Welcome to the labs!

Tamagotchi! - Micro:bits

Thank you to our Sponsors!

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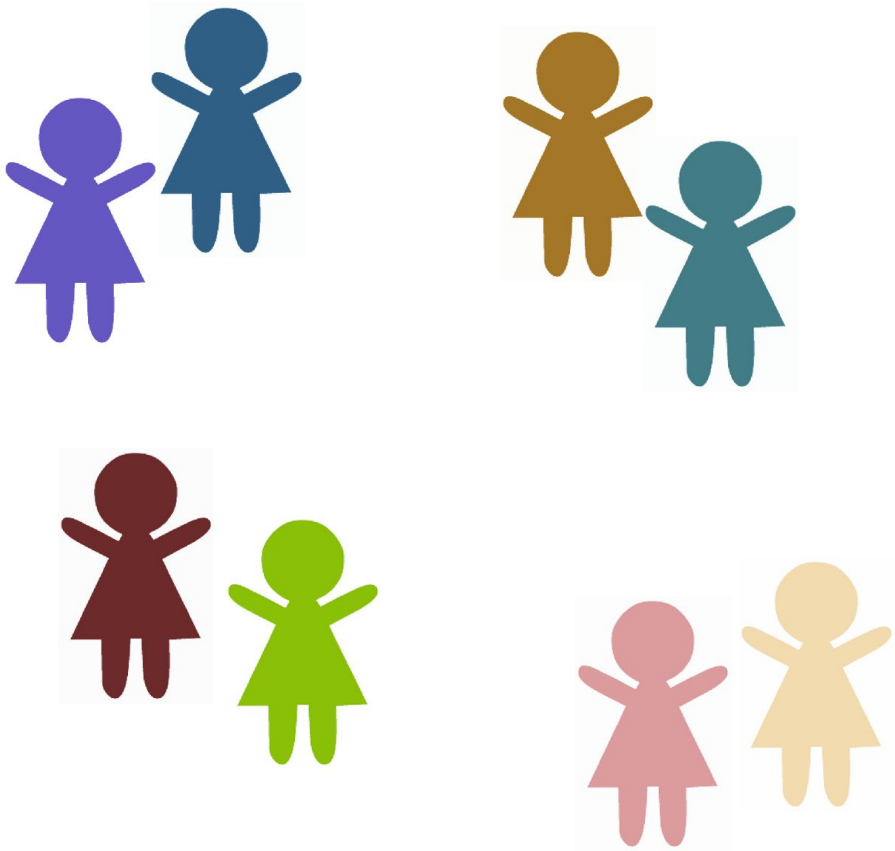
Who are the tutors?

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

Click on your location

Melbourne

Perth

Brisbane

Sydney

Burnie

Canberra

Adelaide

Tell us you're here!

Click on the

Start of Day Survey

and fill it in now!

Start of Day survey

Log on

Click on your Room picture

You can see:

- A link to the **Workbook**
- These **Slides** (to take a look back on or go on ahead)
- Other helpful bits like a Cheatsheet to help you code

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 something extra!

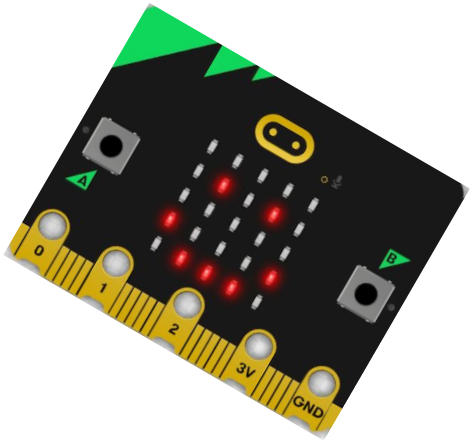
Something to try if you have spare time before the next lecture!

Today’s project!

Tamagotchi - Micro:Bit

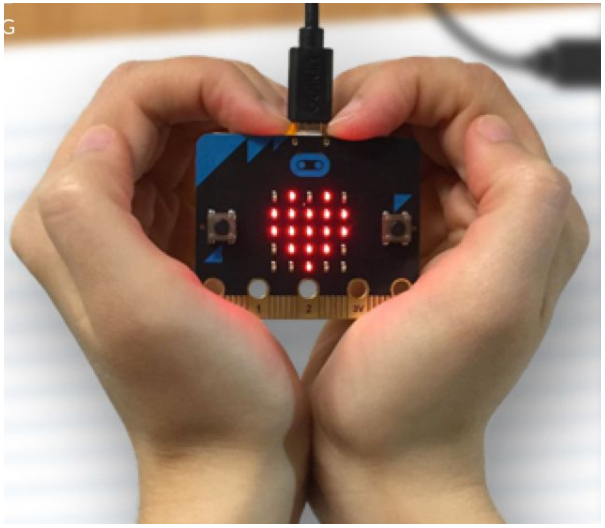
Tamagotchi

- You're going to make your own Tamagotchi electronic pet using a micro:bit
- Tamagotchi pets were a worldwide fad created in Japan in 1996
- Give your pet a name and write some code to feed it, play with it and let it sleep
- **Don't let it get hungry, bored or sleepy!**
- **Keep it alive, watch it grow and change**



Tamagotchi

Sadly 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/

Intro to Micro:Bit

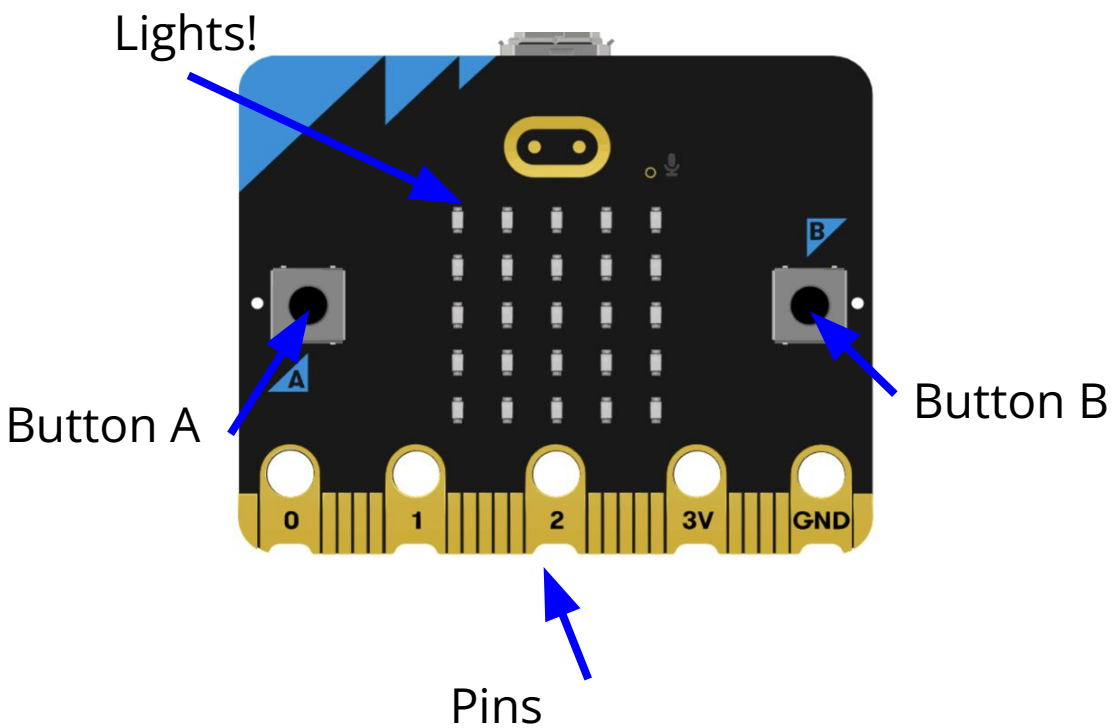
What is a Micro:Bit?

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

Lights: We can turn each light on or off to make different images

Pins: These let us connect the Micro:Bit to other devices using wires

Front



What is a Micro:Bit?

