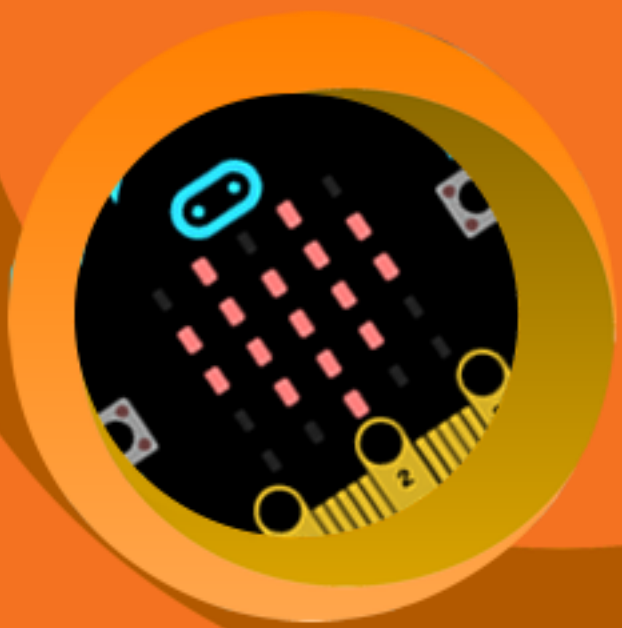
THE DUSTON SCHOOL 4-19

Knowledge Organiser

Computing

Year 8 Term 2: Microbits



Enquiry Question

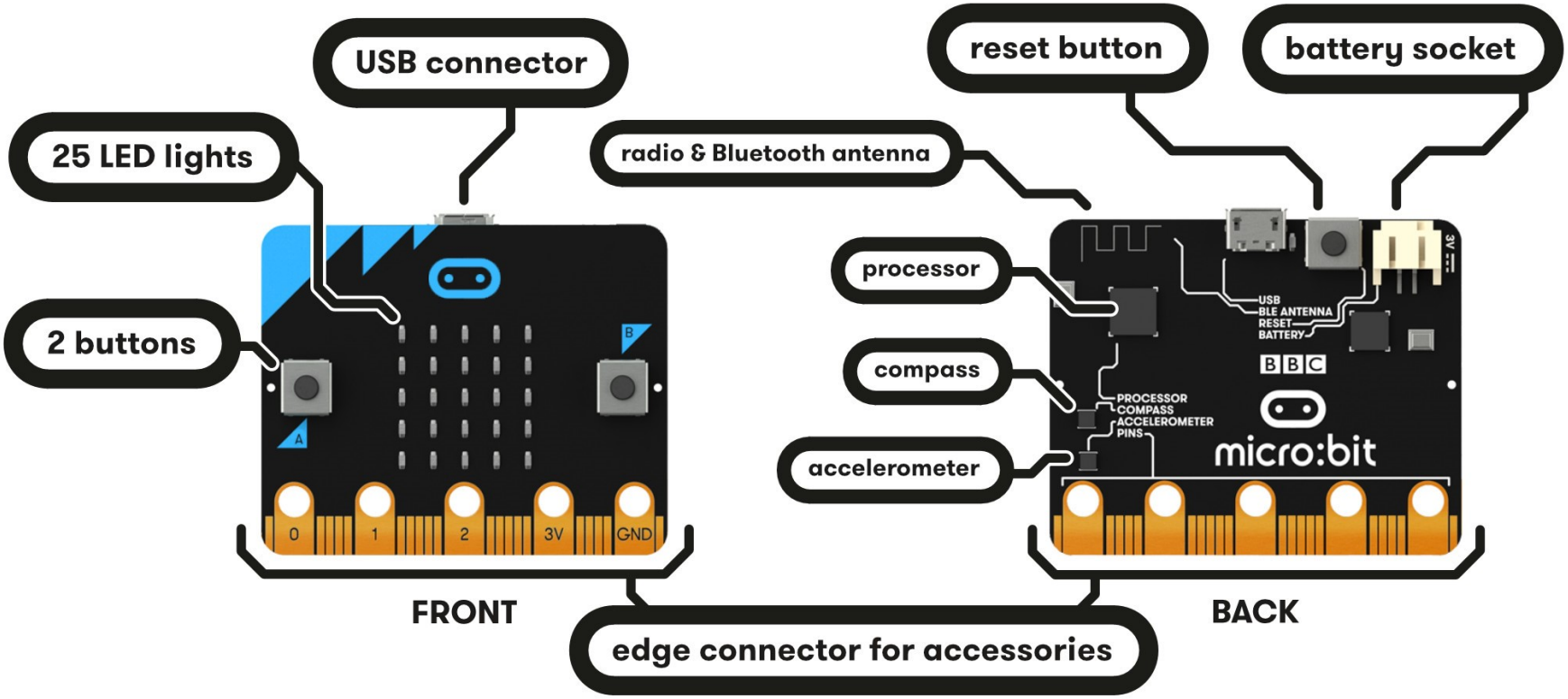
Why is it important to learn basic coding?

