sserc

STEM AMBASSADOR HUB

STEM AMBASSADORS IN SCOTLAND

Nuffield Research Placements

CELEBRATING 25 YEARS

YOUNG STEM leader

led by sserc

Education sserc Industry

PARTNERSHIPS

SSERC MEET – MICROBITS IN THE BIOLOGY CLASSROOM

sserc

To inspire, enthuse and support STEM educators for the benefit of all learners

Professional Learning
gtc
SCOTLAND
2021-2026
AWARDED ORGANISATION

1. Provision of professional learning

Supporting childminders, early years practitioners, primary and secondary school teachers, school technicians and other educators in voluntary, youth work or CLD settings to deliver high-quality, hands-on practical STEM activities for learners

2. The Advisory Service

To ensure the delivery of practical STEM learning is safe for childminders, early years practitioners, primary and secondary school teachers, school technicians and other educators in voluntary or CLD settings and their learners

3. STEM Engagement

Operation of the STEM Ambassador Hub in Scotland, Young STEM Leader Programme, Education Industry Partnerships, Nuffield Research Placements, ESERO Champion, and ENTHUSE Partnerships

Join the discussion

Go to

www.menti.com

Enter the code

2952 3834

Or use QR code

Aims of the Session

- To demonstrate the impact of coding in the Science classroom

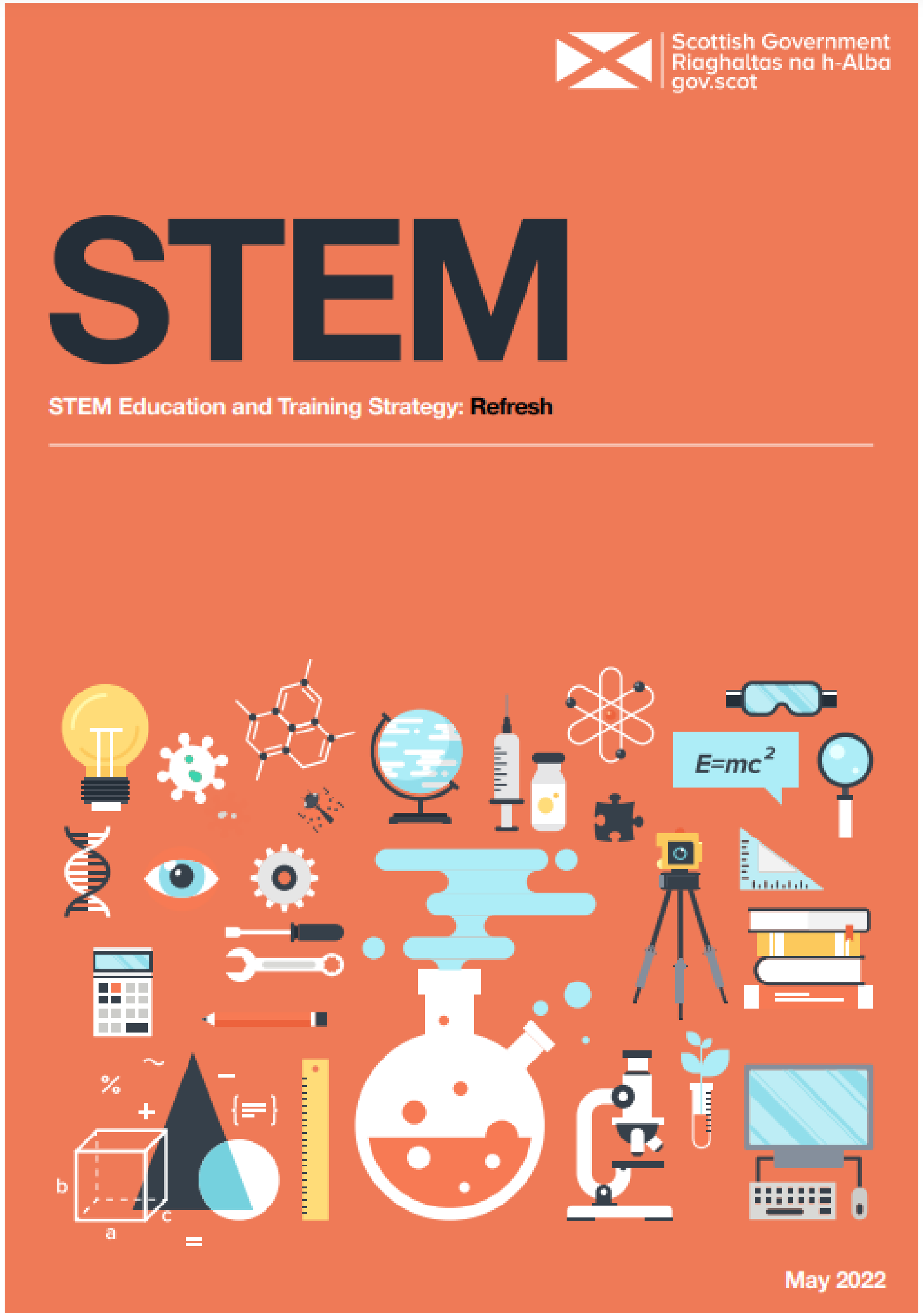
- To illustrate the functionality of the Micro:bit

SSERC Meet: Micro:bits in the biology classroom

Friday 24th February: 4.15 – 5.15pm	
4.15 – 4.20	Introduction to SSERC and to this short course
4.20 – 4.30	Session 1: Light meter
4.30 – 4.40	Session 2: Soil moisture meter
4.40 – 4.50	Session 3: Reaction game
4.50 – 5.00	Session 4: Muscle sensor
5.00 – 5.15	Questions and shared experience of Micro:bits in the classroom

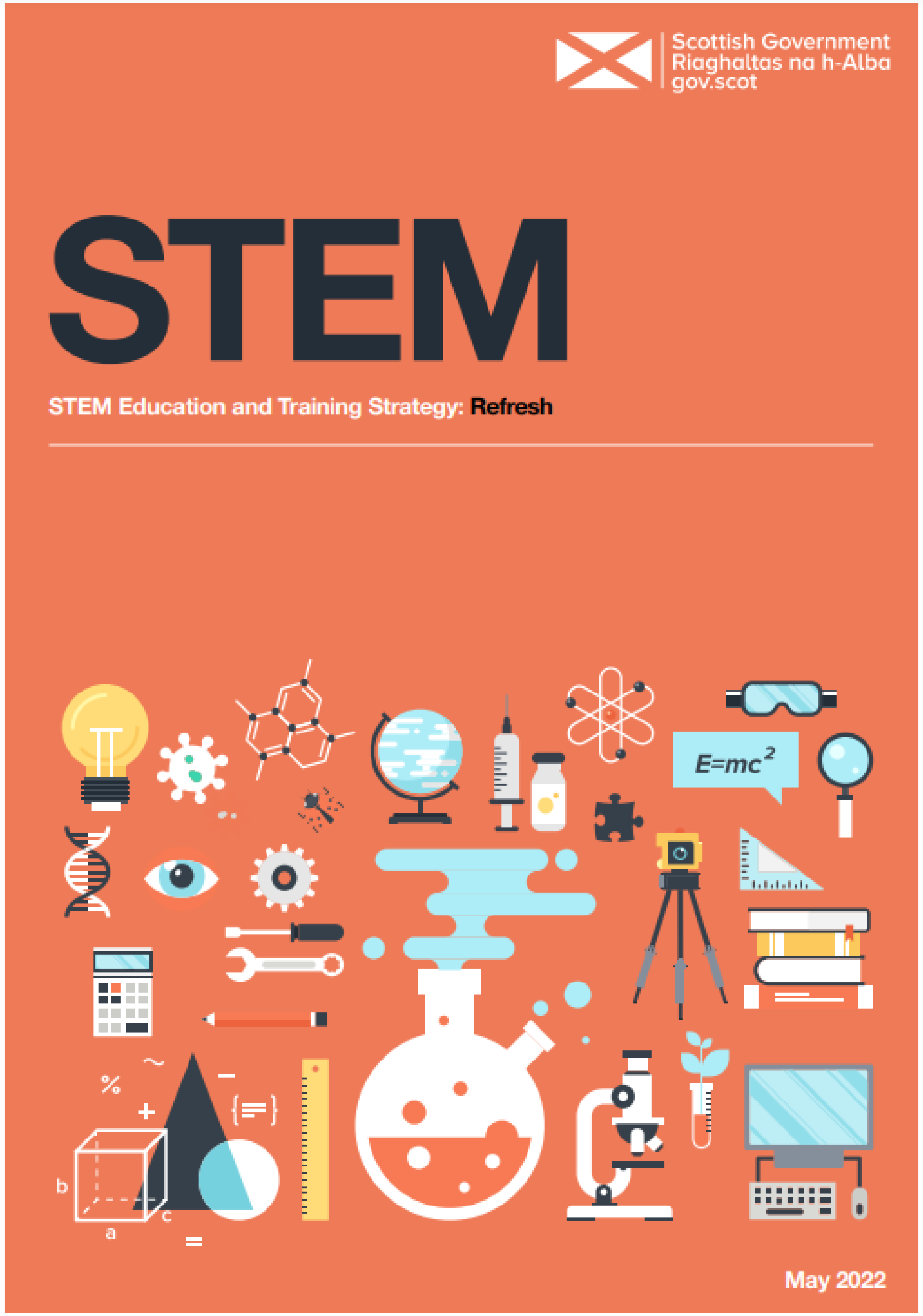
In line with our broader ambitions around equality, we are working to encourage more girls and young women to engage with computing science with a view to strengthening Scotland's future tech sector.

