Welcome to the Labs

Scissors Paper Rock!

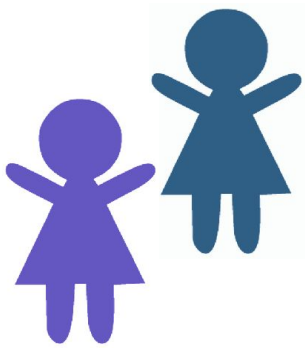
Who are the tutors?

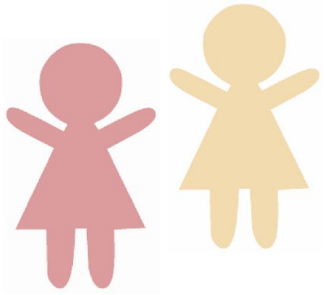
Who are you?

Ultimate Scissors Paper Rock

1. Start with a partner
2. play scissors paper rock!

Who will be the champion?





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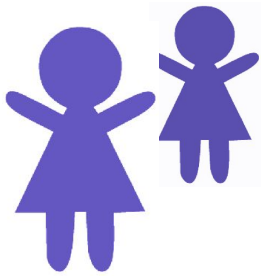

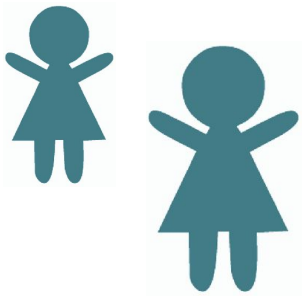

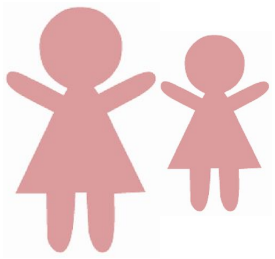

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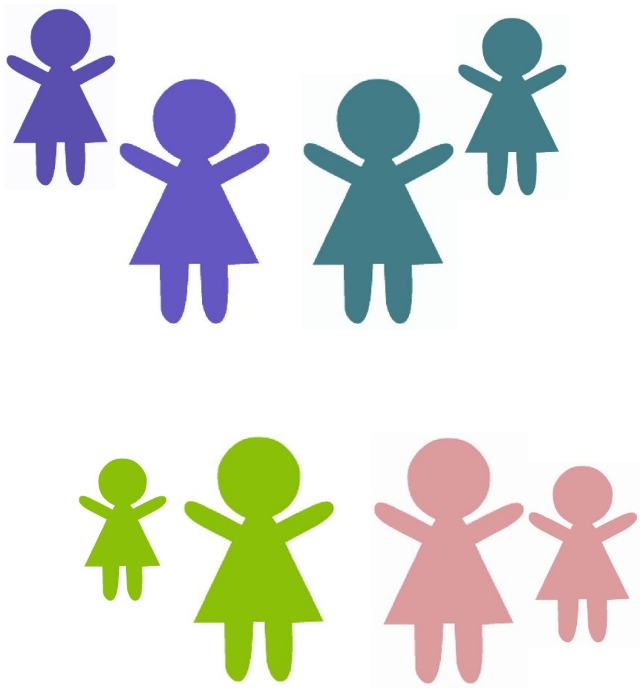

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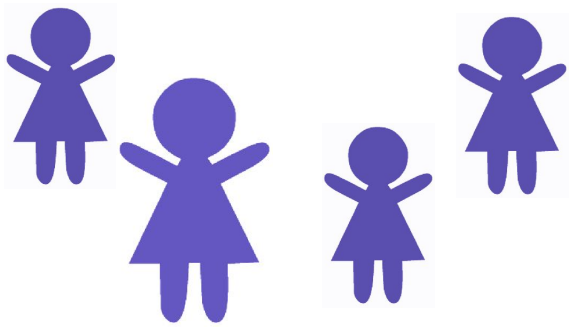