- What type of coding can we do with the Micro:bit
- What are the differences between **block programming** and using Micro:bit **python coding**?
- What are **variables** and how important are they in coding?
- What programs can we create to use the **accelerometer**?
- How important is it to get your **syntax** correct when you are programming using the **Micropython** editor?
- How important are the following commands: **while**, **if**, **elif** and what is their role when used in programming?

Vocabulary

THE DUSTON SCHOOL

MicroBit	Motion Detector	Bluetooth	Editor	Program
A pocket-sized programmable computer with motion detection, a built-in compass and Bluetooth technology.	A motion detector is a device that detects moving objects, particularly people.	Bluetooth is a wireless technology for exchanging data over short distances.	A computer program enabling the user to enter or change text.	A computer program is a collection of instructions that performs a specific task when executed by a computer.
Accelerometer	**Orientation**	**LED**	**Sensor**	**Blocks**
An accelerometer is a device that detects its own acceleration and is used in mobile phones to determine the phone's orientation.	Orientation is the direction in which a document or object is displayed.	Light Emitting Diode - A small bulb used in electronic displays, indoor and outdoor lighting, etc.	A device which detects or measures a physical property and records, indicates, or otherwise responds to it.	Blocks are puzzle-piece shapes that are used to create code.
JavaScript	**Object Orientated**	**Interactive**	**Web Browser**	**Import**
An object-oriented computer programming language commonly used to create interactive effects within web browsers.	This is a programming language around objects rather than "actions" and data rather than logic.	Allowing a two-way flow of information between a computer and a computer-user.	A web browser is a software application for retrieving information resources on the World Wide Web.	This is the term used when data is pulled into an application from another source.
MicroPython	**Open Source**	**Interpreter**	**Embedded**	**Export**
Is a tiny open source Python programming language interpreter that runs on small embedded development boards.	This is software for which the original source code is made freely available and may be redistributed and modified.	An interpreter is a program that can analyse and execute a program line by line.	An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system.	An application that can export data can create a file in a format that another application understands, enabling the two programs to share the same data.
String	**Hexadecimal**	**Binary**	**Data Type**	**Loops**
A string is a collection or sequence of characters.	Hexadecimal is a convenient way to express binary numbers and contains 16 sequential numbers.	Binary describes a numbering scheme in which there are only two possible values for each digit: 0 and 1.	This is a particular kind of data item, as defined by the values it can take.	A loop is a sequence of instructions that is continually repeated until a certain condition is reached.
While	**True**	**False**	**Boolean**	**Variables**
A while loop is a control flow statement that allows code to be executed repeatedly based on a given Boolean condition.	This is one of the two Boolean data types and can be combined with a WHILE. The other type is False.	This is one of the two Boolean data types and can be combined with a WHILE. The other type is True.	A binary variable that can have one of two possible values, 0 (false) or 1 (true).	A variable is a value that can change, depending on conditions or on information passed to the program.
Syntax	**display.scroll**	**display.show**	**print**	**random.choice**
Syntax is the structure of statements in a computer language	This is a command that can be used in MicroPython. This command will display a string of text horizontally on the BBC MicroBit.	This is a command that can be used in MicroPython. This command will display a string an image on the BBC MicroBit.	This is a command in Python that is used to print characters to a screen.	This is a command in Python to randomise a selection.
int	**random.int**	**if**	**elif**	**Sleep**
This is short for integer and represents a whole number	This is a command in Python to show a random whole number.	An IF statement is a programming conditional statement that, if proved true, performs a function or displays information.	This is similar to the IF command and can be sued to return an alternative function or displays alternative information.	This is a command in Python to add a delay between functions. Normally the sleep command is followed by a number of milliseconds