By supporting school-stage extra-curricular programming clubs offering exciting extracurricular activities, we aim to expand and diversify the talent pipeline of young people who study technology-related disciplines and ultimately pursue a career in digital technologies.



- **Digital skills** play a huge and growing role in society and the economy as well as enabling the other STEM disciplines. Like mathematics, digital skills and digital literacy in particular are essential for participation in society and across the labour market. Digital skills embrace a spectrum of skills in the use and creation of digital material, from basic digital literacy, through data handling and quantitative reasoning, problem solving and computational thinking, to the application of more specialist computing science knowledge and skills that are needed in data science, cyber security and coding. Within digital skills, as noted above, computing science is a separate discipline and subject.

However, it is often the interconnections between these separate parts that are important in life and in work.



SESSION 1:
WHY USE MICRO:BITS?

Students <u>create</u> technology with the micro:bit.

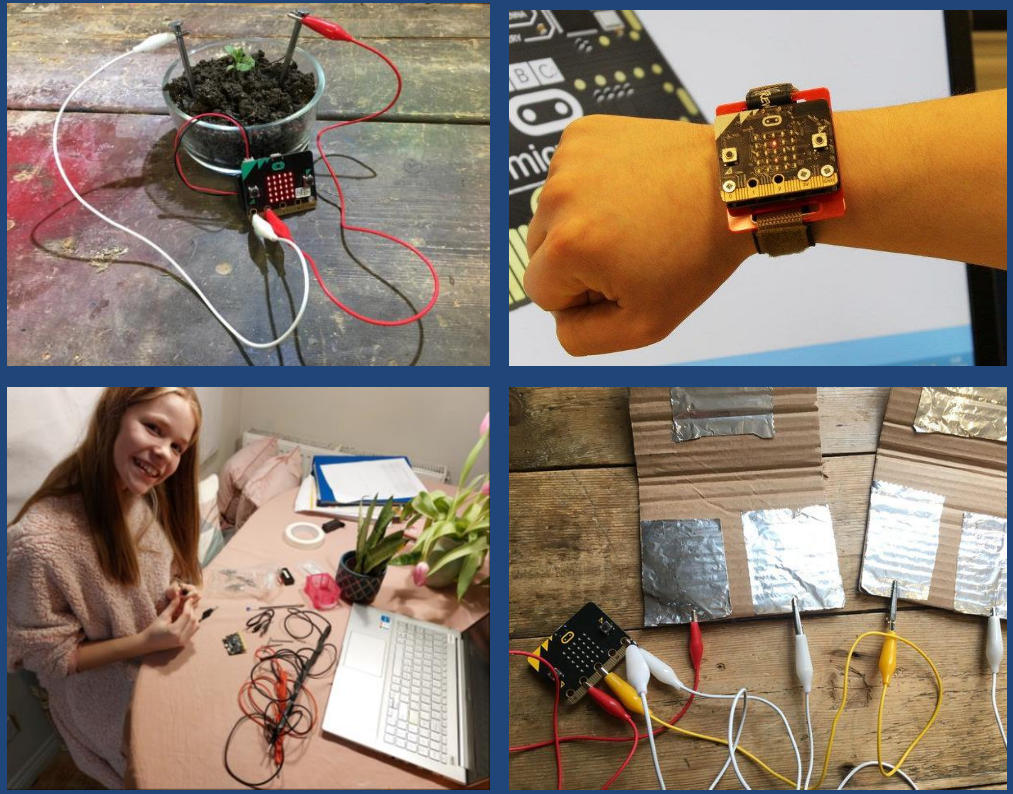
Pupils need to change from being users of technology to being creators, in order to develop <u>critical skills</u>.

Why micro:bit?

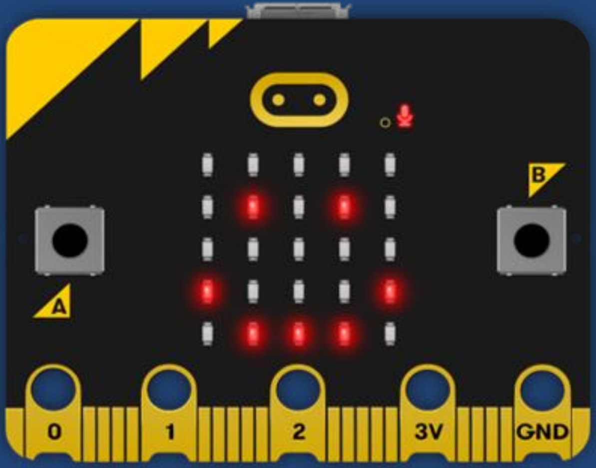
Pupil skills

Collaboration	Communication
Leadership	Critical Thinking
Creativity	Problem Solving