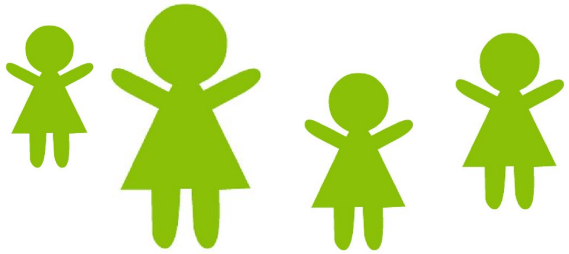

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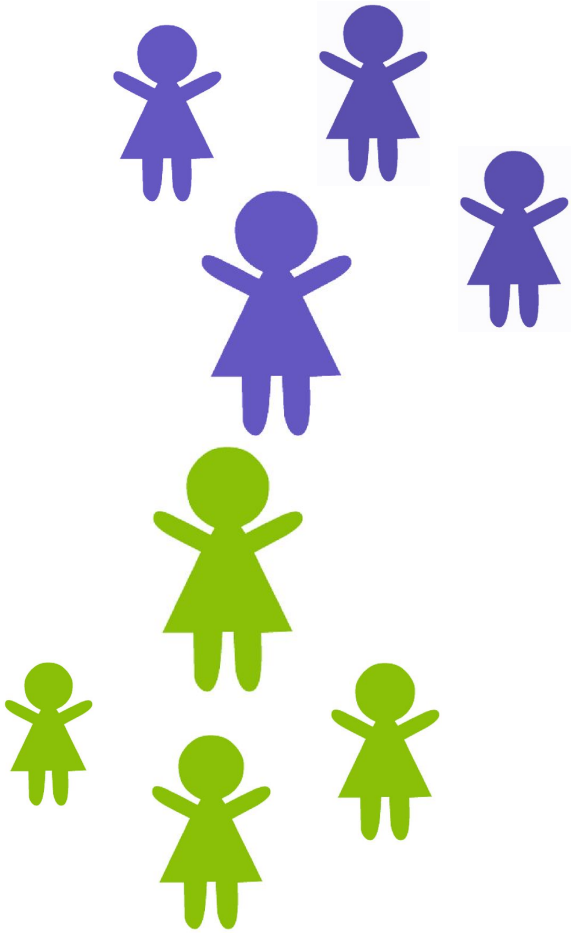

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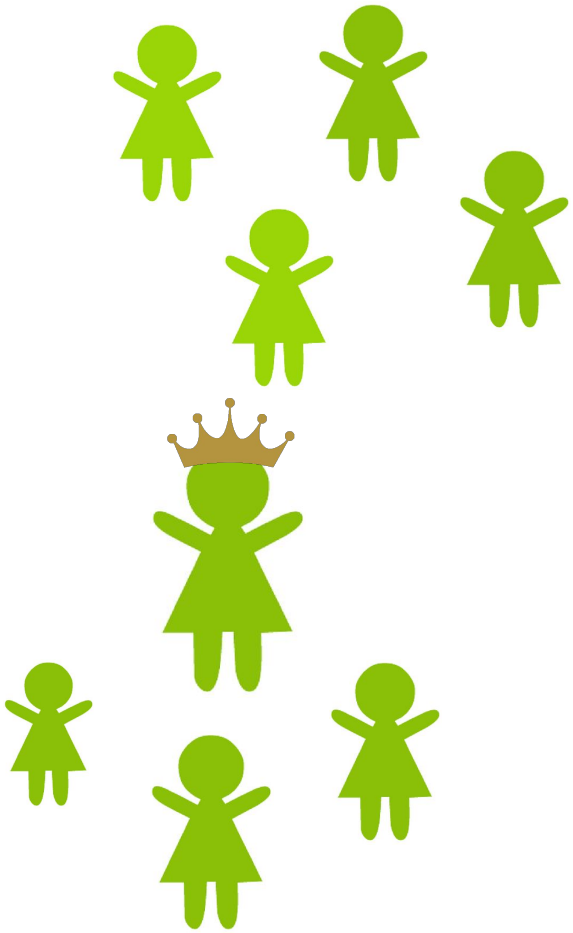


Log on

Log on and jump on the GPN website

girlsprogramming.network/sydney-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!

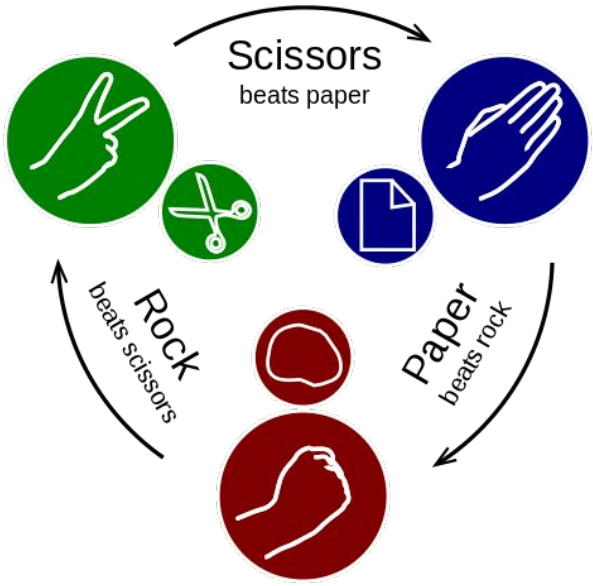
Click on the
Start of Day Survey
and fill it in now!