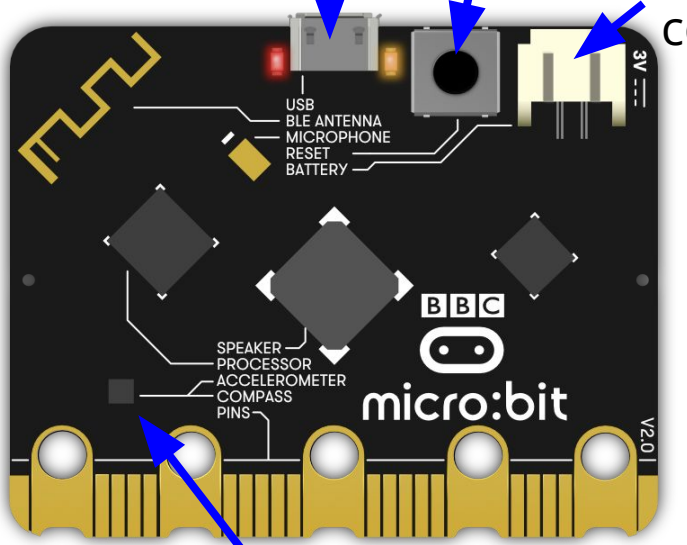
Input: Where we connect the cable from the computer to transfer our code/power to our Micro:Bit

Reset button: Let's you stop your code and starts it again

Battery connection: You can use your micro:bit even when it is not plugged into your computer! Ask you tutor for a battery pack if you need one.

Accelerometer: The Micro:bit can tell us when it is **accelerated** - so it knows when we shake it!

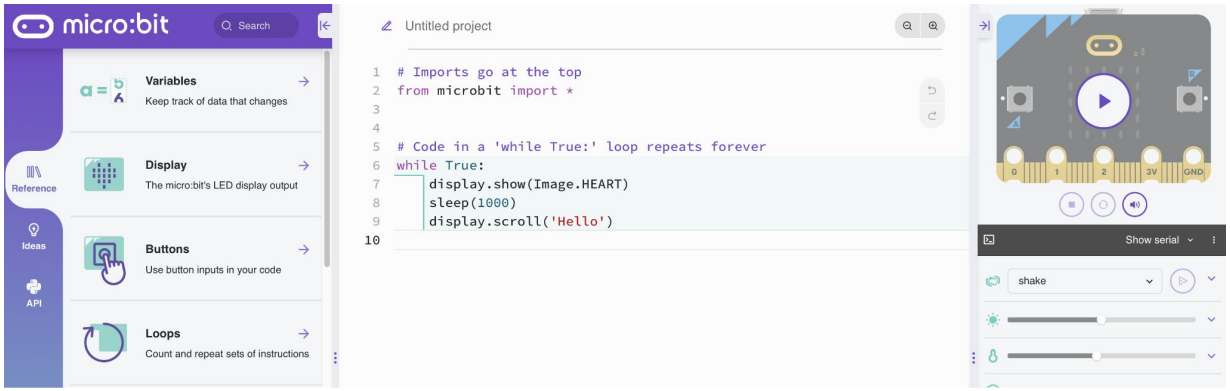
Back



Using python.microbit.org

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

Go to python.microbit.org

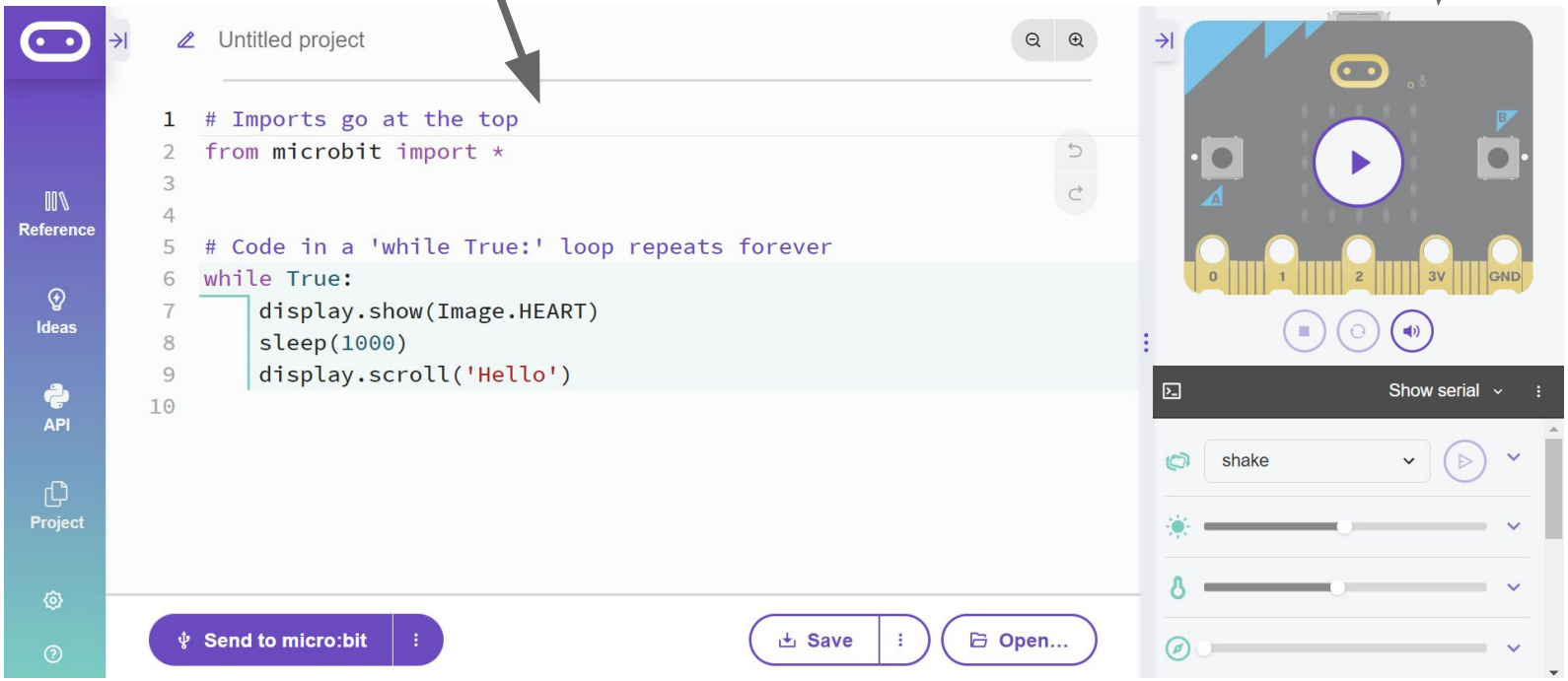


You should see this page pop up!

python.microbit.org

This is where we code

This is the simulator where we test our code



How do we write code for it?

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

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

```
from microbit import *
```

This lets us use lights, sounds, buttons and lots of other cool in our Python code for the Micro:Bit

The Display

Your Micro:Bit has a 5 x 5 display grid of little red LEDs on the front!

You can do some cool stuff with the display like:

Show an image, like a heart!

```
while True:
    display.show(Image.HEART)
    sleep(1000)
    display.scroll('Hello')
```

Scroll a word across the display, like 'Hello'

This code is in your **python.makecode.org** coding space - have a look

It's indented in a while loop - so it will repeat forever

Using the Simulator

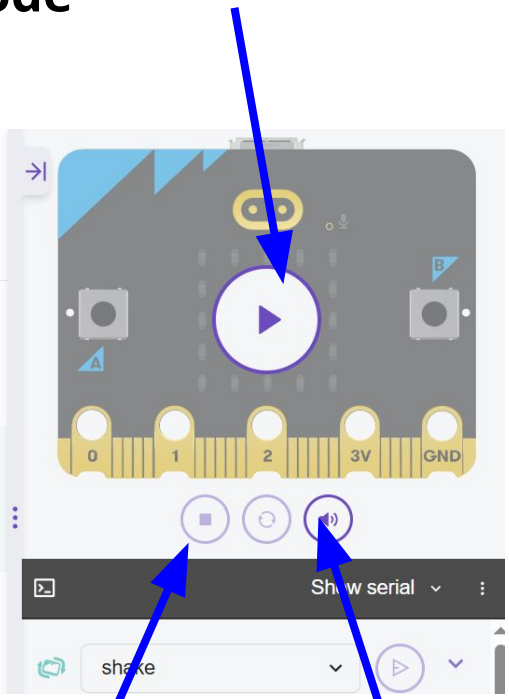
- **Click the arrow on the Simulator to run the code**
- A heart is displayed for 1 second and then ‘Hello’

Untitled project

```
# Imports go at the top
from microbit import *


# Code in a 'while True:' loop repeats forever
while True:
    display.show(Image.HEART)
    sleep(1000)
    display.scroll('Hello')