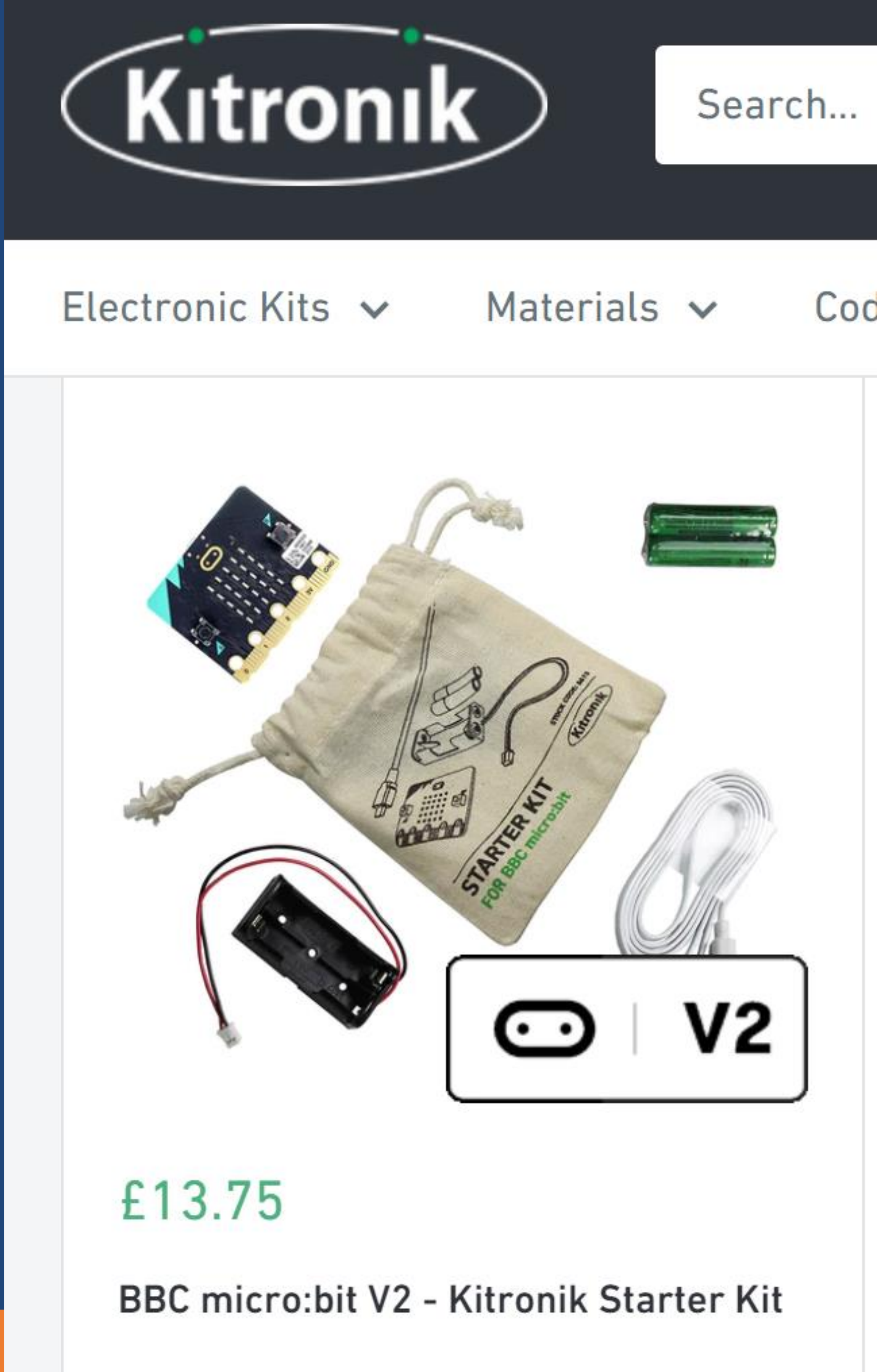
Enhance Engagement



Why micro:bit?

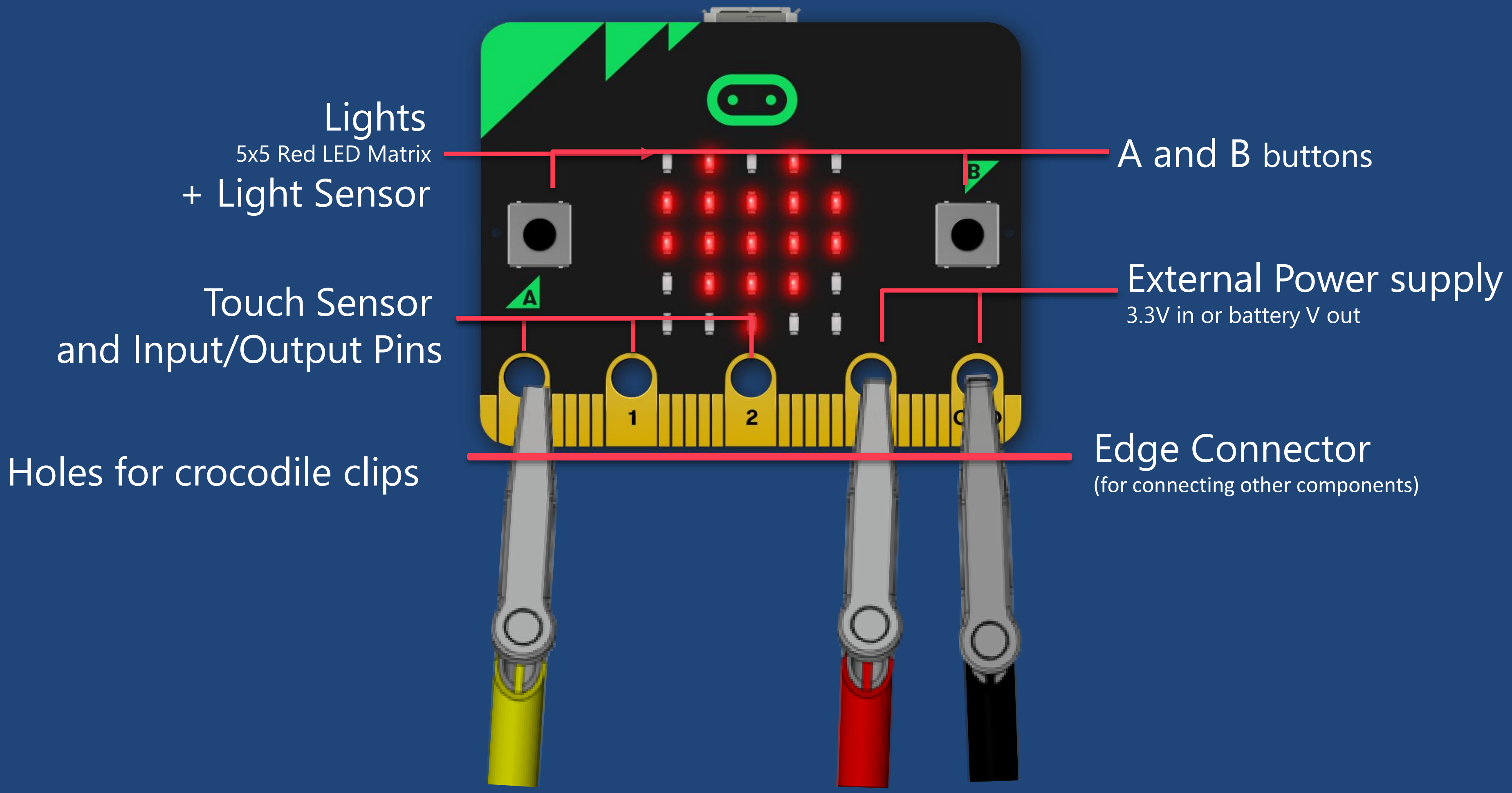


- Perfect tool for developing skills
- Affordable and durable
- Scottish Government providing 2 boxes per school
- Compatible with most devices
- ‘Wow’ factor and engagement
- Brilliant free online infrastructure to support
- Accessible for beginners but unlimited possibilities
- Can be used across the curriculum – vehicle for Cross Curricular learning

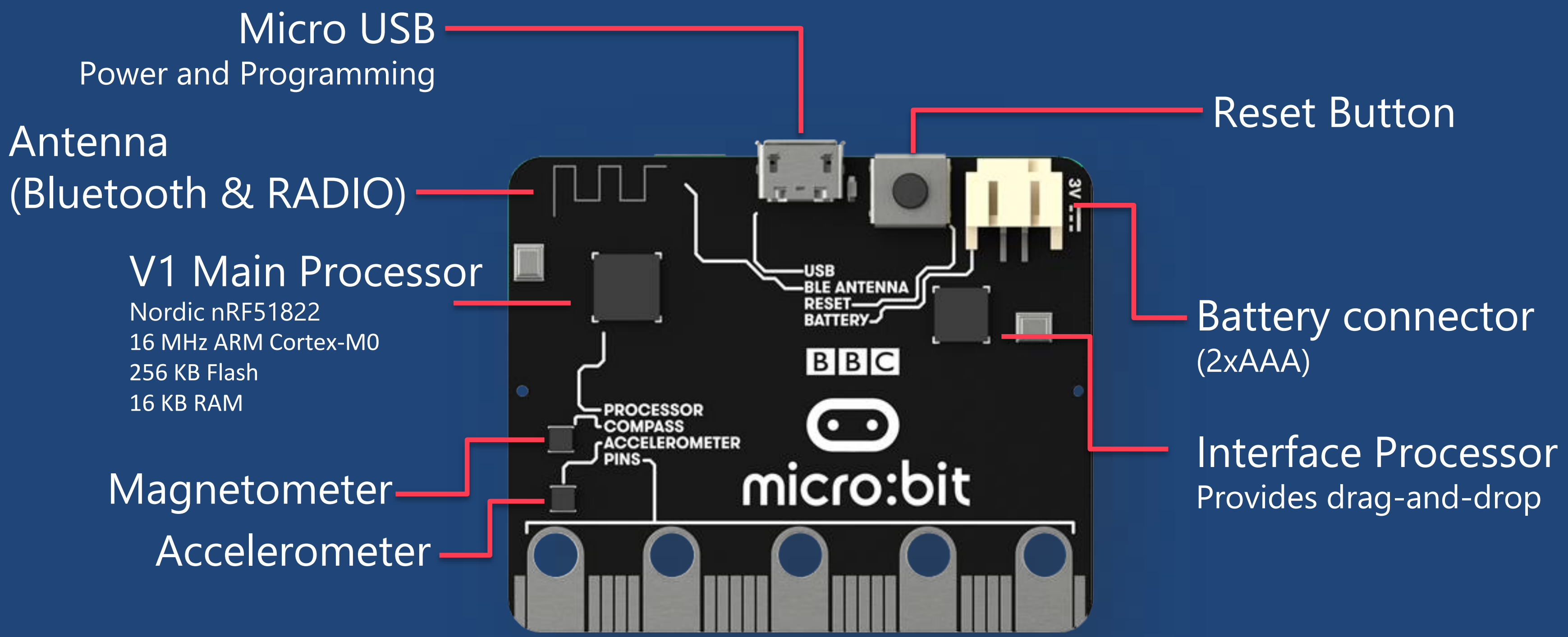


sserc

Micro:bit V1 & 2 (front)



