

# Welcome to the Labs

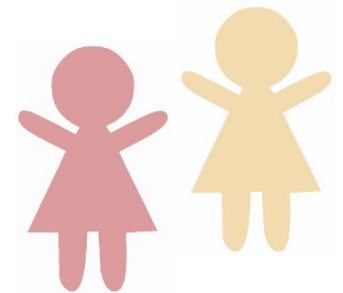
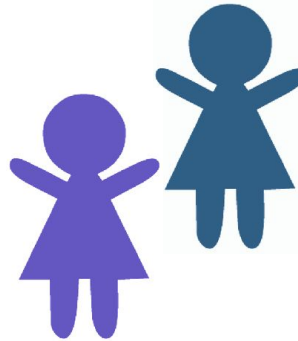
Bop It! - Micro:Bit

# Who are the tutors?

Who are you?

# Two Truths and a Lie

1. Get in a group of 3-5 people
2. Tell them three things about yourself:
  - a. Two of these things should be true
  - b. One of these things should be a lie!
3. The other group members have to guess which is the lie



# Log on

## Log on and jump on the GPN website

[girlsprogramming.network/workshop](https://girlsprogramming.network/workshop)

You can see:

- These **slides** (to take a look back or go on ahead).
- A digital copy of your **workbook**.
- Help bits of text you can **copy and paste**!

There's also links to places where you can do more programming!

Tell us you're here!

Click on the  
**Start of Day Survey**  
and fill it in now!

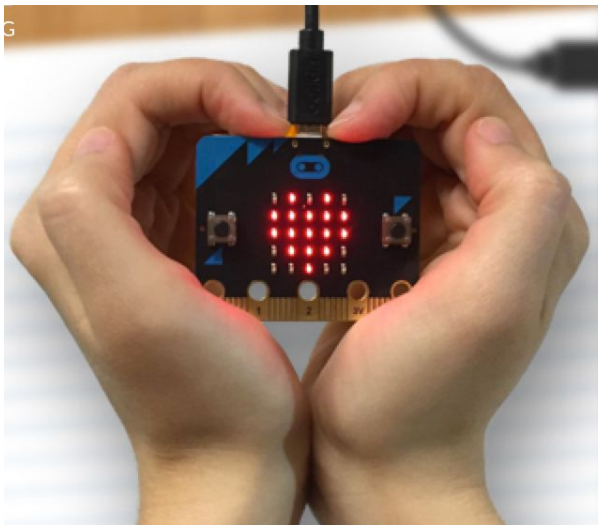
# Today's project!

## **Bop It! - Micro:Bit**

# Micro:Bits - IRL

**Today we have real life MicroBits to use!**

**But sad you can't keep them at the end of the day. 😞**



If you want one for home (maybe for christmas or your birthday!) they're about \$25 .

Find out where to buy them here:

<https://microbit.org/>



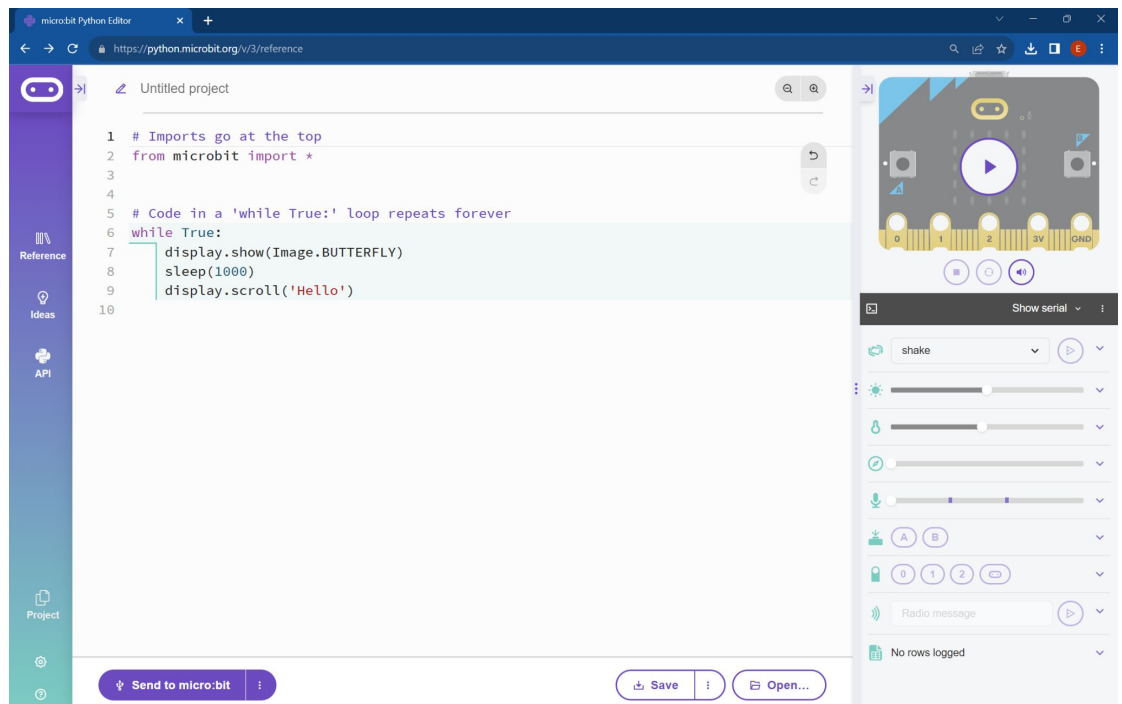
# Micro:Bits - Digital

**We also have an emulator on [python.microbit.org](https://python.microbit.org)!**  
**Which you can use after the workshop! 🎉**

The simulator is a fast way to test the code without downloading it.

Use it while you're still working on your code. And then try it in real life.

(Works with Edge and Chrome)



# Using the workbook!

The workbooks will help you put your project together!

Each **Part** of the workbook is made of tasks!

## Tasks - The parts of your project

Follow the tasks **in order** to make the project!

## Hints - Helpers for your tasks!

Stuck on a task, we might have given you a hint to help you **figure it out**!

The hints have **unrelated** examples, or tips. **Don't copy and paste** in the code, you'll end up with something **CRAZY**!

### Task 6.2: Add a blah to your code!

This has instructions on how to do a part of the project

1. Start by doing this part
2. Then you can do this part

### Task 6.1: Make the thing do blah!

Make your project do blah ....

#### Hint

A clue, an example or some extra information to help you figure out the answer.

```
print('This example is not part of the project' )
```

# Using the workbook!

The workbooks will help you put your project together!

Check off before you move on from a **Part!** Do some bonuses while you wait!

## Checklist - Am I done yet?

Make sure you can tick off every box in this section before you go to the next Part.

## Lecture Markers

This tells you you'll find out how to do things for this section during the names lecture.

## Bonus Activities

Stuck waiting at a lecture marker? Try a purple bonus. They add extra functionality to your project along the way.



## CHECKPOINT



If you can tick all of these off you're ready to move the next part!