```



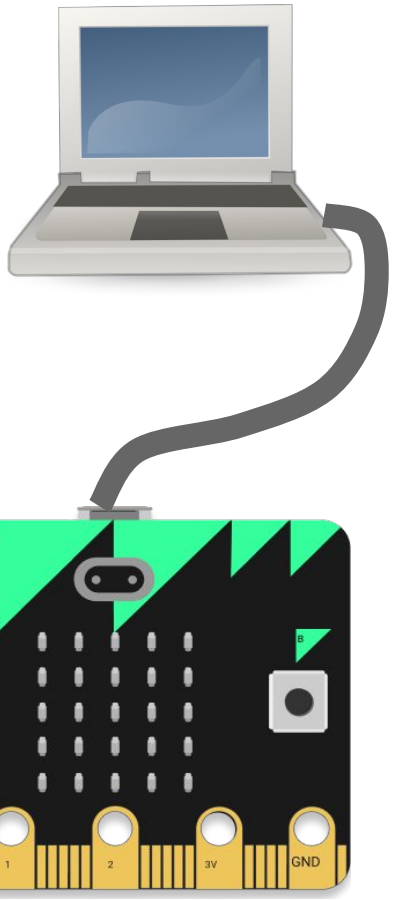
Stop **Restart**

We can run our code on the Simulator or the real micro:bit!

Stop, Restart, Simulator settings are underneath

Connect the Micro:Bit

- Tutors will hand out the micro:bits & cables
- Connect the small end of the cable to the top of micro:bit
- Connect the other end to computer USB port
- New micro:bits will play a “Meet the Microbit” program for you to follow:
  - Push the buttons
  - Shake
  - Tilt to catch flashing LED
  - Clap a few times
- The tutors will help you



Run the code on the Micro:Bit (Chrome/Edge)

It's fun to mess around with the Micro:Bit on the simulator.

Now let's see your code on a Micro:Bit in real life!

Chrome or Edge

Run your code on your Micro:Bit like this

1. Make sure your Micro:Bit is plugged into your computer
2. Click 

bottom left
3. Follow the prompts
4. Choose your micro:bit and click CONNECT
5. **Wait for the red light** on the back of your micro:bit to stop flashing
6. Your code should be running on the micro:bit!

You should see a HEART displayed for 1 second and then HELLO

Want your code to start again? Press black "**reset**" button on the back

Run the code on the Micro:Bit (other browser)

This is for if you don't have the Chrome or Edge browser (eg Safari)

Run your code on your Micro:Bit like this

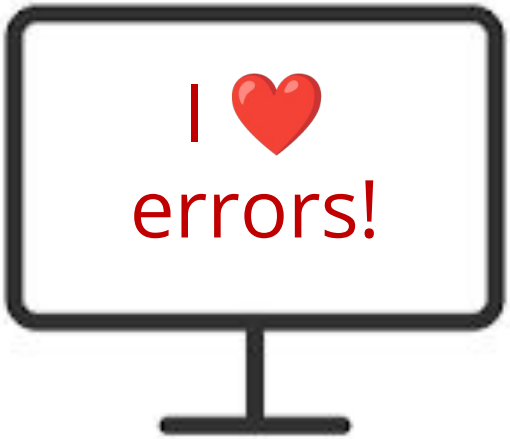
1. Make sure your Micro:Bit is plugged into your computer
2. Click 

bottom left
3. Click Close when you get a popup
4. Name your project and click Confirm and Save
5. Follow the instructions on the popup (drag the file from your downloads folder to the MICROBIT device)
6. **Wait for the red light** on the back of your micro:bit to stop flashing
7. Your code should be running on the micro:bit!

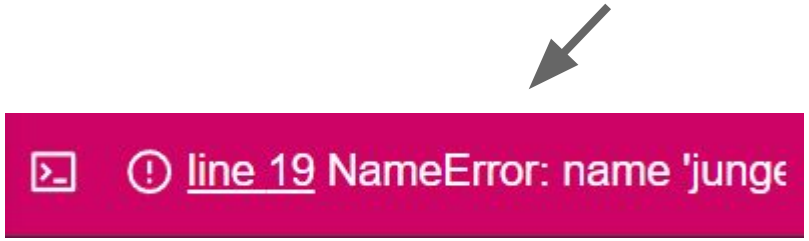
You should see a HEART displayed for 1 second and then HELLO
Want your code to start again? Press black "**reset**" button on the back

Mistakes are Great! Errors on the Micro:bit!

- Programmers make A LOT of errors!
- Error messages give us hints on how to fix the problem
- Mistakes don't break computers!



- Lots of unexpected words on the micro:bit is an error message
- Run on the simulator to see it better



We can learn from our mistakes!

line 5 SyntaxError: invalid synta

1. Where the error is

2. What went wrong

- In your code - red dot at the start of the line
- Put the cursor over than line of code to get a hint

```
5  display.scroll('Welcome to Tamagotchi)
6  name = "zoey"
```

String is not closed — missing quotation mark

Project Time!

Let’s use our MicroBit!

Try Parts 0 & 1 of your Workbook!

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:
    display.scroll(i)
    i = i + 1
```

Introducing … `while` loops!

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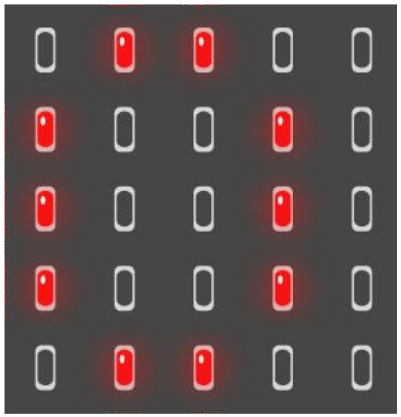
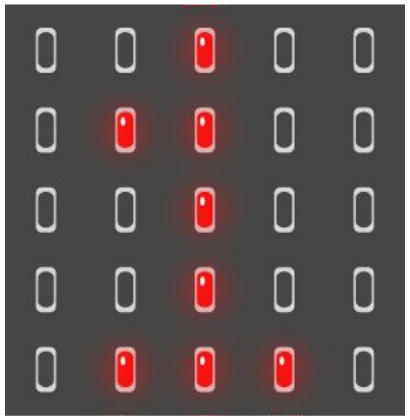
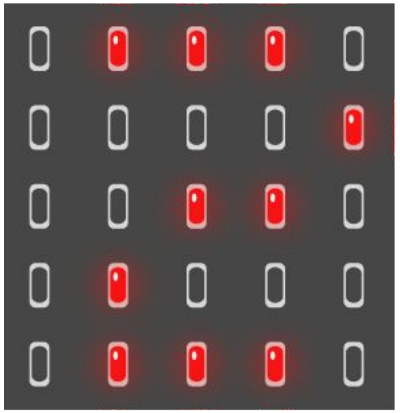
```
i = 0
while i < 3:
    print(i)
    i = i + 1
```







Introducing … `while` loops!

Stepping through a while loop…

Introducing … while loops!

One step at a time!

```
i = 0
while i < 3:
    display.scroll(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:
    display.scroll(i)
    i = i + 1
```

MY VARIABLES

```
i = 0
```

Introducing … while loops!

One step at a time!

Print !

```
i = 0
while i < 3:
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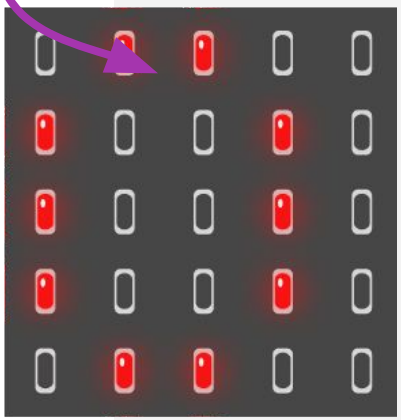
    i = i + 1
```



MY VARIABLES

```
i = 0
```

Introducing … `while` loops!

One step at a time!

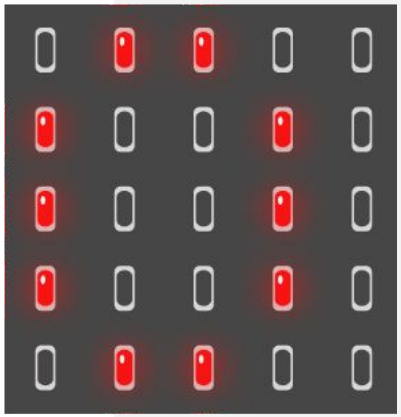
```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

MY VARIABLES

~~i = 0~~

i = 1

UPDATE TIME !