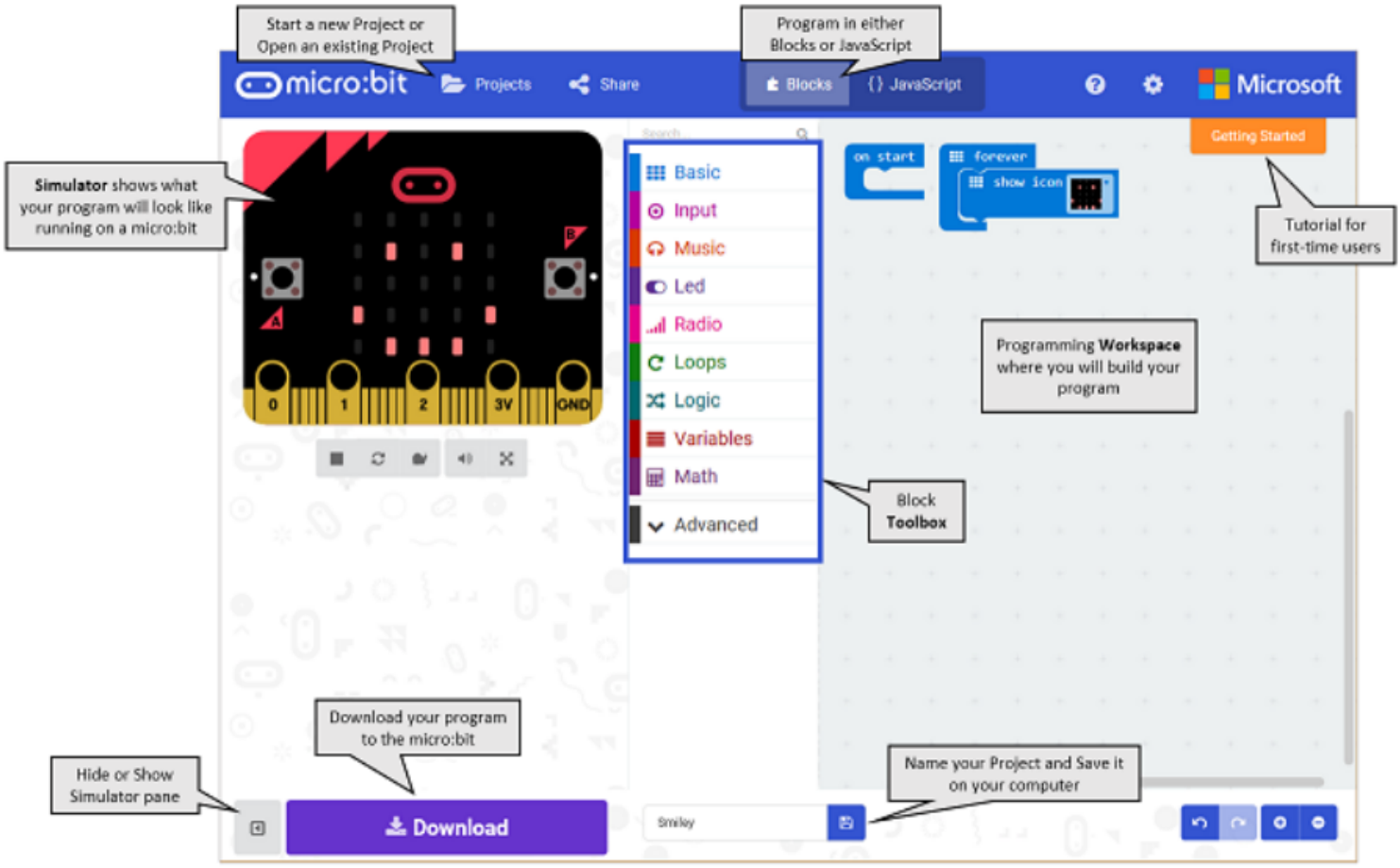
As you can see the Microbit is a little computer. It has buttons for input that can be used to start a program or even as input in a game.