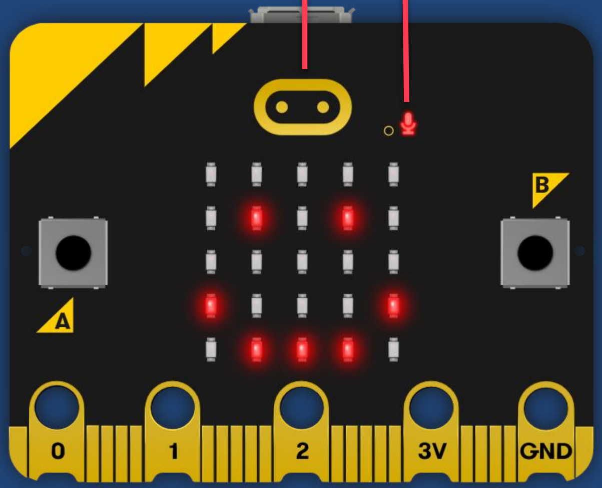
Micro:bit V1 & 2 (back)



Micro:bit V2 only

Touch sensor

Microphone on indicator



Notches make clipping connectors easier

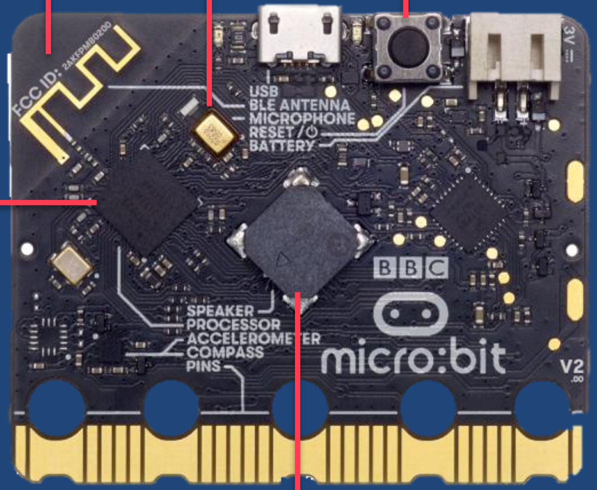
Updated Processor

Nordic nRF52833
64 MHz ARM Cortex-M4
512 KB Flash
128 KB RAM

Updated Radio Antenna

Microphone

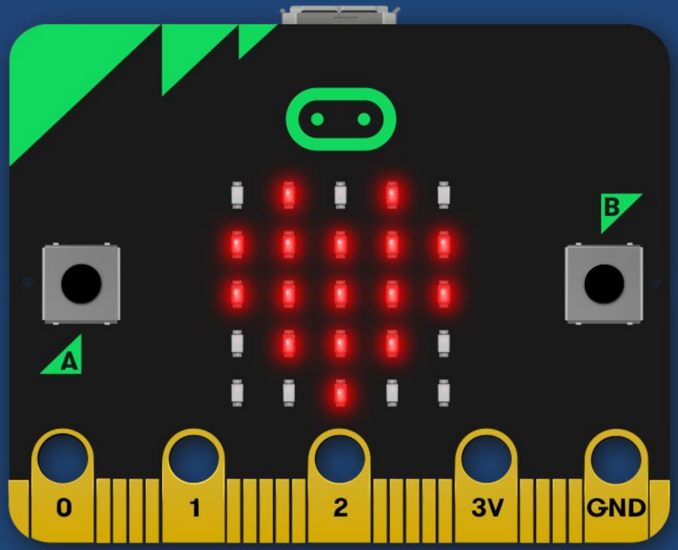
Reset + Sleep Mode



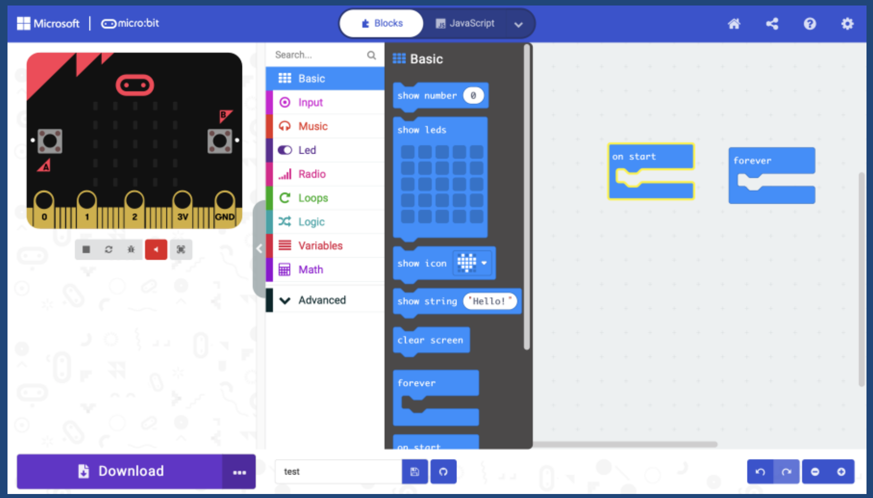
Speaker

Hardware & Software

To use the micro:bit you need both the hardware and software



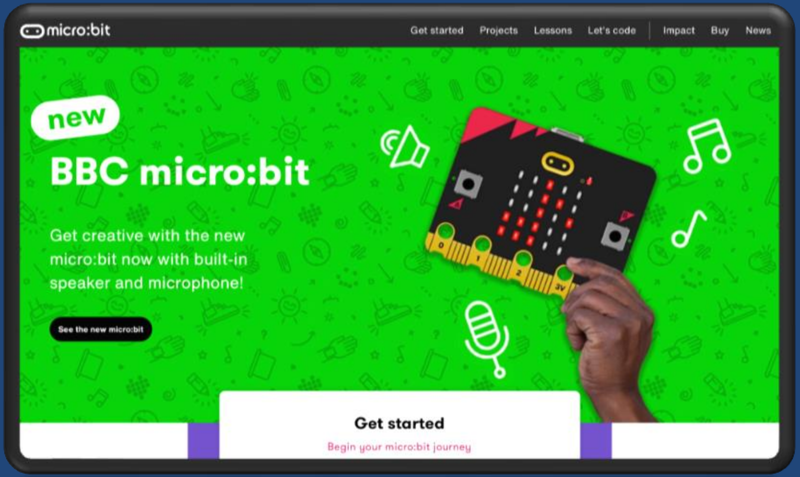
+



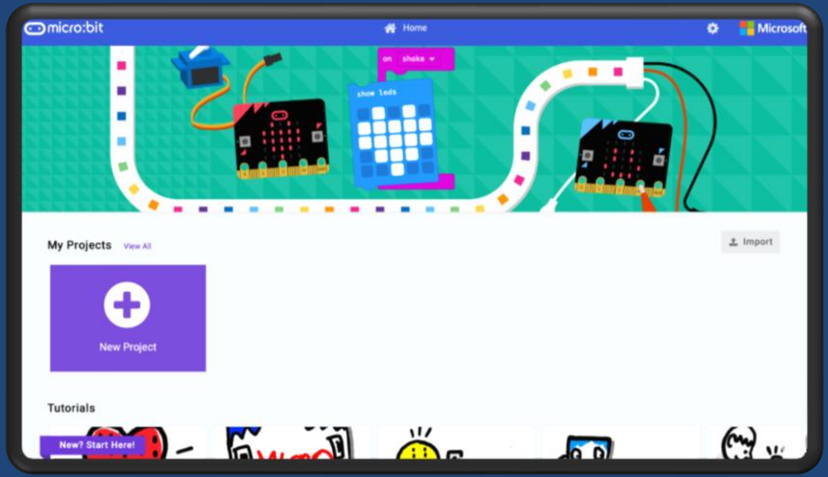
Microsoft MakeCode

No Computing Science Knowledge Required!