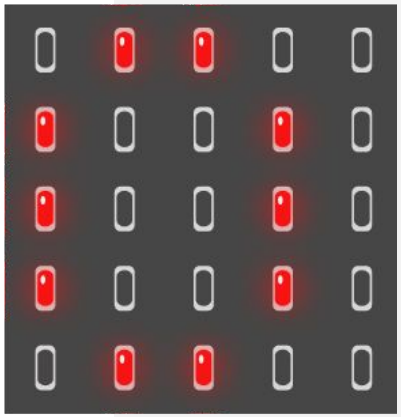


Introducing … while loops!

One step at a time!

Take it from the top!

```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```



MY VARIABLES

~~i = 0~~

i = 1

Introducing … while loops!

One step at a time!

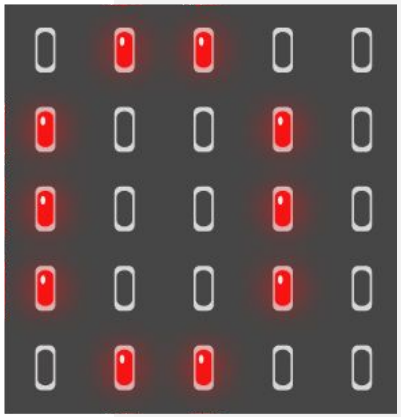
1 is less than 3 !

```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

MY VARIABLES

~~i = 0~~

i = 1



Introducing … while loops!

One step at a time!

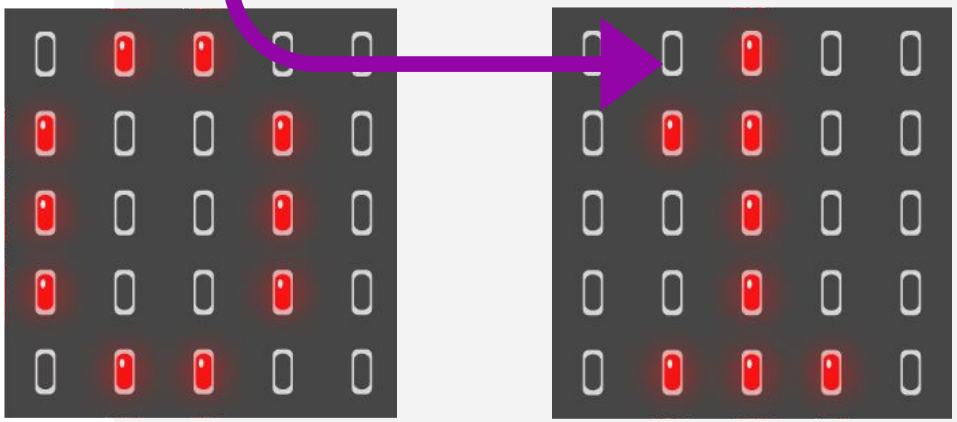
Print !

```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

MY VARIABLES

~~i = 0~~

i = 1



Introducing … while loops!

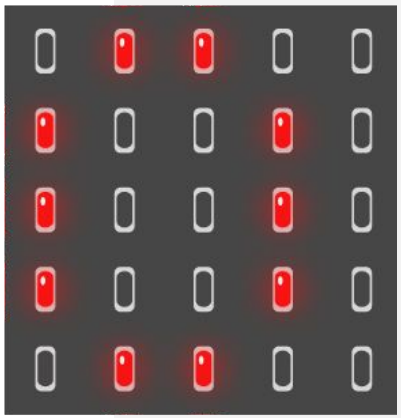
One step at a time!

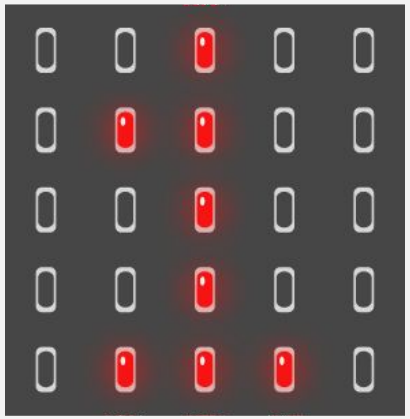
```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

MY VARIABLES

~~i = 0~~
~~i = 1~~
i = 2

UPDATE TIME !





Introducing … while loops!

One step at a time!

Take it from the top!

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MY VARIABLES

~~i = 0~~
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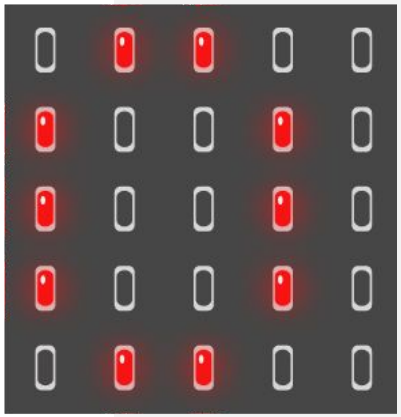
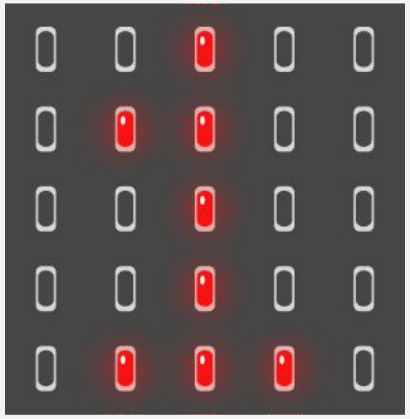




Introducing … while loops!

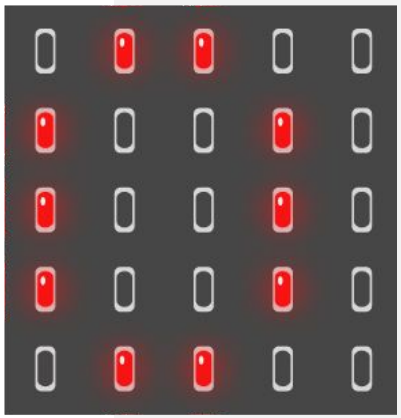
One step at a time!

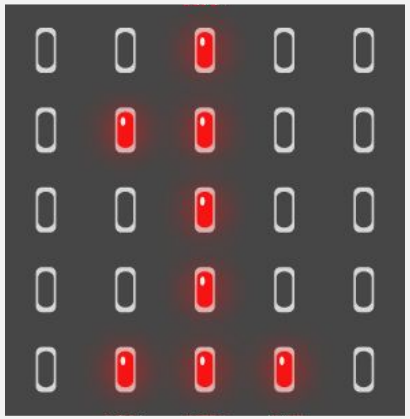
2 is less than 3 !

```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

MY VARIABLES

~~i = 0~~
~~i = 1~~
i = 2





Introducing … while loops!

One step at a time!

Print !

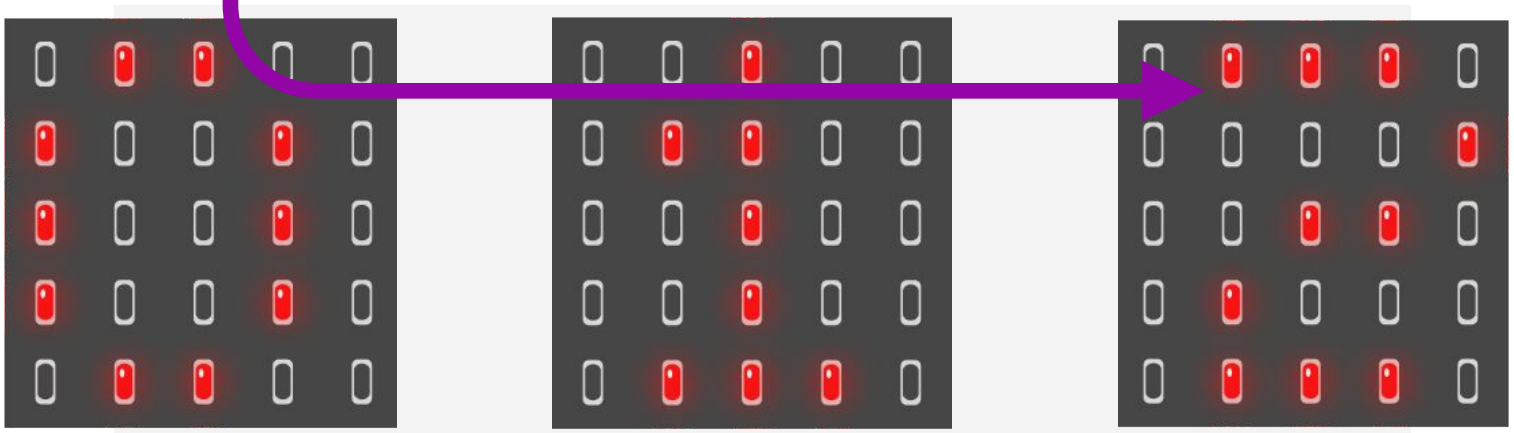
```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

MY VARIABLES

~~i = 0~~

~~i = 1~~

i = 2



Introducing … while loops!