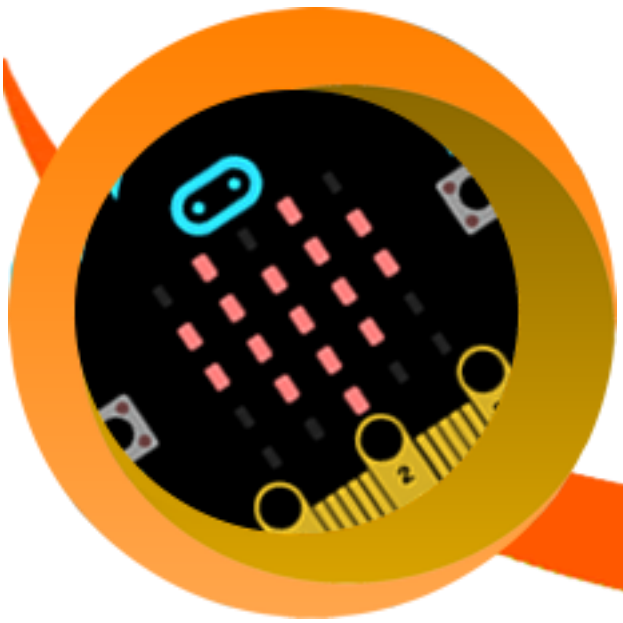
You can connect your Microbit to the computer via USB. The Microbit can even be used with an external battery.

You can connect other accessories like bigger LED's using the edge connectors.

Knowledge

Understanding the block window





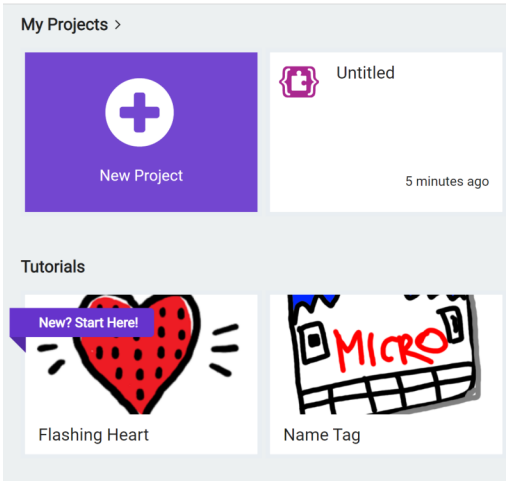
Knowledge

How to use the Block editor

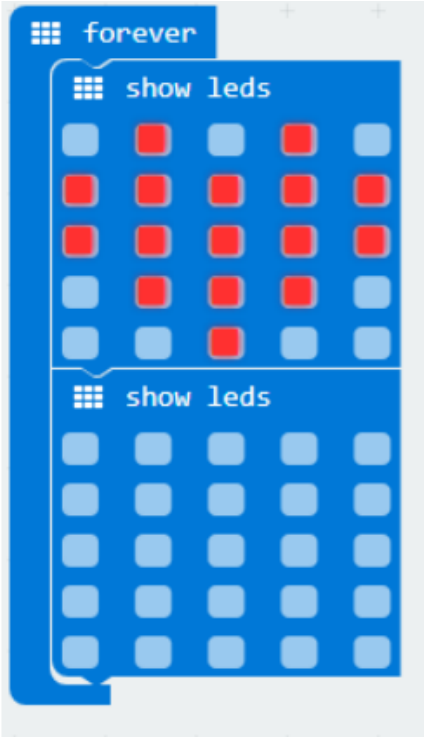
Click to open each list of commands in the Toolbox turn Click and drag commands blocks from the basic list to workspace. Right click blocks to duplicate them. Try dragging block next to each other, do they connect? Click and drag blocks back to the toolbox to delete them. Try the undo and redo buttons. Try the view zoom in and out buttons. Right click in the workspace and click Delete <#> Blocks to clear all the commands in the workspace.

In the home section click on the "Flashing Heart" tutorial. This will help you get started with coding for the Microbit.

For now you can use the online Microbit and test your programs there. Once we are familiar with the programming we can use the actual Microbit.