micro:bit.org vs MakeCode



vs



Using microbit.org

Classroom joining details

Open the URL and enter the classroom name and PIN

Go to URL	microbit.org/join
Classroom name	Green Bear Ice skate Piano
PIN	226637

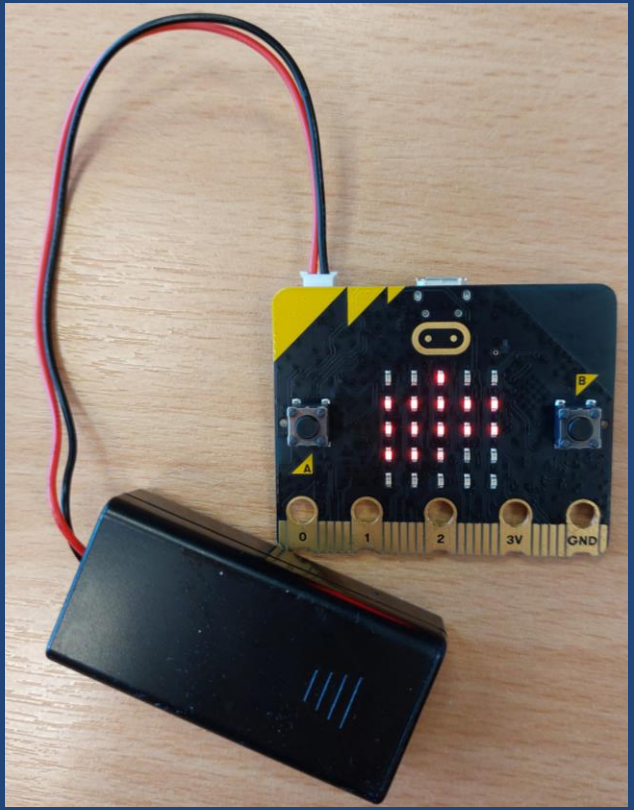
You need to input the classroom name AND pin.

SESSION 2: A LIGHT METER

Curriculum Organisers		Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement
	Biodiversity and interdependence	I can sample and identify living things from different habitats to compare their biodiversity and can suggest reasons for their distribution. SCN 3-01a	• Identifies living things using biological keys. • Collects and analyses increasingly complex data and information, for example, temperature and light intensity, to suggest reasons for the distribution of organisms within different habitats.

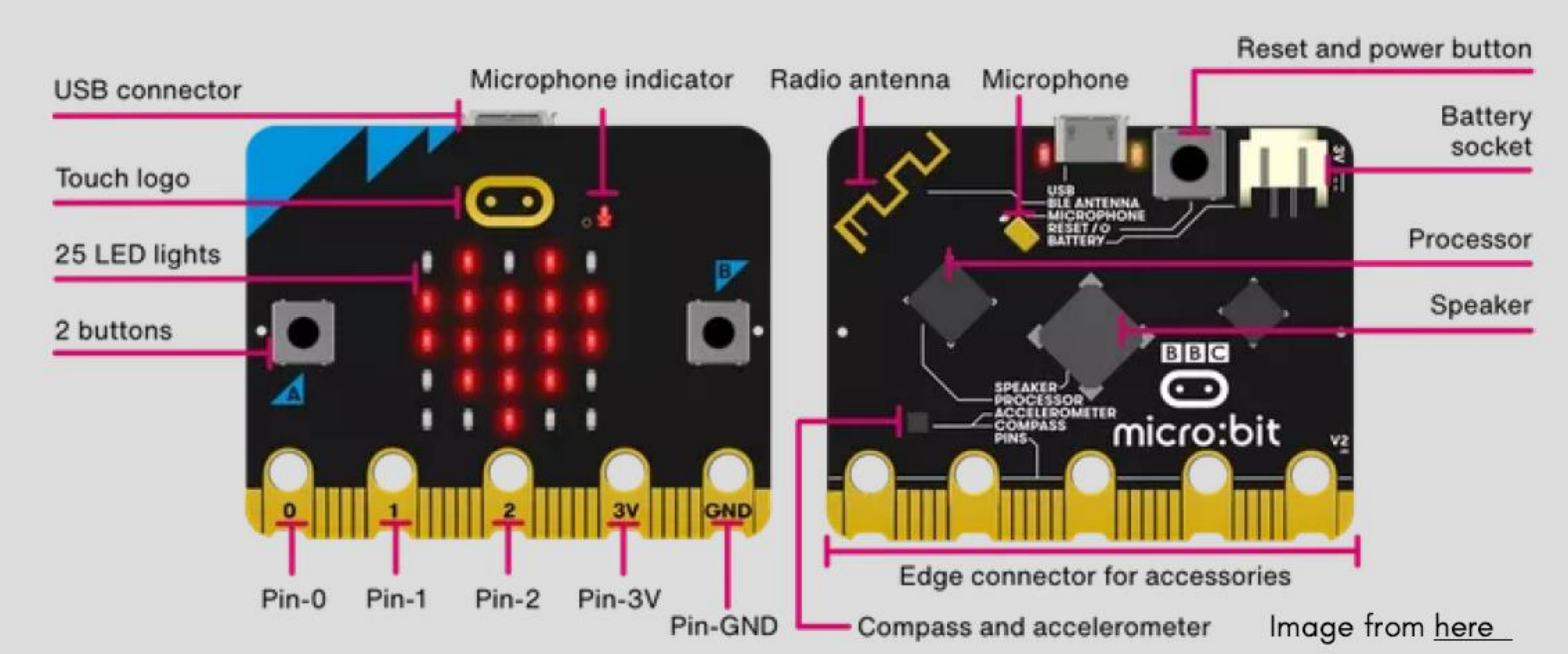
Biology: life on Earth (continued)		
Key areas	**Depth of knowledge required**	**Suggested learning activities**
1 Ecosystems (continued)		
d Competition in ecosystems occurs when resources are in short supply. Interspecific competition occurs amongst individuals of different species for one or a few of the resources they require. Intraspecific competition occurs amongst individuals of the same species and is for all resources required. Intraspecific competition is therefore more intense than interspecific competition.		♦ Investigate interspecific competition in animals, eg red and grey squirrels, brown and rainbow trout. ♦ Investigate interspecific competition in plants, eg a variety of different seeds grown together. ♦ Investigate intraspecific competition, eg cress seedling density, trees of the same species growing close together.
2 Distribution of organisms		
a Competition for resources, disease, food availability, grazing and predation are biotic factors. Light intensity, moisture, pH and temperature are abiotic factors.		♦ Interpret predator prey interaction graphs.
b Measuring abiotic factors such as light intensity, soil moisture, pH and temperature. Possible sources of error and how to minimise them.		♦ Use of techniques for abiotic factors: temperature using thermometer or temperature probes, light using light meters, moisture using moisture meters, pH using pH meters or chemical test. ♦ Use of probes linked to appropriate data logging software.

- Device
- Micro:bit v2
- MakeCode website



Coding the Micro:bit

This will function as a Light Meter.



sserc

Pros and cons?

3 in 1 Soil Meter

Provides quick indications of soil moisture pH and light conditions.

