied between pairs (activity choice, effort). • Stretch talk: why might two pairs who both did star jumps show different sized rises?

Cross-curricular hook

Tie to Maths Data and Number — multiply by 4, average two readings, and read rises from the class bar chart.