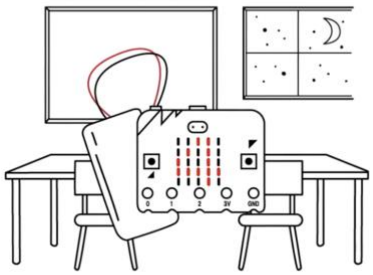
Investigating the world around us project workbook

OVERVIEW

In this Science investigation, learners will explore their local environment by using the sensors on the micro:bit. They will take three measures (temperature, sound and light level) and explore how they change in different locations.



Once they have collected their data, they will then be able to use that data to answer questions like: Where was the coldest place? Where was the noisiest place?

In this project, your learners will:

- Conduct a scientific experiment measuring temperature, light and sound levels.
- Explore how measurements change depending on location and other factors.
- Draw conclusions using the data collected.

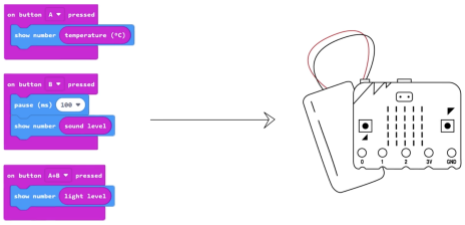
This workbook is part of the “Science exploration with the micro:bit” Professional Development course by the Micro:bit Educational Foundation.

EQUIPMENT

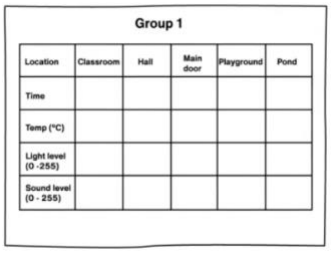
To run this investigation, you will need:

- ❑ micro:bits for your learners with the environment exploration code loaded. (See Appendix 1 – micro:bit code)

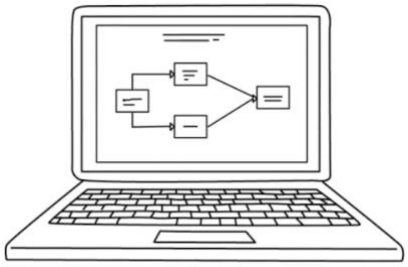
  This can be done in advance or in the lesson.



- ❑ Our data recording sheet or some paper to make your own. (See Appendix 2 – data recording sheet)



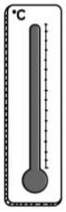
- ❑ **Optional**: slide-deck to help explain the project. (See Appendix 3 – slide-deck)

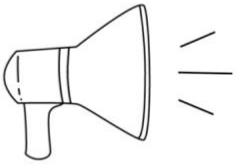


INVESTIGATE

STEP 1 – OUTLINE THE INVESTIGATION

Once the code is on their micro:bits, explain to learners that they will be measuring three things: temperature, light and sound.

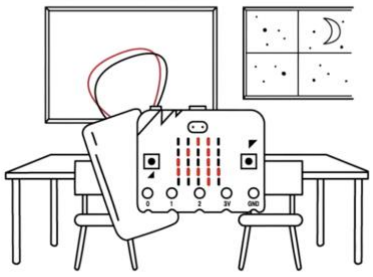


STEP 2 – IDENTIFY LOCATIONS TO COLLECT DATA

Decide on a set of locations to record data with the class. You could do this in advance, but deciding as a class allows learners to identify and hypothesize locations that might show different data.

Consider having a variety of locations both indoor and outdoor. For example, in the classroom, hall and by the main door.




STEP 3 – DEMONSTRATE HOW THE INVESTIGATION WORKS

Model how to use the micro:bits to get temperature, light and sound readings:

MICRO:BIT FEATURE	MEASURES	DATA COLLECTED	
Button A	Temperature	Measured in degrees Celsius	Remind learners that they should let their micro:bit sit in the new location for a few minutes to get an accurate temperature reading.
Button B	Sound	Scale = 0 (no sound) to 255 (loud sound).	Learners should be encouraged to press the button and step back.
Button A + B	Light	Scale = 0 (dark) to 255 (bright light).	You can remind learners that things like shade will impact light levels.

STEP 4 – INVESTIGATION TIME

Ensure learners understand what the buttons measure and what locations they are visiting, then send them off to investigate, making sure they have the data recording sheet or a piece of paper to record results.

The data recording sheet reminds learners what each button does as a useful memory aid.

For each location, they should record the three measures (temperature, sound and light).

DISCUSS

Once they have collected their data, bring everyone back together.

CONSIDER SOME KEY QUESTIONS

Where was the coldest place? Warmest place? Noisiest? Quietest? Brightest? Darkest?

INTERROGATE DATA FURTHER

Were there any surprising results?