At this point experiment with turning on and off individual LEDs by clicking on them. This will create a different effect in the micro:bit simulator.



Knowledge

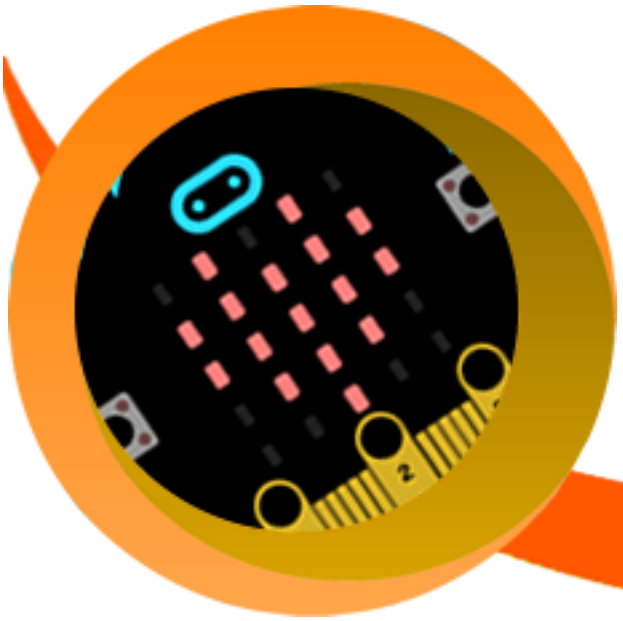
Downloading the code to the Microbit

In the workspace area, give the code a name.

Click the purple Download button in the lower left of the MakeCode screen. This will download the file to your computer, to the location where your browser is set to save downloads.

To move the program to your micro:bit, drag the downloaded “your file name.hex” file to the MICROBIT drive, as if you were copying a file to a flash drive. The program will copy over, you can see this happening as the yellow LED will begin flashing. When it stops your code will begin running on the micro:bit immediately.

Unplug your micro:bit and attach a battery pack. Your code will run. It is not lost, as when you code the microbit it holds the code until another program is downloaded. The micro:bit will only hold one program at a time.