- ☐ Your program does blah
- ☐ Your program does blob

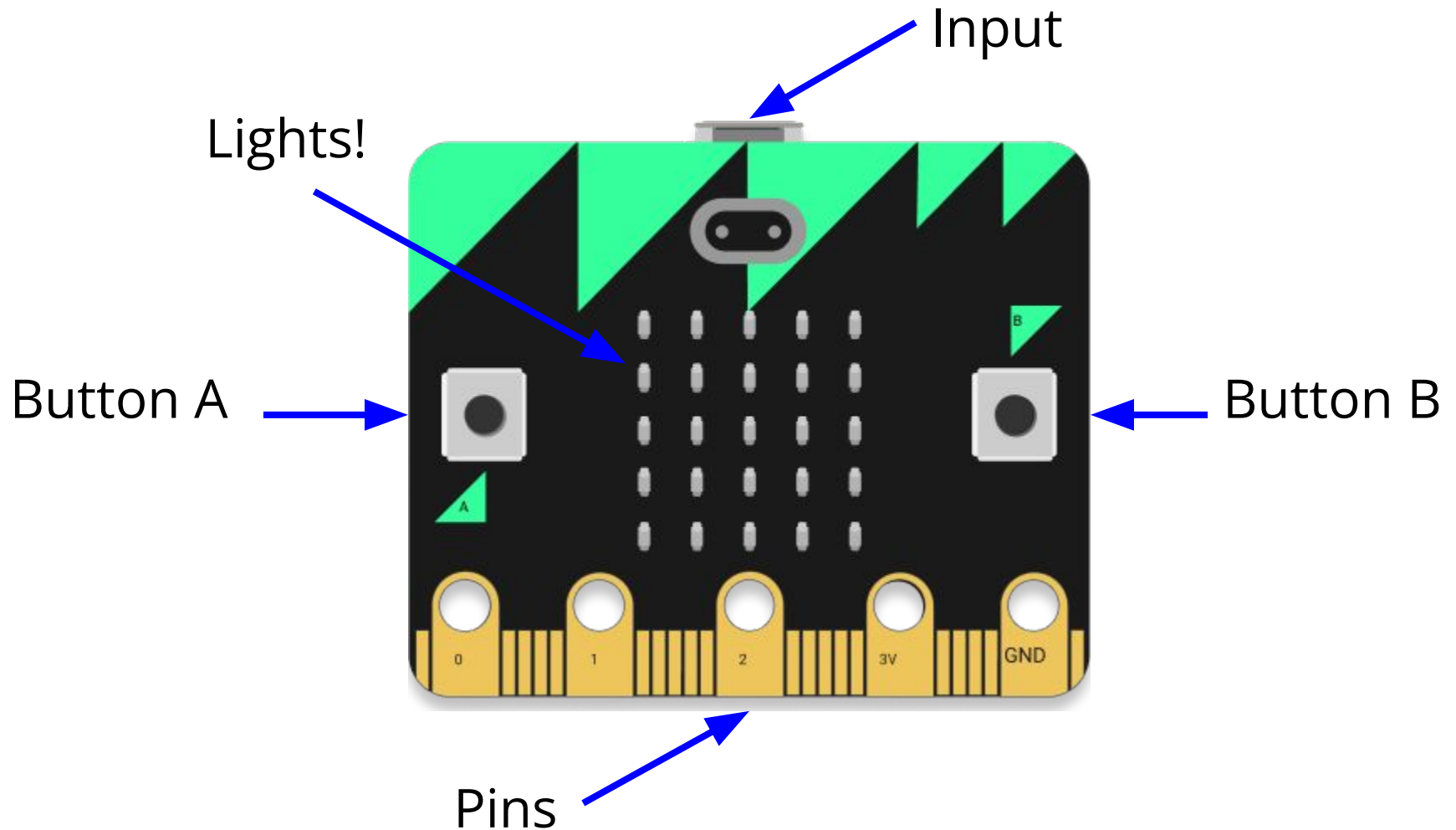


## ★ BONUS 4.3: Do some extra!

Something to try if you have spare time before the next lecture!

# Intro to Micro:Bit

# What is a Micro:Bit?



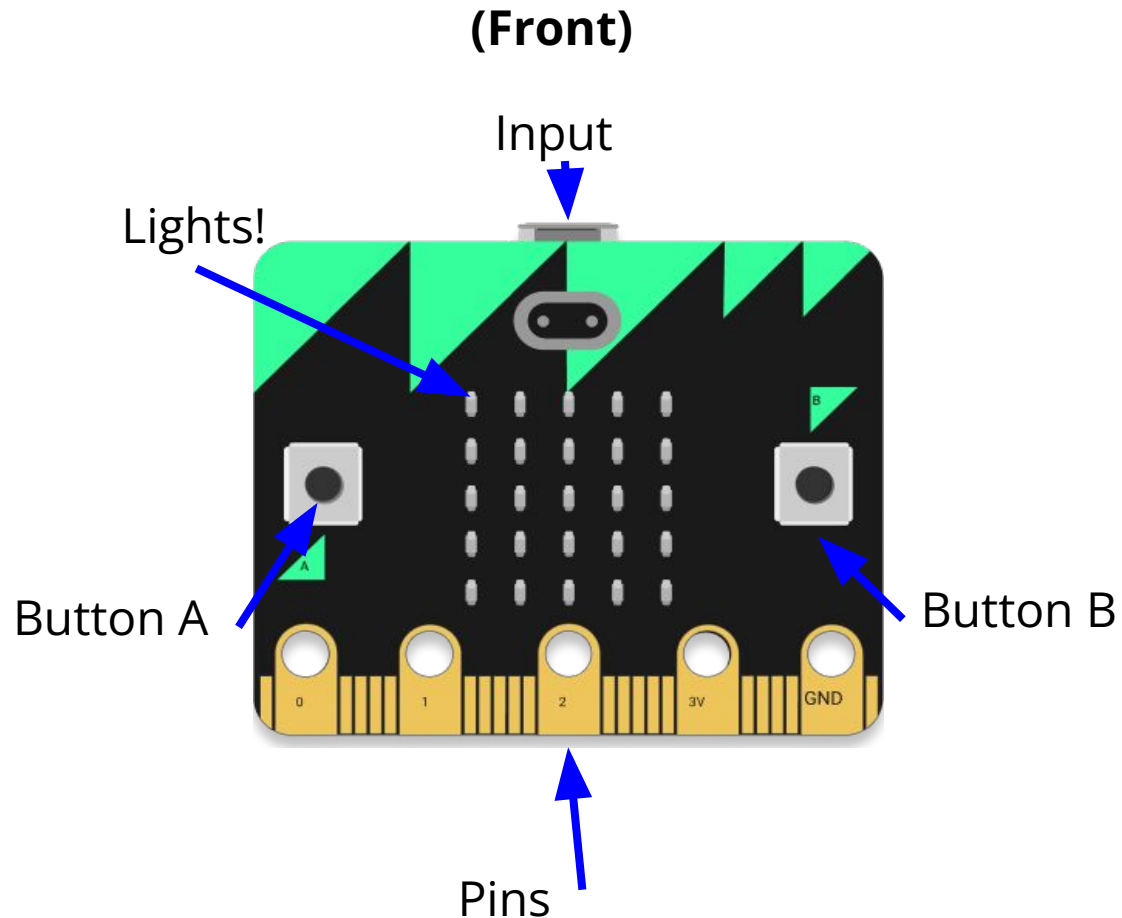
# What do the different parts do?

