technology

micro:bit: logging data over time

Lesson at a glance

The class programs a micro:bit to show a sensor reading as a live bar graph that keeps redrawing itself, first the light level and then another sensor of their choosing. The point of the hour is that watching a reading change over time tells you something a single number cannot: whether it is rising, falling or holding steady. Model the first graph on the board, let them build it and wave a hand over the sensor, then have them watch one reading for a stretch and describe what it did.

Learning objectives

- Program a micro:bit to log repeated readings over a period of time
- Read a logged dataset for a trend: what rose, fell or changed and when
- Explain why logging over time shows more than a single reading

Before the bell — prep

One micro:bit per pair if you have them, otherwise the MakeCode simulator, which has sliders for every sensor used here. Build the light graph yourself once beforehand and try covering the sensor, so you know what a good response looks like. A torch is useful on a dull day. Decide before the lesson which sensor the class will watch for the long look, light is the most reliable indoors.

Materials

Item	Qty	Per	Source	Low-cost substitute
micro:bit (with USB lead)	1	pair	school devices	run the lesson on the IWB using the MakeCode simulator

Safety watch-point

Normal care with devices and cables, and supervise unplugging micro:bits so the connectors are not pulled sideways. Nothing else on this lesson.

Lesson 27

Teaching moves

- **What we're building:** Show one light reading on the board and ask what it tells them about the next ten minutes. Take the answer that it tells them nothing, then say that today the micro:bit will keep reading and draw it, so they can watch it change. Do not open the editor yet.
- **Show light level:** Run this one and cover the sensor with a hand so the number drops. Ask what the number means. It is not lux or anything they can name, it is a scale the device uses, and saying that plainly now avoids a lot of confusion later.
- **Graph light level:** This is the block the lesson turns on. Model it, run it, and pass a hand slowly over the sensor so the bar visibly climbs and falls. Draw out that the forever loop is what makes it live: the graph is redrawn constantly, so what they are watching is the reading changing, not a picture of it.
- **Graph other sensors:** Let them choose a second sensor and work out the up-to value themselves. Ask what the biggest reading is likely to be before they type it, and let a wrong guess play out: a bar that never fills, or one that is full all the time, is the fastest way to learn what that number does.
- **Get creative:** This is the watching time, so protect it. Ask each pair to pick one sensor, leave it running, and describe what it did: did it rise, fall, hold steady, or jump. That description is what goes in the journal, not a table of numbers.
- **Code talk:** Talk only, nothing typed and nothing saved. Ask what watching over time showed that one reading could not have. Then take one bug and how they tracked it down. Finish on what else in the school would be worth watching this way.

What it should show

Most pupils finish with a live bar graph of the light level that responds instantly to a hand or a torch, and a second sensor graphed with a sensible up-to value. The description they can give of what their reading did over a few minutes matters more than any number. A pupil with one working graph and a clear account of what it did has met the objectives.

Misconceptions & interventions

- **Pupils expect the graph to stay on screen like a chart they could read later, and think it is broken because it keeps changing.** — Name it as a live graph. It shows what the sensor reads right now, over and over. Nothing is stored, which is exactly why they have to watch it and describe what it did.
- **Pupils treat the up-to value as decoration and leave it at whatever was there, so the bar is always full or never moves.** — Ask what the biggest reading from that sensor could be. Then change the up-to value on the board and let them watch the same reading redraw at a different scale.
- **Pupils read the bar as a measurement in a unit, and ask what the number means in degrees.** — Say that this is the device's own scale, not a unit they have met. What matters is whether it is going up or down, which is the whole point of watching over time.
- **When a sensor does not respond, pupils rebuild the program instead of testing the sensor.** — Have them change one thing, the sensor block or the up-to number, and run again. In the simulator, remind them the sliders drive the sensor and nothing will move without them.

Differentiation

Emerging	Developing	Proficient
• Aim for the light graph alone, working and responding to a hand. That is the whole idea of the lesson in one script. • The simulator is a good option here, its sliders make the graph move without needing a bright window.	• Graph a second sensor and choose the up-to value deliberately rather than by trial and error. Ask them to say why they picked it. • Watch one reading for a few minutes and describe what it did in a sentence.	• Make the reading change on purpose, a torch, a hand, a shout, and describe what the graph did each time. • Ask what they would need in order to keep the readings after the micro:bit is unplugged, and why a live graph does not do that.

Cross-curricular hook

Maths, through reading a graph. The bar is a chart with a scale the pupil chose, and the language of rising, falling and holding steady is the language of any line graph they meet later.