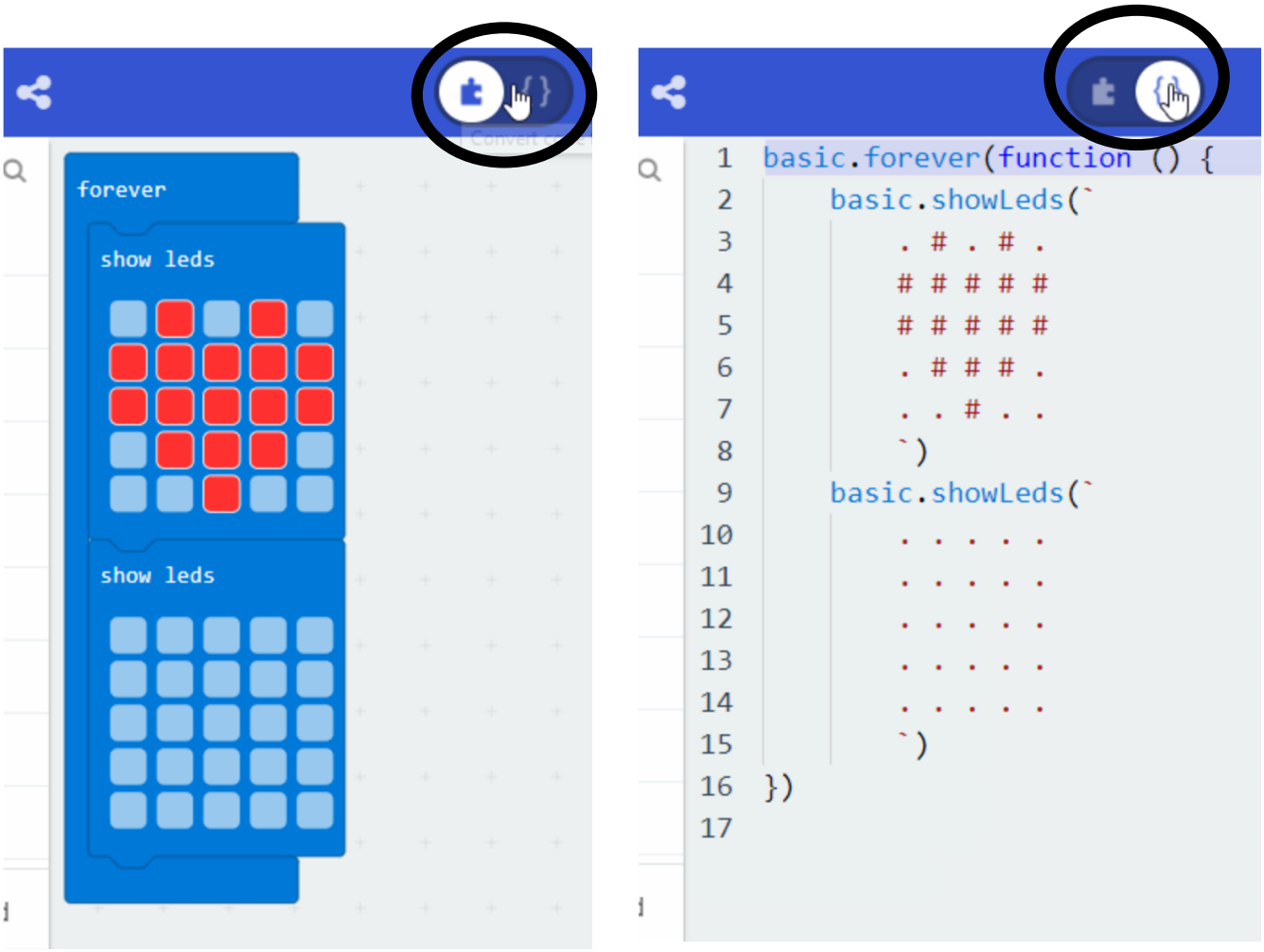


Knowledge

Javascript

The MicroBit can also be programmed using Javascript. Using a text based language like Javascript gives you more control as to what you can do with your Microbit.

To start you can open your block code and click on the Javascript button at the top of the screen switch between block code and Javascript.



Although it looks really different, the JavaScript code (text) has the same meaning as your blocks. Let's add comments in the code to explain what it does. Comments are lines that start with //.

Knowledge

Javascript

The comments will show up in the blocks too. Quickly switch over to **Blocks** and back if you want to see what it looks like.

```
// this is the "forever" block.
// It makes the code inside of it run in a loop, over and over again.
basic.forever(function () {
    // this is the "show leds" block.
    // It reads the text (. # . ...) to figure out which LED is on.
    // '.' means off and '#' means on
    basic.showLeds(`
        . # . # .
        # # # # #
        # # # # #
        . # # # .
        . . # . .
        `)
    // this is the second "show leds" block.
    // all LEDs are off so it only contains '.' characters.
    basic.showLeds(`
        . . . . .
        . . . . .
        . . . . .
        . . . . .
        . . . . .
        `)
// Every open bracket '{' or parenthesis '(' needs to be closed with a matching '}' or a ')'
})
```

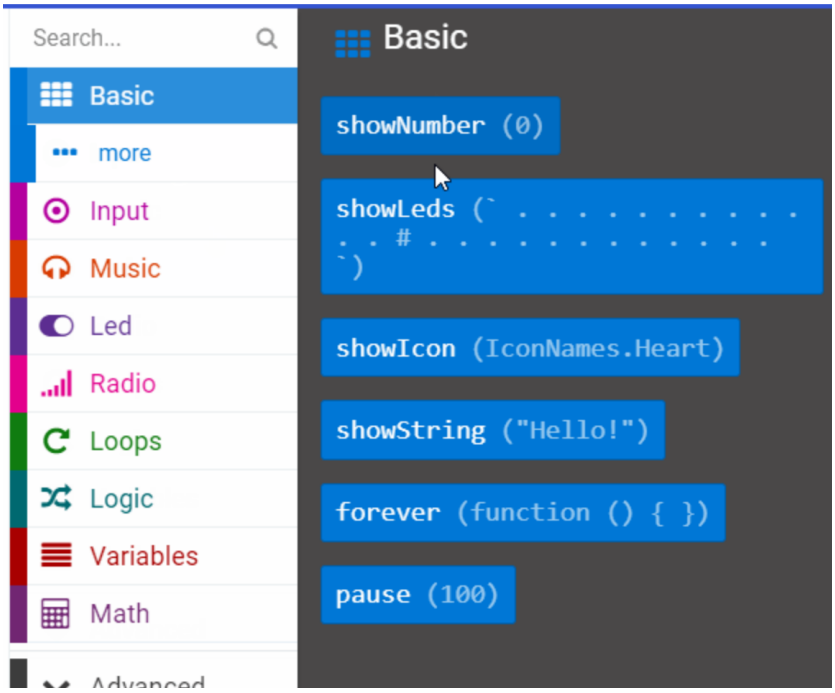
Let's draw a small heart in the second `basic.show leds` string. We'll do that by replacing some of the `.` characters with a `#`. As you make your changes, the simulator should restart and modify the animation just like when you're coding with blocks.