**Input:** This is how we get code onto our Micro:Bit and tell it what to do!

**Buttons:** We can press these and tell the Micro:Bit to do different things when we do

**Lights:** Each of these is a little light that we can turn on. When we turn them on in different patterns we can make images!

**Pins:** These let us connect the Micro:Bit to other devices like extra buttons

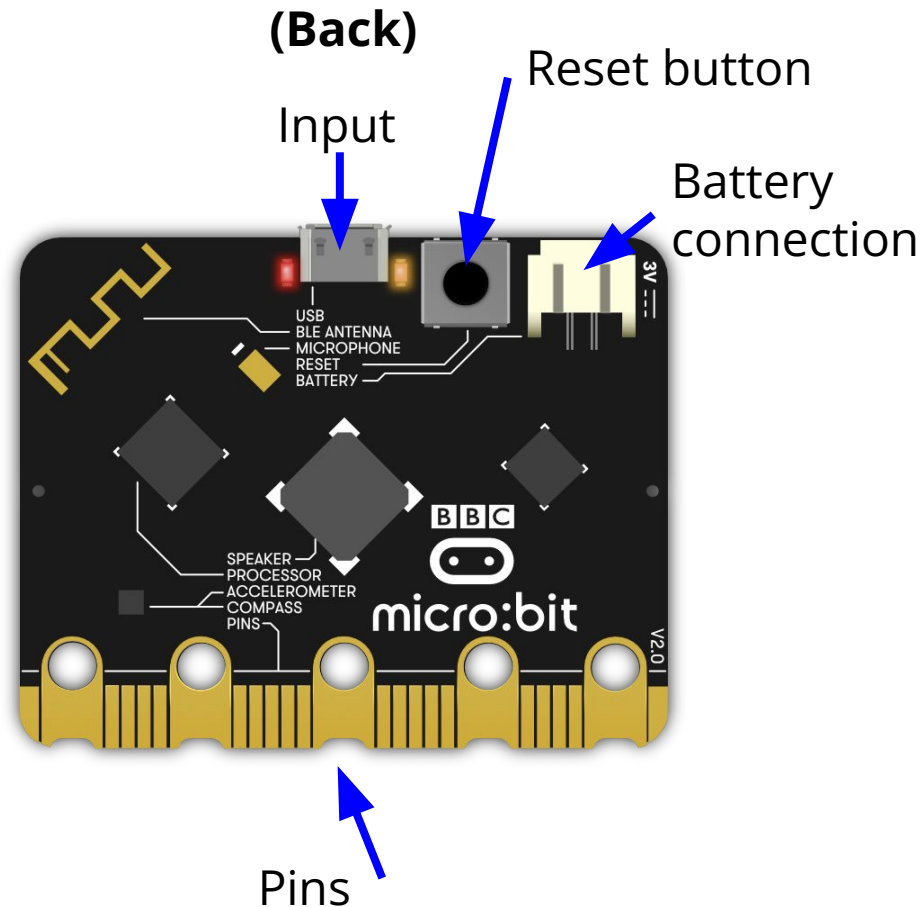


# What do the different parts do?

**Input:** This is how we get code onto our Micro:Bit and tell it what to do!

**Reset button:** Stops your code and starts it up again

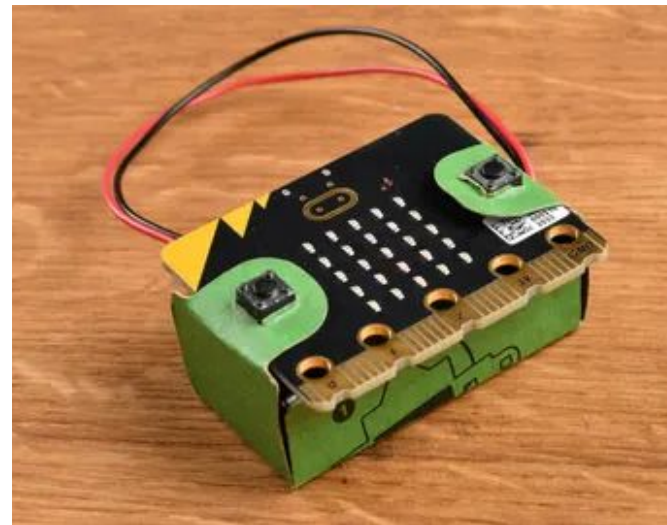
**Pins:** These let us connect the Micro:Bit to other devices like extra buttons



# Battery pack!

You can use your micro:bit even when it is not plugged into your computer!