One step at a time!

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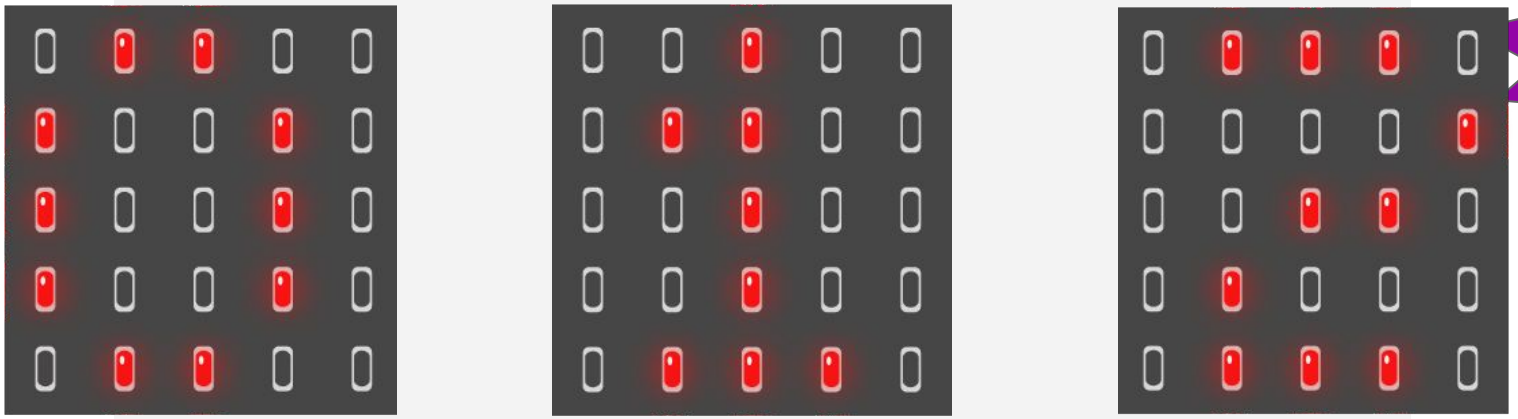
    i = i + 1
```

MY VARIABLES

~~i = 0~~
~~i = 1~~
~~i = 2~~
i = 3

UPDATE TIME !



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```
i = 0
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```

MY VARIABLES

~~i = 0~~
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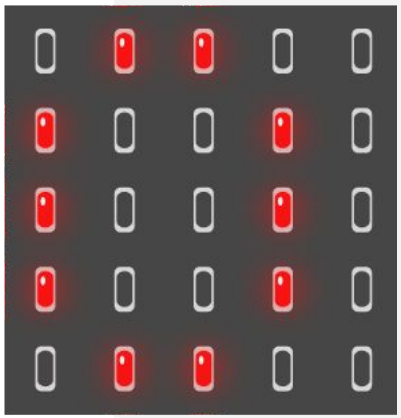
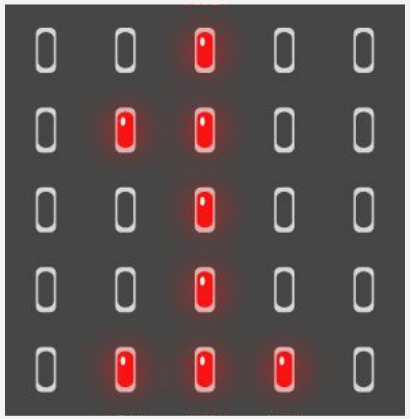
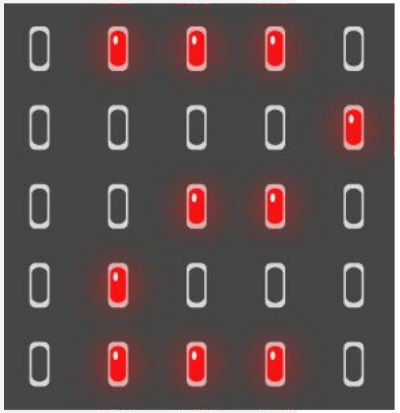






Introducing … while loops!

One step at a time!

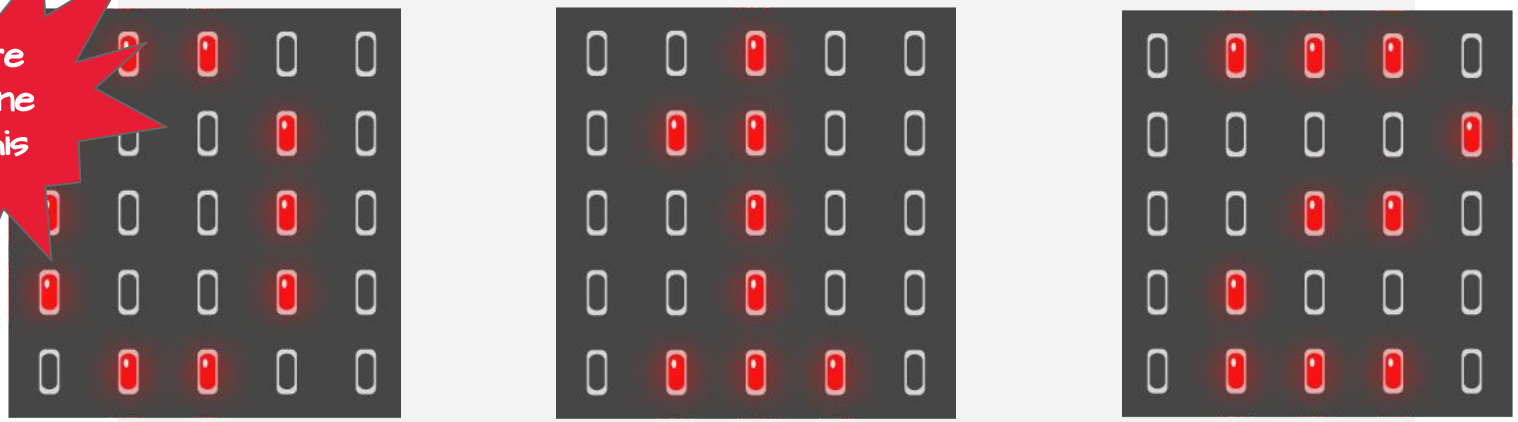
3 IS NOT less than 3 !

```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

We are are done with this loop!

MY VARIABLES

~~i = 0~~
~~i = 1~~
~~i = 2~~
i = 3



Introducing … `while` loops!

Initialise the loop variable

Loop condition

```
i = 0
while i < 3:
    display.scroll(i)
    i = i + 1
```

Code to repeat

Update the loop variable

What happens when.....

What happens if we forget to update the loop variable?

```
i = 0
while i < 3:
    display.scroll(i)
```

What happens when.....

What happens if we forget to update the loop variable?