Was there any variance in results gathered between groups? Why might that be?

> *Consider that the groups were recording data at different times, so things like the sun going behind a cloud or a large bus going past, will impact results.*

EXPLORE ROBUSTNESS

How might learners combine data to provide more robust results?

> *One way to do this is to take an average of multiple readings. For example, if there was variance in the light level data collected by the main door, you can take an average of all the readings collected.*

OPTIONAL CODING

As an optional activity, you can share the code with your learners and explore it together. As the learners will have a practical understanding of how the investigation worked, they should be able to relate that to the code they see on the screen.

We have annotated the code with comments to help support understanding (See Appendix 4 – annotated code).

APPENDICES

APPENDIX 1 – MICRO:BIT CODE

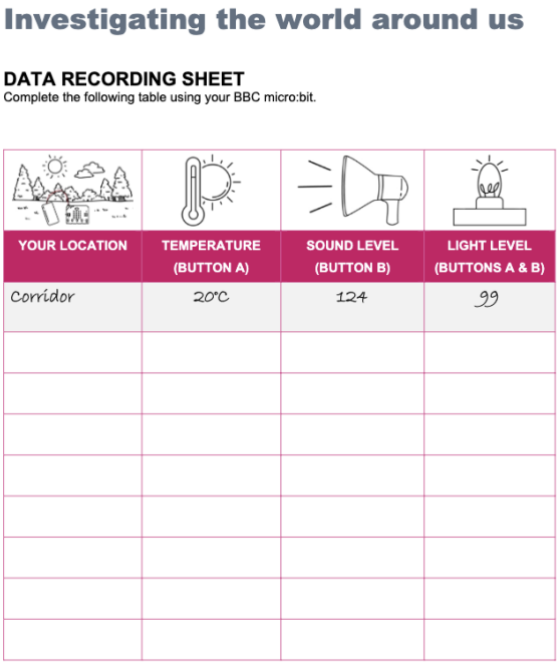
We have prepared the code for you so that you don't need to do any coding to run this science investigation. You can simply use the micro:bit as the science tool.

There are two ways to get the code:

	WHERE DO I GET IT?	HOW TO PUT IT ON THE MICRO:BIT?
Hex file	We have included a hex file (the code file) in the supporting materials download	Instructions are available in this video – putting a hex file on your micro:bit (https://mbit.io/pd-hex)
Downloaded from Microsoft MakeCode	Alternatively, you can access then download the code from MakeCode: https://mbit.io/pd-world-code	Instructions are available in this video – direct flashing from MakeCode (https://mbit.io/pd-flashing)

APPENDIX 2 – DATA RECORDING SHEET

The data record sheet is available to Download materials page.



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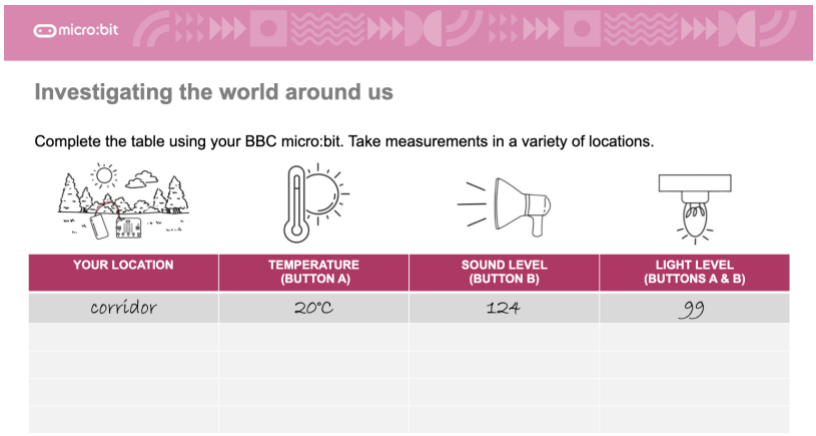
DATA RECORDING SHEET

Complete the following table using your BBC micro:bit.

YOUR LOCATION	TEMPERATURE (BUTTON A)	SOUND LEVEL (BUTTON B)	LIGHT LEVEL (BUTTONS A & B)
Corridor	20°C	124	99

APPENDIX 3 – SLIDE-DECK

The slide for sharing with your class (should you need it) is available to Download materials page.



micro:bit

Investigating the world around us

Complete the table using your BBC micro:bit. Take measurements in a variety of locations.

YOUR LOCATION	TEMPERATURE (BUTTON A)	SOUND LEVEL (BUTTON B)	LIGHT LEVEL (BUTTONS A & B)
corridor	20°C	124	99

APPENDIX 4 – ANNOTATED CODE

Should you want to explore the code further, the annotated code below explains the purpose of each block of code and how they work together.