You can ask your tutor for a battery pack if you need one.





# How do we write code for it?

Micro:Bits use **Python**, which is the programming language that we usually teach here at GPN!

Because they have buttons, lights and other cool stuff we need to make sure that we tell Python that we want the extra stuff for Micro:Bits. We do this using this line of code:

```
from microbit import *
```

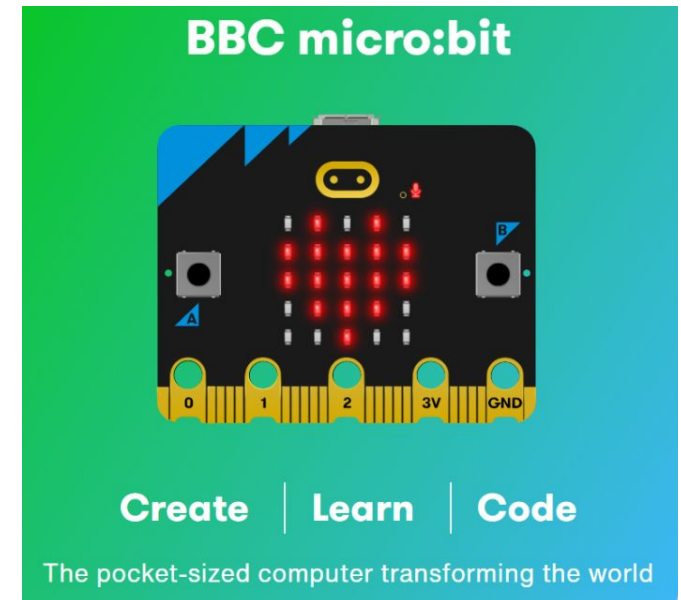
Always make sure this line is at the top of your code!

# Using microbit.org!

Today we will be using **microbit.org** to program our Micro:Bits.

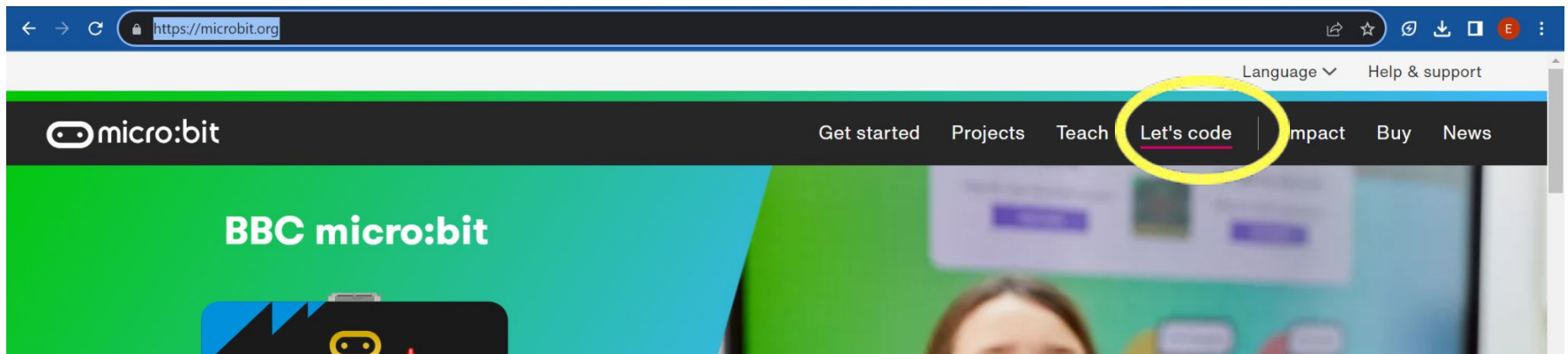
microbit.org has a great Micro:Bit simulator which makes learning how to program them really easy!

We can write and test code for the simulator **and** real micro:bit!



