



micro:bit measures light and temperature

Pupils turn a micro:bit into a mini weather station and answer a real question: is it warmer in the sun, in the shade or under a tree? Coding, measuring and a first lesson on heat islands.

Ages: 10–15

Duration: 2 × 50 min

Kit: micro:bit (V2 for data logging)

Editor: makecode.microbit.org

■ What the board measures

Light — from 0 to 255

The LED display also works as a light sensor. 0 means dark, 255 bright light. It isn't a lux meter, but it's excellent for comparisons.

Temperature — in °C

The sensor is inside the processor, so it measures the chip's temperature. This is close to the air temperature, usually 1–3 °C higher when the board is working hard.

■ Lesson 1 — the first thermometer

Block version (MakeCode)

- on button A pressed → show number *temperature (°C)*
- on button B pressed → show number *light level*

The same program in JavaScript (MakeCode)

```
input.onButtonPressed(Button.A, function () {
  basic.showNumber(input.temperature())
})
input.onButtonPressed(Button.B, function () {
  basic.showNumber(input.lightLevel())
})
```

And in Python (MicroPython)

```
from microbit import *

while True:
    if button_a.was_pressed():
        display.scroll(temperature())
    if button_b.was_pressed():
        display.scroll(display.read_light_level())
    sleep(100)
```

Lesson 2 — the experiment: sun, shade, tree

- 1 **Hypothesis.** Each team writes down where they think it will be warmest, and why.
- 2 **Measuring.** The board stays 3 minutes in each place: tarmac in the sun, grass in the shade, under a tree. Record temperature and light.
- 3 **Class table.** Teams add their values to a shared table and calculate the average.
- 4 **Conclusion.** Was the hypothesis confirmed? What does it mean for a school yard without trees?

Place	Time	Light (0–255)	Temperature (°C)	Notes
Tarmac, in the sun				
Grass, in the shade				
Under a tree				
In the classroom				

Going further: automatic data logging (micro:bit V2)

With the **datalogger** extension in MakeCode, the board records values by itself — for example once a minute, all day. The data then opens as a table, straight from the board, in a browser.

```
datalogger.setColumnTitles("light", "temperature")
loops.everyInterval(60000, function () {
    datalogger.log(
        datalogger.createCV("light", input.lightLevel()),
        datalogger.createCV("temperature", input.temperature())
    )
})
```

The environmental link

Dark surfaces without vegetation heat up much more than surfaces shaded by trees. This is called the **urban heat island** effect. Pupils now have their own data for a concrete proposal: where should trees be planted in the school yard?

Look after the kit

The board isn't waterproof. Outdoors, put it in a clear zip-lock bag and don't leave it in direct sun for more than a few minutes, so it doesn't heat itself up.

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