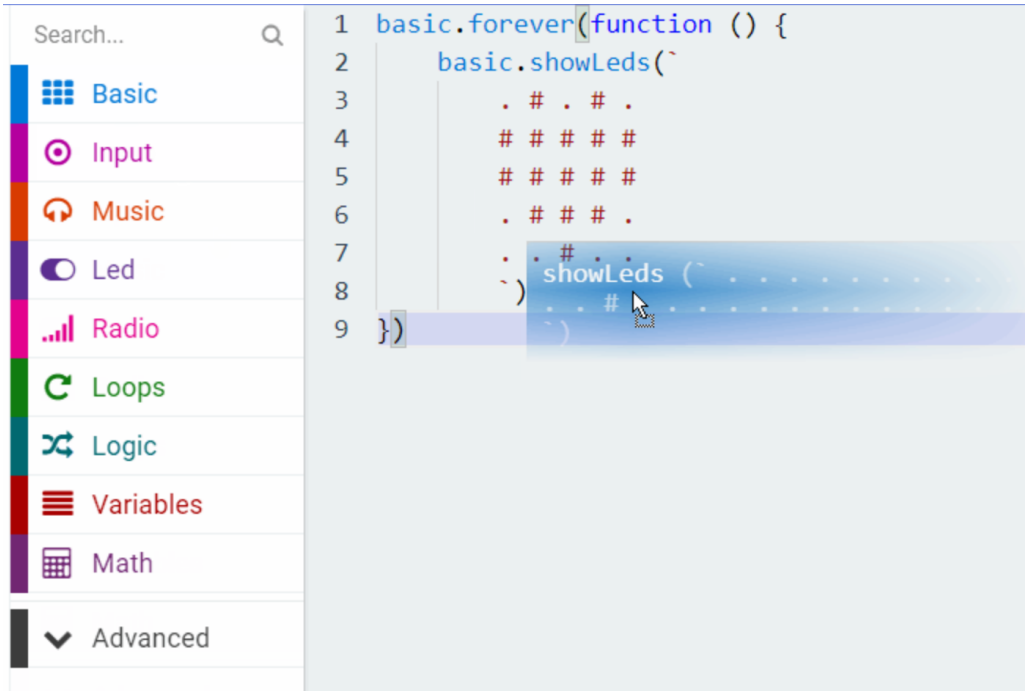
Knowledge

Javascript

Dragging code from the toolbox.

Writing new code is a bit harder than modifying it since you don't know the syntax yet. Good news though, you can drag snippets of code from the toolbox… just like in blocks. Click on the **Basic** category, then drag the `show leds` code block into the JavaScript editor to add a new image.





Knowledge

Homework

Task 1 Due ……..

Go to the following website and complete the task, take screen shots of your work and paste in a word document. Print the word document to hand in.