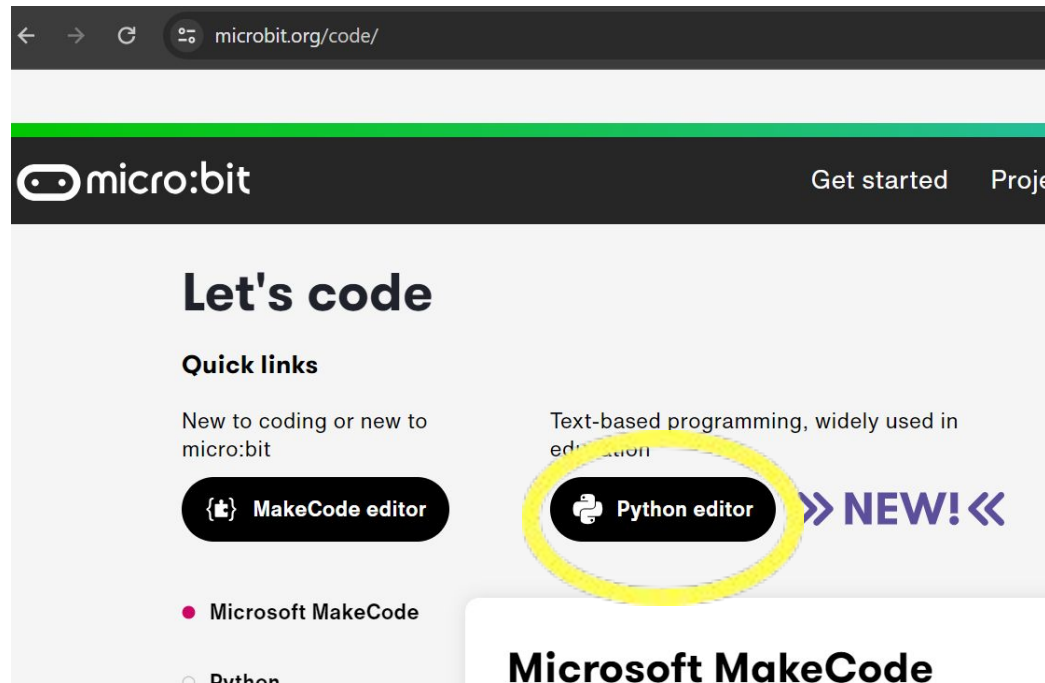
# Getting to the website!

***Go to [microbit.org](https://microbit.org)***



# Getting to the website!

***Click on 'Python editor'***




***Now we can start programming!***

# Using a Micro:Bit IRL

It's fun to mess around with the Micro:Bit online, but it's also really fun to see your code on a Micro:Bit in real life!

## How to send your code to the Micro:Bit

1. Go to **microbit.org > Let's Code > Python editor** (or directly to [python.microbit.org](https://python.microbit.org))
  2. **Plug** your Micro:Bit into your computer
  3. Click the **send to micro:bit** button on the website to download your code. A purple button with a downward arrow icon and the text "Send to micro:bit".
  4. Follow the steps that appear.
  5. **Wait for the red light** at the back to stop flashing and the code should be running!
- If you want your code to start again from the beginning, press the black **"reset"** button on the back

# The Display

Your Micro:Bit has a display! It is the 5 by 5 grid of little red LEDs on the front! You can do some cool stuff with the display like:

Scroll the words “Hello World” across the display

```
display.scroll("Hello World")
```

Show an image, like a happy face!

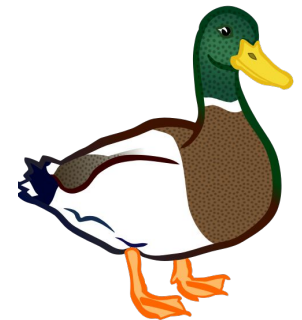
```
display.show(Image.HAPPY)
```

# A micro playground!

Look to the left in the **Reference** tab. There's lots of **Display** ideas to try out!

Try using **two** of the **Reference** ideas! Can you get your Micro:Bit to draw a duck with the caption 'Silly Duck!'?

You can use the **simulator** MicroBit on the website to test your code and when you're happy with it, you can download it and put it on your real MicroBit!



# Project Time!

Let's get started!

**Let's try use it in our project!**  
**Try to do Part 0 and 1**

The tutors will be around to help!



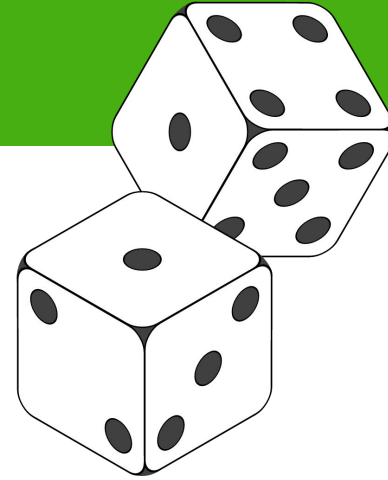
Random!

# That's so random!

There's lots of things in life that are up to chance or random!



Python lets us **import** common bits of code people use! We're going to use the **random** module!



We want the computer to be random sometimes!



# Using the random module

Let's choose something randomly from a list!

This is like drawing something out of a hat in a raffle!