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i = 0
while i < 3:
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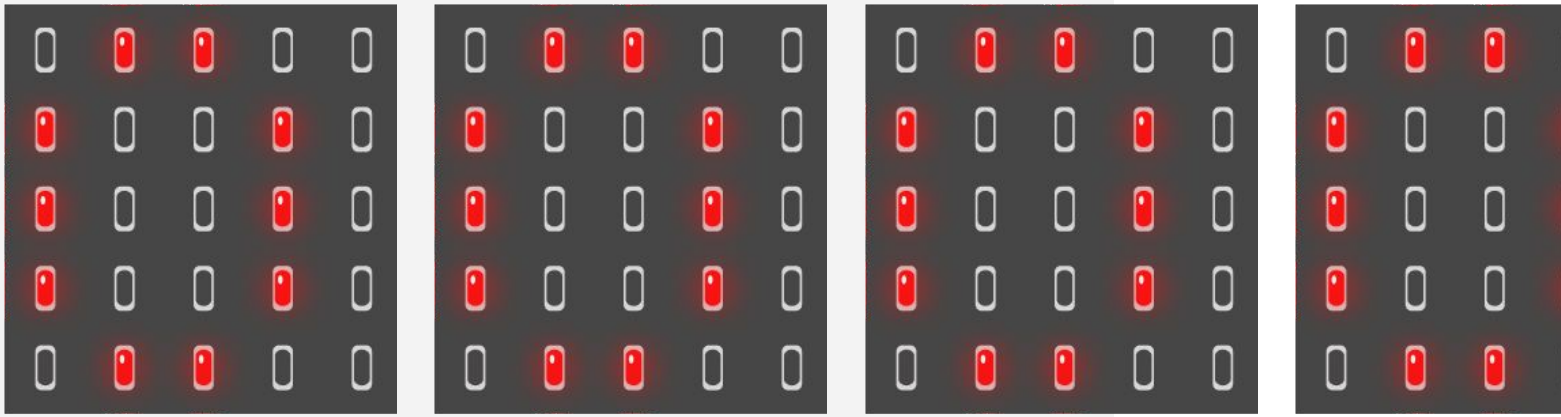
```



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:
    display.scroll("Are we there yet?")
```

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:
    display.scroll("Are we there yet?")
```

Are we the

Micro:Bit Instructions

Scroll... Scroll... Scroll... on the micro:bit

Words are too big to display within a 5x5 grid of lights.

Remember we can display words with **`display.scroll()`**.

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

Sometimes the text scrolls across too slowly - you can speed it up with **delay.**

```
display.scroll('Hello World', delay=100)
```

A smaller delay (eg 100 results in faster scrolling).

The default speed is 150!

Multiple Instructions

What happens if we want to change the speed **AND** join variables with strings?

This is how you would do it! :)

```
win_count = 3
display.scroll('Wins: '+ str(win_count), delay=75)
```

Message

delay

See that we need to use **str( )** to convert the number win_count to a string before we can join it (+) with the the other string!

Sleep... zzz! ... on the micro:bit

Computers are really fast, sometimes our program moves too quickly to enjoy it!

For example:

```
display.show(Image.HAPPY)
sleep(1000)
display.show(Image.SAD)
sleep(1000)
display.show(Image.CONFUSED)
sleep(1000)
```

Without a sleep, the computer will run through the code so quickly, and we will only see a CONFUSED face.

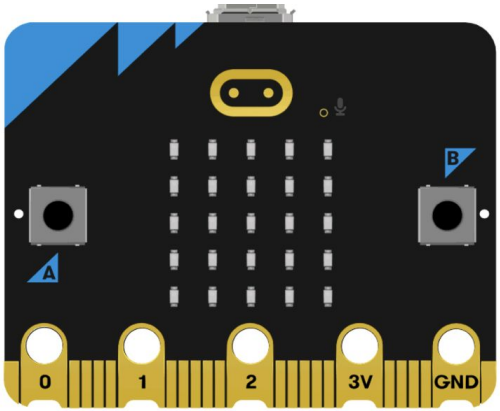
We can slow it down by using **sleep()**

Sleep is done in milliseconds (so the number of seconds x 1000)

Micro:Bit Inputs

Buttons!

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



You can use this code to check if a button is pressed:

```
if button_a.was_pressed():

If button_b.was_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

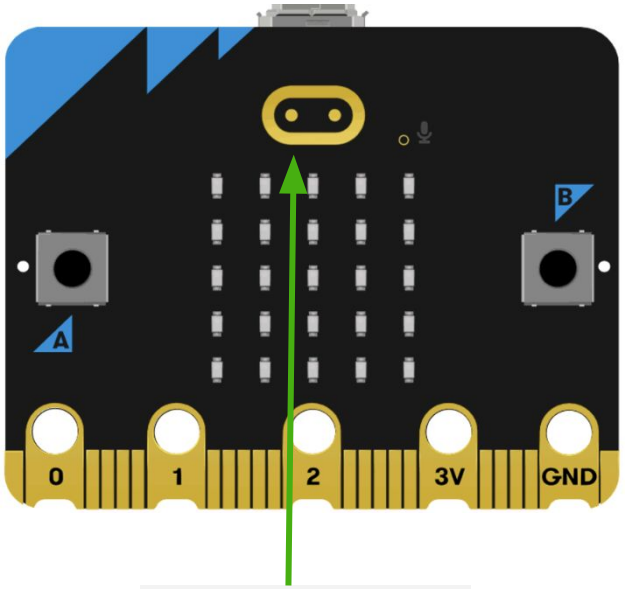
What do you think happens if *both* button a AND button b are being pressed?

Pin Logo!

Your Micro:Bit has touch sensitive pin logo at the top of the Micro:bit.

You can use this code to check if the pin logo is being touched.

```
if pin_logo.is_touched():
```



Pin Logo

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** seconds?

Running Time

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

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time = running_time()
```

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4000

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

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** seconds?

10,500

Accelerometer!

Your micro:bit has a motion sensor.

This sensor has the ability to detect when you tilt it left to right, backwards and forwards and up and down.

To use the accelerometer, we need a while loop. You can use this code to detect when the micro:bit has been shaken:

```
while True:
  if accelerometer.was_gesture('shake'):
```

Information from the sensor

Accelerometer!

What do you think this code does?

```
while True:
  if accelerometer.was_gesture('shake'):
      display.scroll('I’m getting dizzy')
```

Accelerometer!

What do you think this code does?

```
while True:
  if accelerometer.was_gesture('shake'):
      display.scroll('I’m getting dizzy')
```

It will display ‘I’m getting dizzy’ every time the micro:bit is shaken

Indentation

Whenever we have an if statement or while loop, there is something we have to do to make sure it only runs what we want it to run inside the if statement.

... that is called indentation

```
while True:
    if num>10:
        display.scroll('a big number')
```

These gaps are indentation!

Indentation

Whenever we have an if statement or while loop, there is something we have to do to make sure it only runs what we want it to run inside the if statement.

... that is called indentation