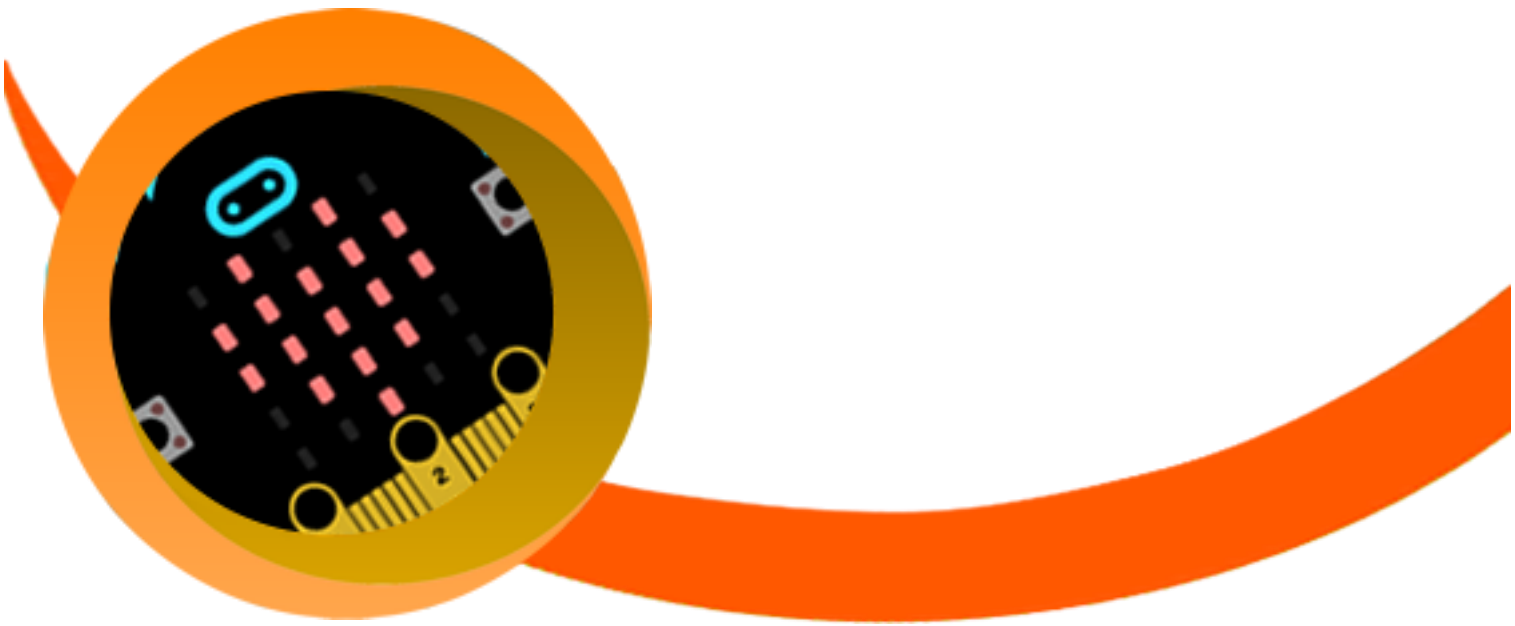
http://microbit.org/en/2017-03-07-magic-eight/

Task 2 Due ……..

Use the following website to help you to make a program that uses Micro:bit python editor:

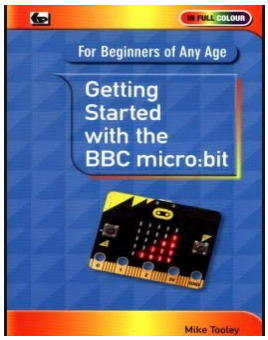
https://www.microbit.co.uk/app/#edit:1bad1a4a-e7b7-4394-6e9e-0b8096b5381a

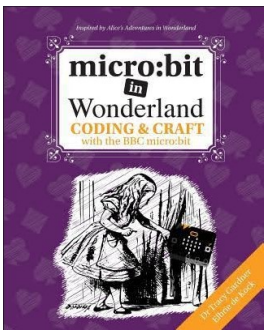
http://microbit-challenges.readthedocs.io/en/latest/tutorials/getting_started.html



Wider Reading List

- The Official BBC micro:bit User Guide Paperback by Gareth Halfacree
- Micro:bit in Wonderland by Tracy Gardner Elbrie de Kock & Tech Age Kids
- Getting Started with the BBC Micro:Bit Book by Mike Tooley





- http://microbit.org/
- http://microbit.org/code/
- https://makecode.microbit.org/#
- http://python.microbit.org/v/1
- http://www.itpro.co.uk/desktop-hardware/26289/13-top-bbc-micro-bit-projects