## Try this!

1. Import the random module!

```
>>> import random
```

2. Copy the shopping list into IDLE

```
>>> shopping_list = ["Bread", "Chocolate", "Ice Cream",  
                    "Pizza"]
```

3. Choose randomly! Try it a few times!

```
>>> random.choice(shopping_list)
```



# Using the random module

## You can also assign your random choice to a variable

```
>>> import random
>>> shopping_list = ["Bread", "Chocolate", "Ice Cream",
                    "Pizza"]
>>> random_food = random.choice(shopping_list)
>>> print(random_food)
```



# Project Time!

Raaaaaaaaaandom! Can you handle that?

**Let's try use it in our project!**  
**Try to do Part 2**

The tutors will be around to help!

# While Loops

# Loops



We know how to do things on repeat!

Sometimes we want to do some code on repeat!

# Introducing ... while loops!

## What do you think this does?

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```



# Introducing ... while loops!

## What do you think this does?

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
i is 1
i is 2
>>>
```

# Introducing ... while loops!

Stepping through a while loop...

# Introducing ... while loops!

## One step at a time!

```
◆ i = 0  
  while i < 3:  
    print("i is " + str(i))  
    i = i + 1
```

MY VARIABLES

i = 0

Set the  
variable

# Introducing ... while loops!

## One step at a time!

0 is less  
than 3!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

MY VARIABLES

i = 0

# Introducing ... while loops!

## One step at a time!

Print!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

i is 0

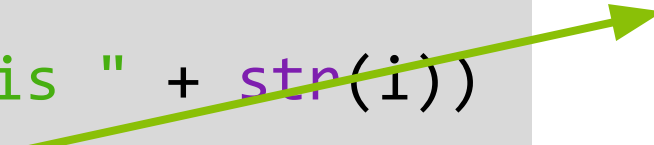
MY VARIABLES

i = 0

# Introducing ... while loops!

## One step at a time!

```
i = 0
while i < 3:
    print("i is " + str(i))
    ◆ i = i + 1
```



MY VARIABLES

~~i = 0~~  
i = 1

UPDATE  
TIME!

```
i is 0
```

# Introducing ... while loops!

## One step at a time!

Take it  
from the  
top!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
```

### MY VARIABLES

```
i = 0
i = 1
```

# Introducing ... while loops!

## One step at a time!

i is less  
than 3!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

### MY VARIABLES

```
i = 0
i = 1
```

```
i is 0
```



# Introducing ... while loops!

## One step at a time!

Print!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
i is 1
```


### MY VARIABLES

```
i = 0
i = 1
```

# Introducing ... while loops!

## One step at a time!

```
i = 0
while i < 3:
    print("i is " + str(i))
    ◆ i = i + 1
```



### MY VARIABLES

```
i = 0
i = 1
i = 2
```

UPDATE  
TIME!

```
i is 0
i is 1
```

# Introducing ... while loops!

## One step at a time!

Take it  
from the  
top!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
i is 1
```

### MY VARIABLES

```
i = 0
i = 1
i = 2
```

# Introducing ... while loops!

## One step at a time!

2 is less  
than 3!

```
◆ i = 0
  while i < 3:
    print("i is " + str(i))
    i = i + 1
```

### MY VARIABLES

```
i = 0
i = 1
i = 2
```

```
i is 0
```

```
i is 1
```

# Introducing ... while loops!

## One step at a time!

Print!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
i is 1
i is 2
```


### MY VARIABLES

```
i = 0
i = 1
i = 2
```

# Introducing ... while loops!

## One step at a time!

```
i = 0
while i < 3:
    print("i is " + str(i))
    ◆ i = i + 1
```



### MY VARIABLES

```
i = 0
i = 1
i = 2
i = 3
```

UPDATE  
TIME!

```
i is 0
i is 1
i is 2
```

# Introducing ... while loops!

## One step at a time!

Take it  
from the  
top!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
i is 1
i is 2
```

### MY VARIABLES

```
i = 0
i = 1
i = 2
i = 3
```

# Introducing ... while loops!

## One step at a time!

3 IS NOT  
less than  
3!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

We are  
done  
with this  
loop!

```
i is 0
i is 1
i is 2
```

### MY VARIABLES

```
i = 0
i = 1
i = 2
i = 3
```



# Introducing ... while loops!

Initialise the loop variable

Loop condition

Code to repeat

Update the loop variable

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

# What happens when.....

What happens if we forget to update the loop variable?

```
i = 0
while i < 3:
    print("i is " + str(i))
```

# What happens when.....

## What happens if we forget to update the loop variable?

```
i = 0
while i < 3:
    print("i is " + str(i))
```

[illegible]

# Infinite loop!

Sometimes we want our loop to go forever!