Pack Size: 1

View full specifications

Code: SO96204

Be the first to review this product

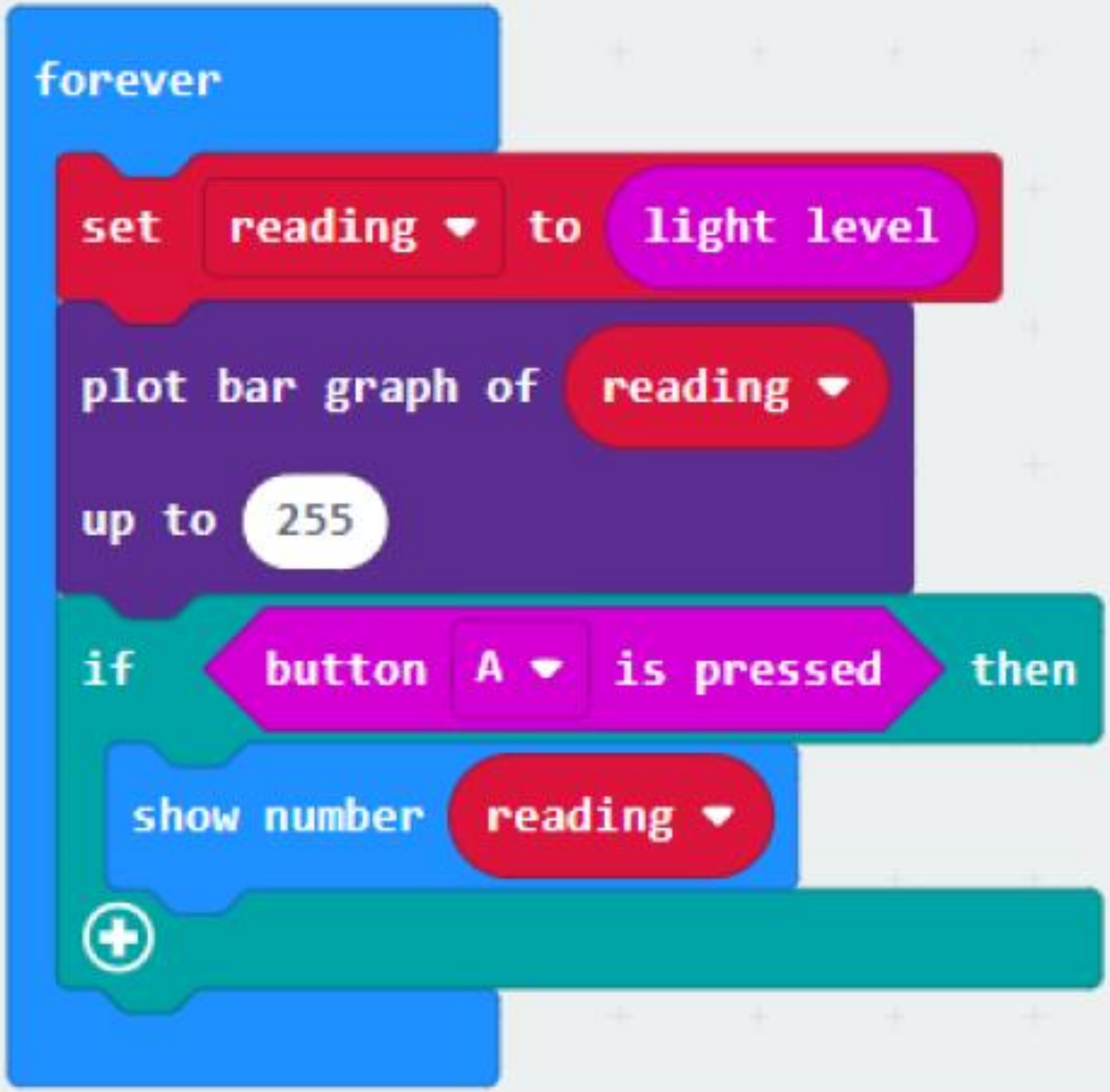
£10.80

£12.96 Inc. VAT

In stock

- 1 +

Add to Basket



Great one to start with because the makecode website has a step-by-step tutorial on how to code the micro:bit

SESSION 2:
SOIL MOISTURE METER

Curriculum Organisers		Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement
	Biodiversity and interdependence	I can sample and identify living things from different habitats to compare their biodiversity and can suggest reasons for their distribution. SCN 3-01a	• Identifies living things using biological keys. • Collects and analyses increasingly complex data and information, for example, temperature and light intensity, to suggest reasons for the distribution of organisms within different habitats. or soil moisture!

Forces, electricity and waves

Electricity	Having measured the current and voltage in series and parallel circuits, I can design a circuit to show the advantages of parallel circuits in an everyday application. SCN 3-09a	• Applies knowledge from practical investigations to describe the similarities and differences between series and parallel circuits and explain the advantages of parallel circuits in an everyday application.

Biology: life on Earth (continued)		
Key areas	**Depth of knowledge required**	**Suggested learning activities**
1 Ecosystems (continued)	N5	
d Competition in ecosystems occurs when resources are in short supply. Interspecific competition occurs amongst individuals of different species for one or a few of the resources they require. Intraspecific competition occurs amongst individuals of the same species and is for all resources required. Intraspecific competition is therefore more intense than interspecific competition.		♦ Investigate interspecific competition in animals, eg red and grey squirrels, brown and rainbow trout. ♦ Investigate interspecific competition in plants, eg a variety of different seeds grown together. ♦ Investigate intraspecific competition, eg cress seedling density, trees of the same species growing close together.
2 Distribution of organisms		
a Competition for resources, disease, food availability, grazing and predation are biotic factors. Light intensity, moisture, pH and temperature are abiotic factors.		♦ Interpret predator prey interaction graphs.
b Measuring abiotic factors such as light intensity, soil moisture, pH and temperature. Possible sources of error and how to minimise them.		♦ Use of techniques for abiotic factors: temperature using thermometer or temperature probes, light using light meters, moisture using moisture meters, pH using pH meters or chemical test. ♦ Use of probes linked to appropriate data logging software.

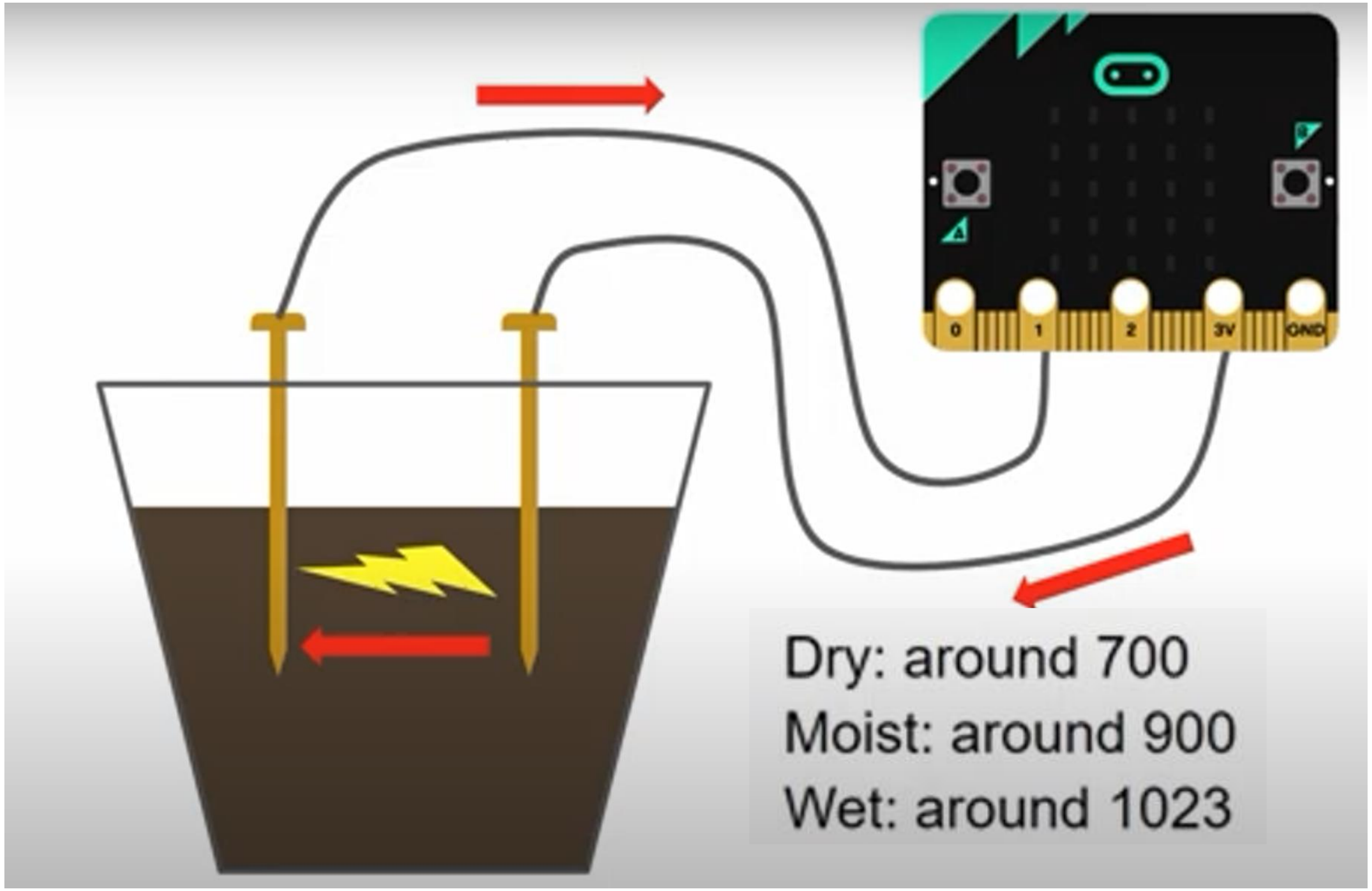
- Microbit & device
- Makecode website

Part 1 – quantifying moisture levels

- 3x Soil in a container – 1 dry, 1 just right, 1 too wet
- Access to water
- 2 nails
- 4 wires
- 8 crocodile clips
- Paper and pen to record values