```
while True:
  if num>10:
      display.scroll('a big number')
```

We use the indentation to tell the code that a piece of code is "inside" another, for loops this means any code that has at least one extra gap after the loop, will be run.

But how do we indent?

There a couple ways to make sure a line of code is indented.

One is pressing the **TAB** button on your keyboard before a line of code.

Another is selecting the lines you want to indent and pressing the **TAB** button to indent them all at once.

And the last main one is to select all the lines you want to indent and press the **CTRL** and the **]** button at the same time.

Remember you need to indent for your code to work right!

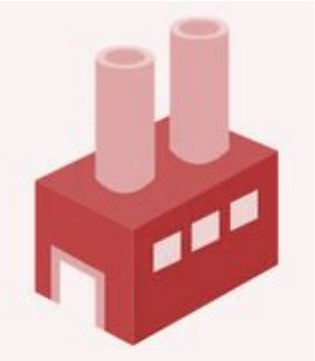
Functions!

Simpler, less repetition, easier to read code!

How functions fit together!

Functions are like factories!

Metal Worker



Your main factory!

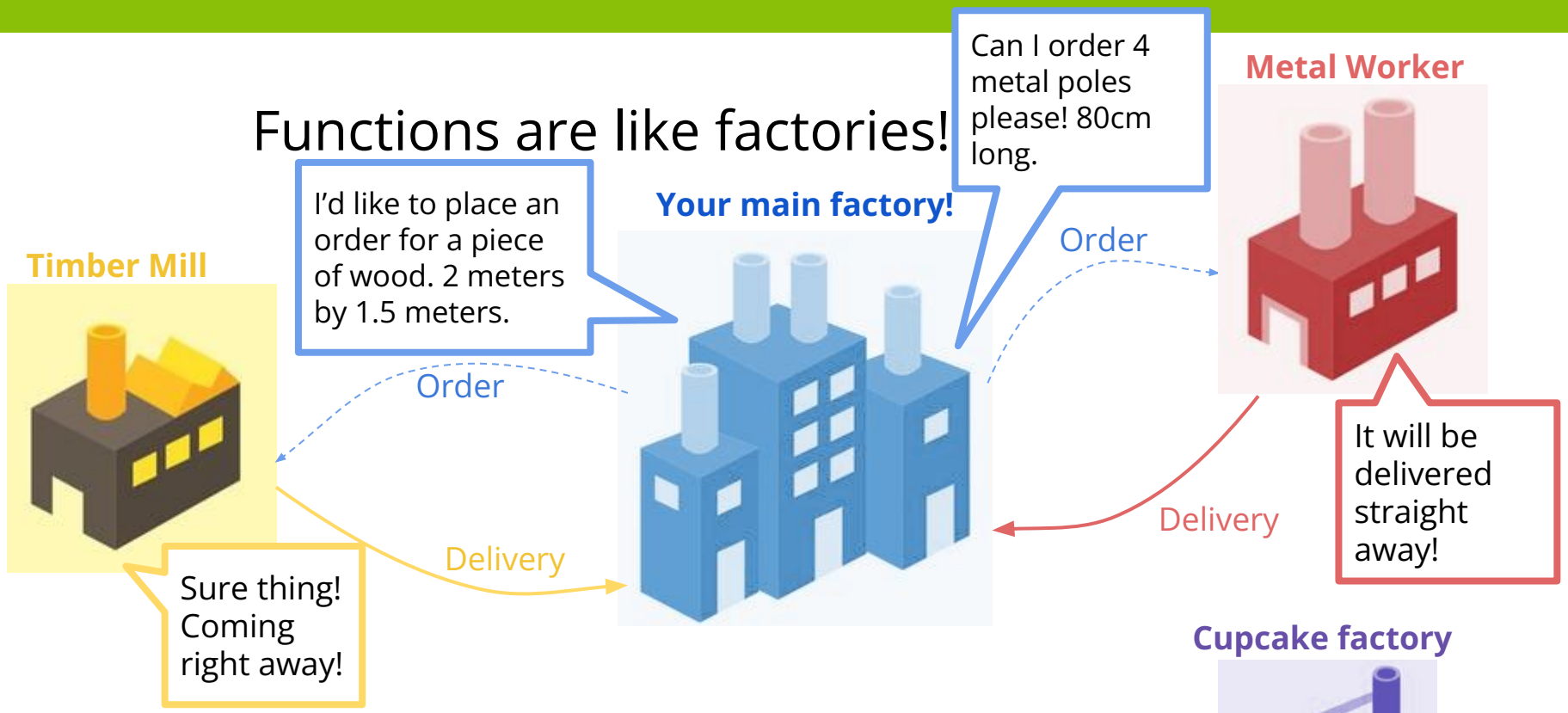
Timber Mill

Cupcake factory

Running a factory doesn't mean doing all the work yourself, you can get other factories to help you out!

How functions fit together!

Functions are like factories!

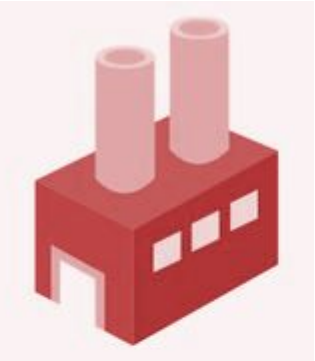


Asking other factories to do some work for you makes your main task simper. You can focus on the assembly!

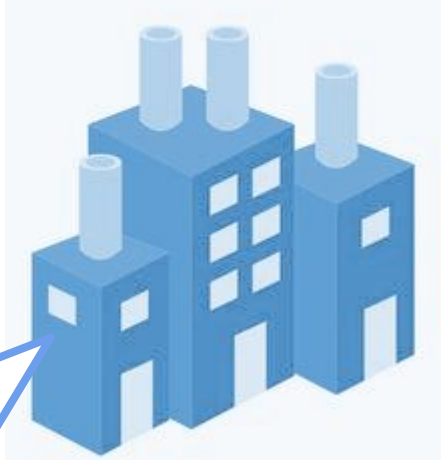
How functions fit together!

Functions are like factories!

Metal Worker



Your main factory!



Timber Mill

Look at this beautiful table I made!

Outsourcing made it simple!

Cupcake factory

How functions fit together!

Your main code!

You can write a bunch of helpful functions to **simplify** your **main goal**!

You can **write** these **once** and then **use** them **lots** of times! They can be **anything** you like!

Helps with printing nicely

Uses stats to make decisions

Does calculations

Don’t reinvent the wheel

We’re already familiar with some python in built functions like print and input!

There’s lots of functions python gives us to save us reinventing the wheel!

For instance we can use len to get the length of a string, rather than having to write code to count every letter!

```
>>> len("Hello world")
```

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```
>>> len("Hello world")
11
```

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For instance we can use len to get the length of a string, rather than having to write code to count every letter!

```
>>> len("Hello world")
11
```

What do these do?:

```
>>> name = "Renee"
>>> len(name)


>>> int("6")


>>> str(6)
```

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For instance we can use len to get the length of a string, rather than having to write code to count every letter!

```
>>> len("Hello world")
11
```

What do these do?:

```
>>> name = "Renee"
>>> len(name)
5

>>> int("6")


>>> str(6)
```

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11
```

What do these do?:

```
>>> name = "Renee"
>>> len(name)
5

>>> int("6")
6

>>> str(6)
"6"
```

Defining your own functions

Built in functions are great! But sometimes we want custom functions!

Defining our own functions means:

- We cut down on repeated code
- Nice function names makes our code clear and easy to read
- We can move bulky code out of the way

Defining your own functions

Then you can use your function by calling it!

```
def cat_print():
    print("""
                        #
                         #
                         #
                ^..^ #####
                =TT=      ;
                 #########
                 # #   # #
                 M M   M M """)


cat_print()
cat_print()
```

Which will do this!

```
                        #
                         #
                         #
                ^..^ #####
                =TT=      ;
                 #########
                 # #   # #
                 M M   M M
                        #
                         #
                         #
                ^..^ #####
                =TT=      ;
                 #########
                 # #   # #
                 M M   M M
```

Defining your own functions

Then you can use your function by calling it!

```
def cat_print():
    print("""
                    #
                     #
                     #
          ^..^ #####
          =TT=      ;
           #########
           # #   # #
           M M   M M """)

cat_print()
cat_print()
```

When using a function in a **script** make sure you define the function first.

It doesn't matter if you call it from inside another function though!

Which will do this!

```
                    #
                     #
                     #
          ^..^ #####
          =TT=      ;
           #########
           # #   # #
           M M   M M
                    #
                     #
                     #
          ^..^ #####
          =TT=      ;
           #########
           # #   # #
           M M   M M
```

Functions often need extra information

Functions are more useful if we can change what they do

We can do this by giving them arguments (aka parameters)

```
>>> def hello(person):
...   display.scroll('Hello, ' + person + ', how
are you?')
>>> hello('Alex')
Hello, Alex, how are you?
```

Here, we give the hello() function a name

Any string will work

```
>>> hello('abcd')
Hello, abcd, how are you?
```

Functions can take multiple arguments

Often we want to work with multiple pieces of information.

You can actually have as many parameters as you like!

This function takes two numbers, adds them together and prints the result.

```
>>> def add(x, y):
...   display.scroll(x + y)
>>> add(3, 4)
7
```

Arguments stay inside the function

The arguments are not able to be accessed outside of the function declaration.

```
>>> def hello(person):
...   display.scroll('Hello, ' + person + '!')
>>> display.scroll(person)
Traceback (most recent call last):
File "<stdin>", line 1, in <module>
NameError: name 'person' is not defined
```

Variables stay inside the function

Neither are variables made inside the function. They are **local variables**.

```
>>> def add(x, y):
...     z = x + y
...     display.scroll(z)
>>> add(3, 4)
7
>>> z
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'z' is not defined
```

Global variables are not affected

Changing a variable in a function **only changes it *inside* the function.**

```
>>> z = 1
>>> def add(x, y):
...     z = x + y
...     display.scroll(z)
>>> add(3, 4)
7
```

Global variables are not affected

Changing a variable in a function **only changes it *inside* the function.**

```
>>> z = 1
>>> def add(x, y):
...     z = x + y
...     display.scroll(z)
>>> add(3, 4)
7
```

What's the value of z now?

```
>>> display.scroll(z)
```

Global variables are not affected

Changing a variable in a function **only changes it *inside* the function.**

```
>>> z = 1
>>> def add(x, y):
...     z = x + y
...     display.scroll(z)
>>> add(3, 4)
7
```

What's the value of z now?