So we set a condition that is always True!

**We can even just write True!**

```
while True:  
    print("Are we there yet?")
```

# Give me a break!

But what if I wanna get out of a loop early?  
That's when we use the **break** keyword!

```
number = 0
while number != 42 :
    number = input("Guess a number: ")

    if number == "I give up":
        print("The number was 42")
        break

    number = int(number)
```

# Continuing on

How about if I wanna skip the rest of the loop body and loop again? We use **continue** for that!

```
number = 0
while number != 42 :
    number = input("Guess a number: ")

    if not number.isnumeric():
        print("That's not a number!")
        print("Try again")
        continue

    number = int(number)
```

# Running Time

Sometimes you want to time things. Like, for example, if you wanted to put a time limit on a game and see how many points you can get in 30 seconds!

To figure out how long the Micro:Bit program has been running (in milliseconds) you can use this command:

```
time = running_time()
```

What would `running_time()` be after 4 seconds?

What about after **10 and a half** second?

# Running Time

Sometimes you want to time things. Like, for example, if you wanted to put a time limit on a game and see how many points you can get in 30 seconds!

To figure out how long the Micro:Bit program has been running (in milliseconds) you can use this command:

```
time = running_time()
```

What would `running_time()` be after 4 seconds?

**4000**

What about after **10 and a half** second?



# Running Time

Sometimes you want to time things. Like, for example, if you wanted to put a time limit on a game and see how many points you can get in 30 seconds!

To figure out how long the Micro:Bit program has been running (in milliseconds) you can use this command:

```
time = running_time()
```

What would `running_time()` be after 4 seconds?

**4000**

What about after **10 and a half** second?

**10,500**

# Project Time!

**while** we're here:

**Try to do Part 4!**

The tutors will be around to help!

# Micro:Bit Buttons

# Buttons!

Your Micro:Bit has 2 buttons: Button A and Button B

You can use this code to check whether or not a button is pressed:

```
button_a.is_pressed()
```

```
button_b.is_pressed()
```

The statement will be **TRUE** if the button is being pressed at that time and it will be **FALSE** if it is *not* being pressed

# Buttons!

What do you think this code does?

```
if button_a.is_pressed():  
    display.show(Image.HAPPY)  
  
if button_b.is_pressed():  
    display.show(Image.SAD)
```

If **button a** is pressed when the Micro:Bit gets to this line of code then what happens?

If **button b** is pressed when the Micro:Bit gets to this line of code then what happens

What do you think happens if *both* button a AND button b are being pressed?

# Buttons!

What do you think this code does?

```
if button_a.is_pressed():  
    display.show(Image.HAPPY)  
  
if button_b.is_pressed():  
    display.show(Image.SAD)
```

If **button a** is pressed when the Micro:Bit gets to this line of code then what happens?

**The Micro:Bit shows a Happy face**

If **button b** is pressed when the Micro:Bit gets to this line of code then what happens

What do you think happens if *both* button a AND button b are being pressed?

# Buttons!

What do you think this code does?

```
if button_a.is_pressed():  
    display.show(Image.HAPPY)  
  
if button_b.is_pressed():  
    display.show(Image.SAD)
```

If **button a** is pressed when the Micro:Bit gets to this line of code then what happens?

**The Micro:Bit shows a Happy face**

If **button b** is pressed when the Micro:Bit gets to this line of code then what happens

**The Micro:Bit shows a Sad face**

What do you think happens if *both* button a AND button b are being pressed?

# Micro:Bit Radio



# Radio

Your Micro:Bit can send messages to other Micro:Bits using radio waves!

It only takes a few lines of code to make this work!

1. We have to tell the Micro:Bit that we want to use the radio:

```
import radio
```

2. We need to turn the Radio on:

```
radio.on()
```

3. We need to send a message:

```
radio.send("Hello World")
```

4. We want to receive a message:

```
message = radio.receive()
```

# Radio Groups

We need to set our radio to communicate on a certain group, otherwise all our Micro:Bits will try to talk to each other! This will get confusing for the Micro:Bit.

After you turn the radio on, set the group channel!

```
radio.config(group=100)
```

Your tutors will give you a group number to use.

# Radio Example

What do you think this code does?

Micro:Bit 1

```
import radio

radio.on()
radio.config(group=100)

while True:
    if button_a.is_pressed():
        radio.send("Hello!")

    if button_b.is_pressed():
        radio.send("World!")
```

Micro:Bit 2

```
import radio

radio.on()
radio.config(group=100)

while True:
    message = radio.receive()
    if message:
        display.scroll(message)
```

Why do you think it's important to check the message?

Tell us what you think!

Click on the  
**End of Day Form**  
and fill it in now!