Part 2 – Measure soil moisture

- Plants in soil

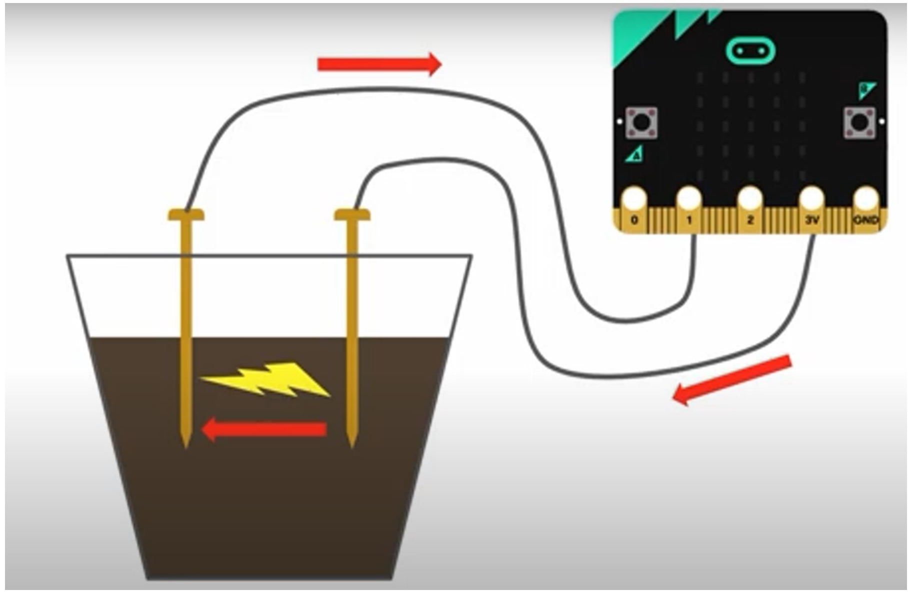


Part 1: Calibration
Need to determine what "dry", "just right", and "saturated" soil will display as on the micro:bit.

These values are then used in the code for part 2.

Part 1

```
on button A pressed
    show number analog read pin P1
```



Part 2

```
forever
    set moisture to analog read pin P1
    if moisture > 1100 then
        show icon
    else if moisture > 900 then
        show icon
    else
        show icon
        play tone High C for 1 beat
        play tone Middle C for 1 beat
```

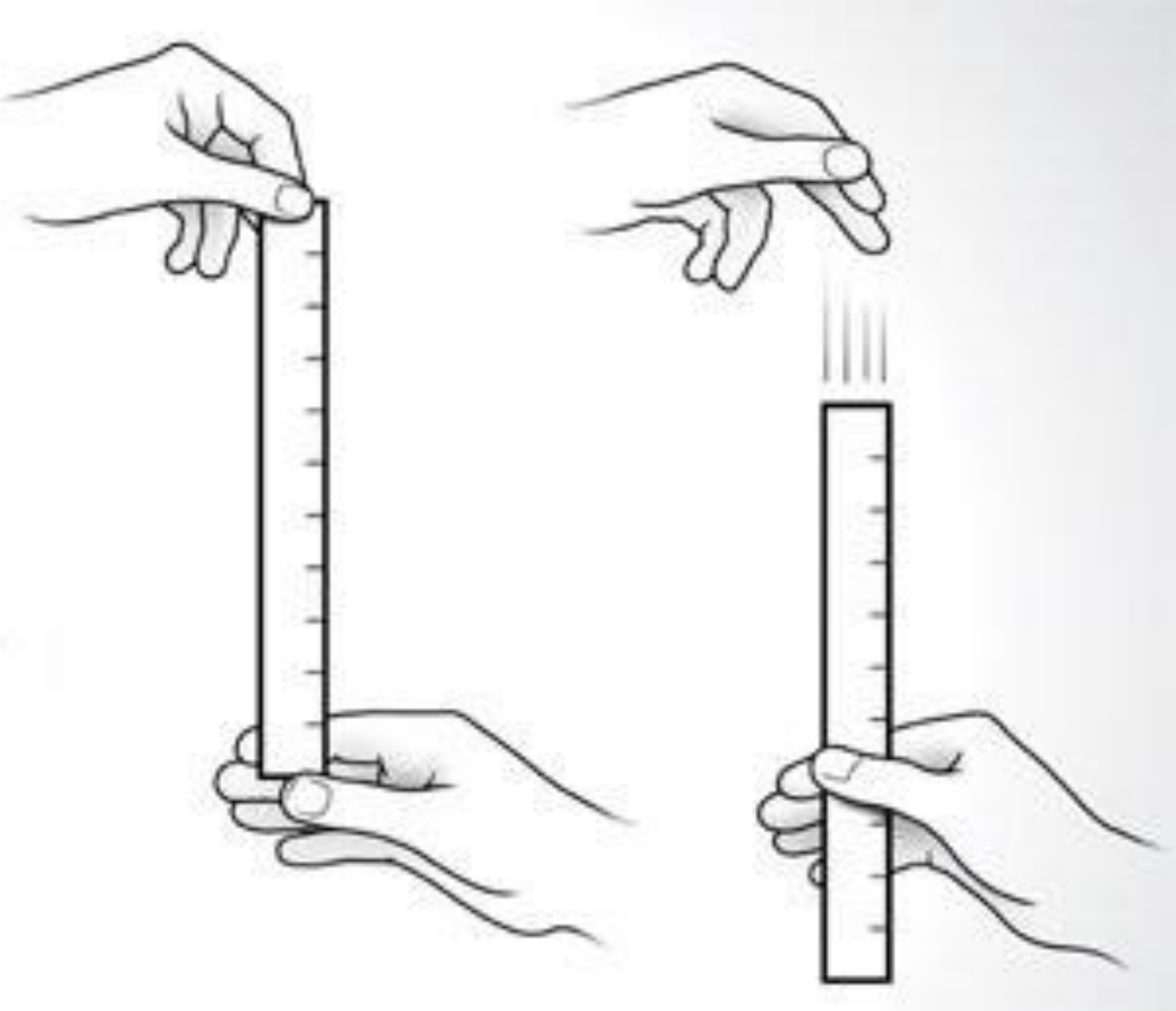
Bit more tricky – you are making the code from scratch – no tutorial on makecode website

SESSION 3:
A REACTION TIMER

N5

Biology: multicellular organisms (continued)		
Key areas	**Depth of knowledge required**	**Suggested learning activities**
2 Control and communication a **Nervous control**	A response to a stimulus can be a rapid action from a muscle or a slower response from a gland.	
i Nervous system consists of central nervous system (CNS) and other nerves. CNS consists of brain and spinal cord. Structure and function of parts of the brain — cerebrum, cerebellum and medulla. Neurons are of three types: sensory, inter and motor. Receptors detect sensory input/stimuli. Electrical impulses carry messages along neurons. Chemicals transfer these messages between neurons, at synapses.	Sensory neurons pass the information to the CNS. Inter neurons operate within the CNS, which processes information from the senses that require a response. Motor neurons enable a response to occur at an effector (muscle or gland).	♦ Investigate reaction time in humans.
ii Structure and function of reflex arc.	Reflexes protect the body from harm.	♦ Research/investigate examples of human reflex activities, eg blinking, iris reflex, response to pain.