```
>>> display.scroll(z)
1
```

Recap: A function signature

definition

the `def` keyword

function **name**

function **arguments**

```
def add(x, y):
```

callsite

function **name**

function **arguments**

```
>>> add(2, 3)
```

Classes

What is an object?

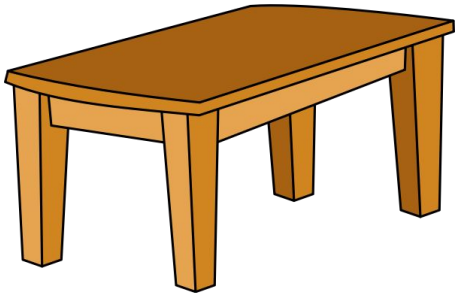
What do you think an object is?

What is an object?

What do you think an object is?

What is an object?

What do you think an object is?



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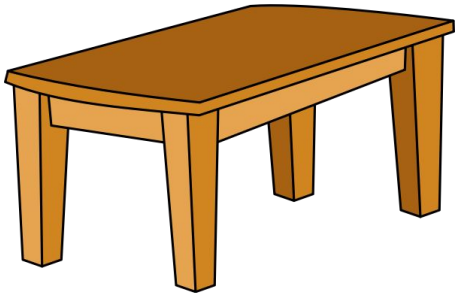

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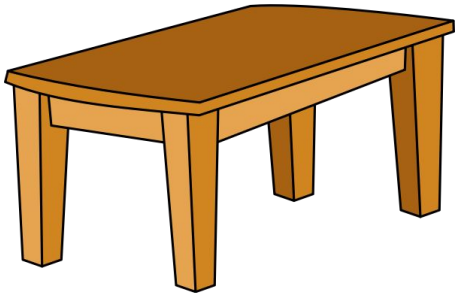

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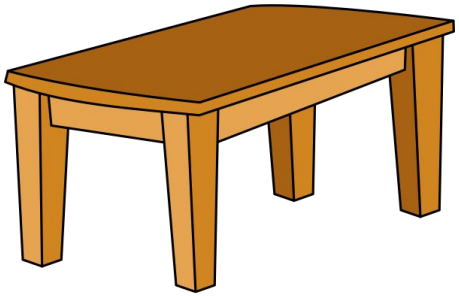

What is an object in code?

An object is something that we know information about and that can sometimes do things

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Like a cat!

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Like a cat!

What information might we know about a cat?

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What information might we know about a cat?

Name

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What information might we know about a cat?

Name

Age

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What information might we know about a cat?

Name

Age

Colour

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What information might we know about a cat?

Name

Owner

Age

Colour

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What information might we know about a cat?

Name
Age
Colour
Owner
Weight

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What information might we know about a cat?

Name
Owner
Age
Microchip #
Weight
Colour

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What things might a cat do?

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What things might a cat do?

Meow

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What things might a cat do?

Meow
Eat

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What things might a cat do?

Meow
Eat
Scratch

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What things might a cat do?

Meow
Eat
Scratch
Sleep

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What things might a cat do?

Meow
Eat
Scratch
Sleep
Purr

What is an object in code?

An object is something that we know information about and that can sometimes do things

Like a cat!

What things might a cat do?

Meow **Sleep**
Eat **Jump** **Purr**
Scratch

What does that look like in Python?

Let’s have a look at how we might make a Cat object in Python code!

What does that look like in Python?

Let's have a look at how we might make a Cat object in Python code!

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour
```

Here we tell python that we are making a new type (or class) of object called Cat

What does that look like in Python?

Let's have a look at how we might make a Cat object in Python code!

__init__ is how we tell Python how to make a new Cat

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour
```

What does that look like in Python?

Let's have a look at how we might make a Cat object in Python code!

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour
```

Here we tell Python what information we need to know about the Cat

Note: self is special and we always need it

What does that look like in Python?

Let's have a look at how we might make a Cat object in Python code!

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour
```

Here we save the information we got so we can use it again

What does that look like in Python?

How do we make a new Cat?

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour

emmy = Cat(“Emmy”, 3, “Dark brown”)
```

What does that look like in Python?

What does this show on the screen?

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour

emmy = Cat(“Emmy”, 3, “Dark brown”)
display.scroll(emmy.name)
display.scroll(emmy.age)
display.scroll(emmy.colour)
```

What does that look like in Python?

What does this show on the screen?

```
class Cat():
  def __init__(self, name, age, colour):
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    self.colour = colour

emmy = Cat("Emmy", 3, "Dark brown")
display.scroll(emmy.name)
display.scroll(emmy.age)
display.scroll(emmy.colour)
```

```
Emmy
3
Dark Brown
```

What about doing things?

We said an object was something with information that could sometimes do things. Our Cat object doesn't do anything right now - let's add a way for it to meow!

What about doing things?

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```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour

  def meow(self):
    display.scroll("Meow")
```

What about doing things?

What does this code do?

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour

  def meow(self):
    display.scroll("Meow")

emmy = Cat("Emmy", 3, "Dark brown")
emmy.meow()
```

What about doing things?

What does this code do?

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  def __init__(self, name, age, colour):
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    display.scroll("Meow")

emmy = Cat("Emmy", 3, "Dark brown")
emmy.meow()
```

Meow

What else can it do?

Let’s have our cat have a Birthday that makes it get older by 1 year!

What else can it do?

Let's have our cat have a Birthday that makes it get older by 1 year!

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour

  def meow(self):
    display.scroll("Meow")

  def birthday(self):
    self.age = self.age + 1
```

What else can it do?

What does this code do?

```
class Cat():
  def __init__(self, name, age, colour):
    self.name = name
    self.age = age
    self.colour = colour

  def meow(self):
    display.scroll(“Meow”)

  def birthday(self):
    self.age = self.age + 1

emmy = Cat(“Emmy”, 3, “Dark brown”)
emmy.birthday()
display.scroll(emmy.age)
```

What else can it do?

What does this code do?

```
class Cat():
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    self.name = name
    self.age = age
    self.colour = colour

  def meow(self):
    display.scroll("Meow")

  def birthday(self):
    self.age = self.age + 1

emmy = Cat("Emmy", 3, "Dark brown")
emmy.birthday()
display.scroll(emmy.age)
```

I have more than 1 cat!

Emmy has a little sister, Saphira! Let's add her to our code too!

```
cat1 = Cat("Emmy", 3, "Dark brown")
cat2 = Cat("Saphira", 1, "Grey")
```

Cat Crime!

There has been a cat crime!

One of the cats has gotten on the kitchen counter and eaten some of my lunch!

They both look innocent but they left a hair behind at the scene of the crime! Let's write some code to work out who did it

Cat Crime

Who did it??

```
cat1 = Cat(“Emmy”, 3, “Dark brown”)
cat2 = Cat(“Saphira”, 1, “Grey”)

hair_colour = “Grey”

if hair_colour == cat1.colour:
  display.scroll(“That hair belongs to”, cat1.name)
elif hair_colour == cat2.colour:
  display.scroll(“That hair belongs to”, cat2.name)
```

Cat Crime

Who did it??

```
cat1 = Cat(“Emmy”, 3, “Dark brown”)
cat2 = Cat(“Saphira”, 1, “Grey”)

hair_colour = “Grey”

if hair_colour == cat1.colour:
  display.scroll(“That hair belongs to”, cat1.name)
elif hair_colour == cat2.colour:
  display.scroll(“That hair belongs to”, cat2.name)
```

```
That hair belongs to Saphira
```

Project time!

You now know all about **classes**!

Let's put what we learnt into our project

Try to do Parts 4-6

The tutors will be around to help!

Micro:Bit Radio

We can use the radio to talk to each other!

All of your Micro:bits have the ability to send and receive radio messages. We are going to use this to make our Micro:bits communicate.

To send radio messages, our Micro:bits send out special invisible light waves at different times to symbolise a series of 1s and 0s, which other Micro:bits can then translate into words and information.

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?

Talking over distance...

Everytime our Micro:bits receive a message, it can do a cool thing, where it tells you how strong the signal was. This strength is an indication of how close together the sending and receiving Micro:bits were.

We can do this with:

```
radio.recieve_full()
```

This will basically tell the Micro:bit to give you all the information it received from the radio message, instead of just the message.

Although when we use this the message isn't completely readable, so we need to, ignore the first three characters, and convert the rest to a special type of string ("utf8)