Sheep Dash - How Fast Are Your Reactions 3.3 stars (22,574 plays / 26 votes) FULLSCREEN

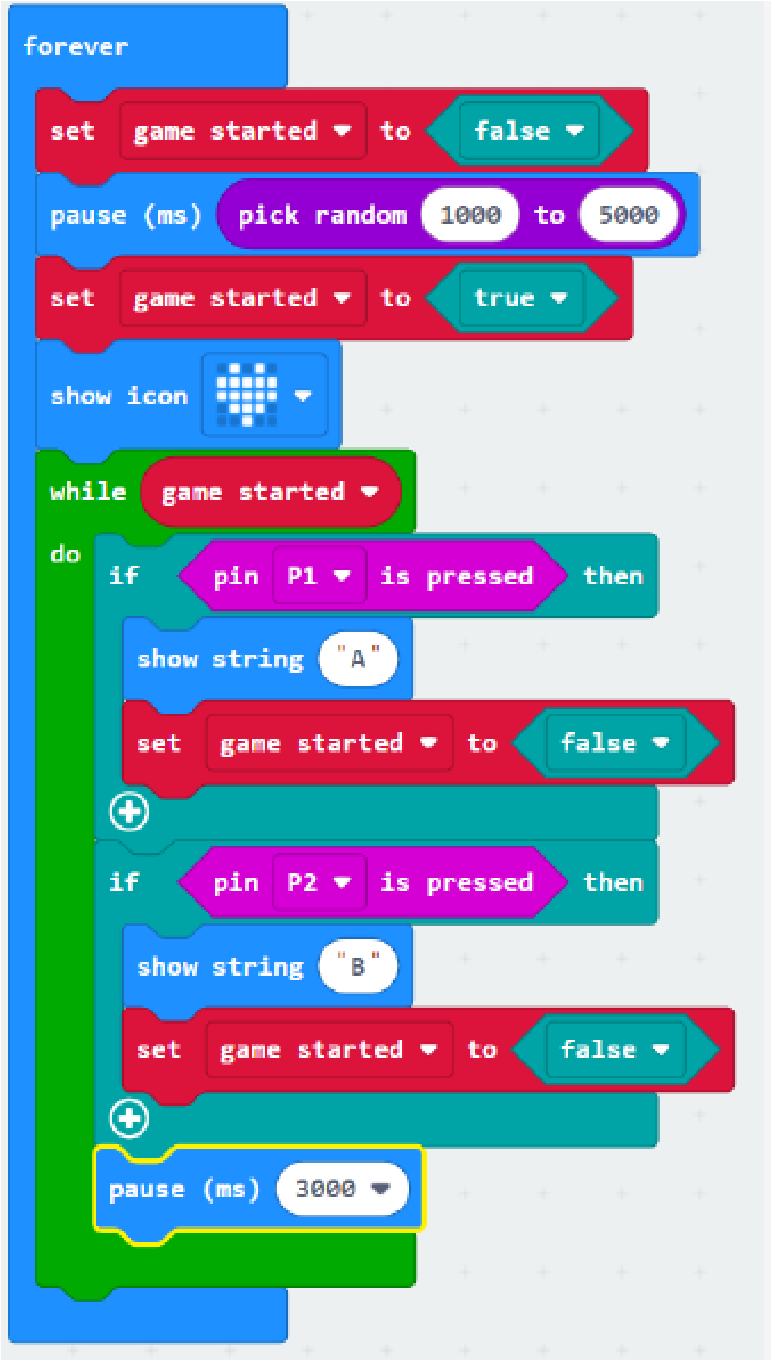


All good and very addictive – but again, here pupils are *users* of technology instead of *creators*.

Explore *our growing brain* by testing your reaction rate with the Micro:bit

MATERIALS

- [Micro:bit]()
- A device to make the code.
- [MakeCode website]().
- 4 crocodile clips & leads
- 2 pieces of cardboard
- 4x pieces of aluminium foil
- Sellotape
- Scissors
- Marker pen


forever
set game started to false
pause (ms) pick random 1000 to 5000
set game started to true
show icon
while game started
do
if pin P1 is pressed then
show string "A"
set game started to false
if pin P2 is pressed then
show string "B"
set game started to false
pause (ms) 3000

SESSION 4:
A MUSCLE SENSOR

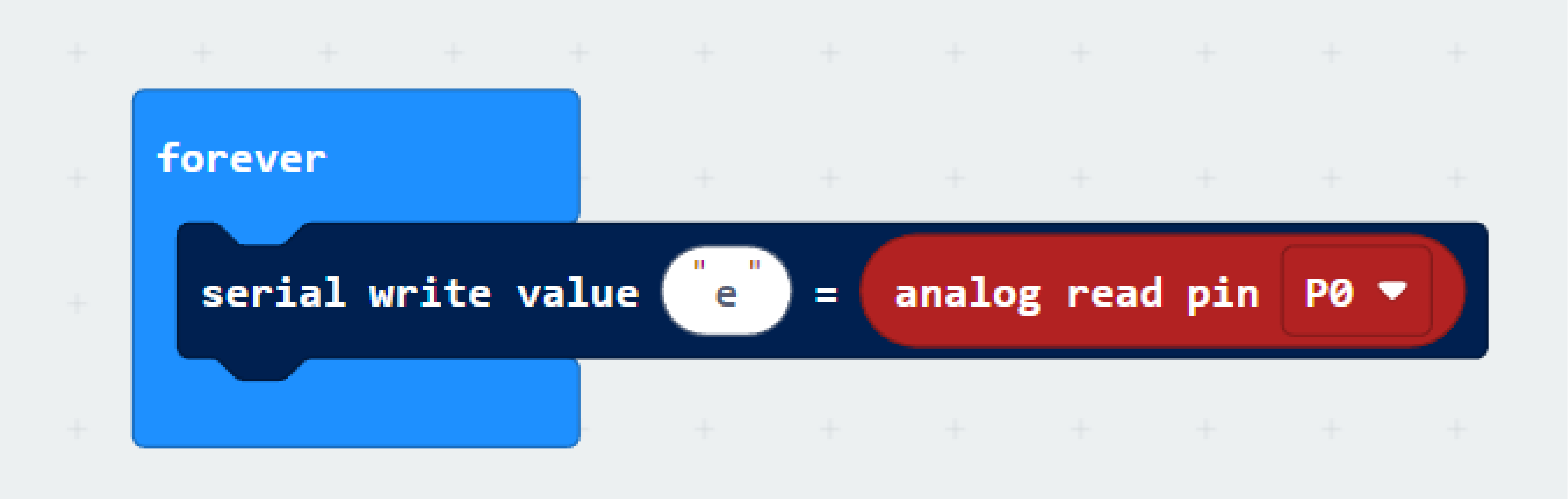
N5

Biology: multicellular organisms (continued)		
Key areas	**Depth of knowledge required**	**Suggested learning activities**
2 Control and communication a **Nervous control**	A response to a stimulus can be a rapid action from a muscle or a slower response from a gland.	
i Nervous system consists of central nervous system (CNS) and other nerves. CNS consists of brain and spinal cord. Structure and function of parts of the brain — cerebrum, cerebellum and medulla. Neurons are of three types: sensory, inter and motor. Receptors detect sensory input/stimuli. Electrical impulses carry messages along neurons. Chemicals transfer these messages between neurons, at synapses.	Sensory neurons pass the information to the CNS. Inter neurons operate within the CNS, which processes information from the senses that require a response. Motor neurons enable a response to occur at an effector (muscle or gland).	♦ Investigate reaction time in humans.
ii Structure and function of reflex arc.	Reflexes protect the body from harm.	♦ Research/investigate examples of human reflex activities, eg blinking, iris reflex, response to pain.



Materials required

- Micro:bit
- Makecode website
- 2 pieces of aluminium foil, folded to create a rectangle ~3cm x 2cm
- 2 pieces of masking tape
- 4 crocodile clips
- 2 wires
- Device


forever
serial write value "e" = analog read pin P0

Open to questions, comments or sharing what you've done in schools as well ☺