Today's project!

Scissors Paper Rock!

Best of Three?

Let’s go round the room, and play some Scissors Paper Rock!



It’s what we’ll be programming today, so have a think about some of the actions required to play!

Scissors Paper Rock

How did you go? Did you win?

Some of the things that we need to do to play scissors paper rock include:

- We have to select a move (out of scissors, paper and rock)
- Our opponent has to select a move
- We need to know what combinations of move result in win, lose or tie.
- We need to compare our moves to see who won!
- We have to congratulate the winner!

We'll be programming these actions today! Our opponent is going to be the computer.

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!

Classes

What is an object?

What do you think an object is?

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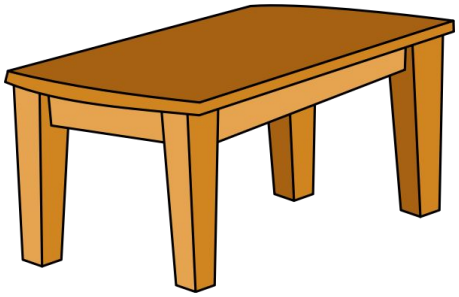

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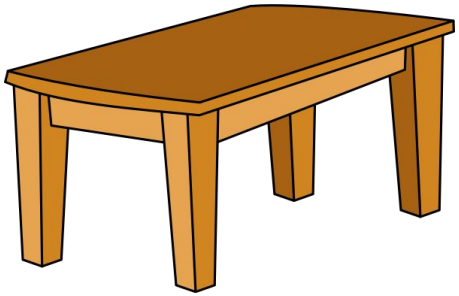

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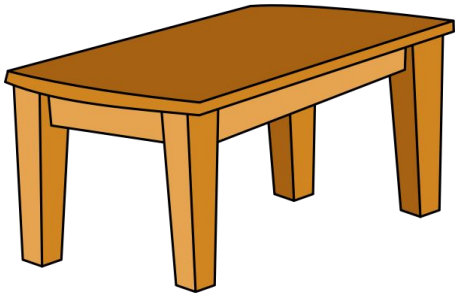

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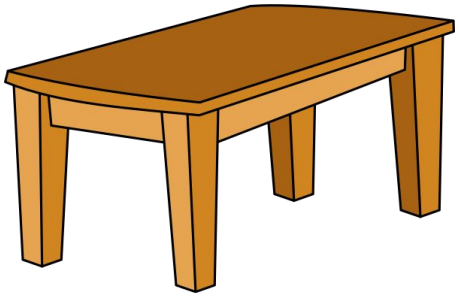

What is an object in code?

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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What information might we know about a cat?

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What information might we know about a cat?

Name

What is an object in code?

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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

Owner

Age

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 information might we know about a cat?

Name	**Owner**
Age	**Weight**
Colour	**Microchip #**

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Like a cat!

What things might a cat do?

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What things might a cat do?

Meow

What is an object in code?

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Like a cat!

What things might a cat do?

Meow

Eat

What is an object in code?

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Like a cat!

What things might a cat do?

Meow

Eat

Scratch

What is an object in code?

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What things might a cat do?

Meow

Eat

Scratch

Sleep

What is an object in code?

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Scratch

Sleep

Purr

What is an object in code?

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Like a cat!

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Eat

Purr

Scratch

Jump

What does that look like in Python?

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

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```
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):
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    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):
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    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 print out?

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

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

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print(emmy.name)
print(emmy.age)
print(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!

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```
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    self.age = age
    self.colour = colour

  def meow(self):
    print("Meow")
```

What about doing things?

What does this code do?

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emmy.meow()
```

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emmy.meow()
```

Meow

What else can it do?

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

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

  def meow(self):
    print(“Meow”)

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

What else can it do?

What does this code do?

```
class Cat():
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emmy = Cat(“Emmy”, 3, “Dark brown”)
emmy.birthday()
print(emmy.age)
```

What else can it do?

What does this code do?

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

4

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

```
That hair belongs to Saphira
```

Project time!

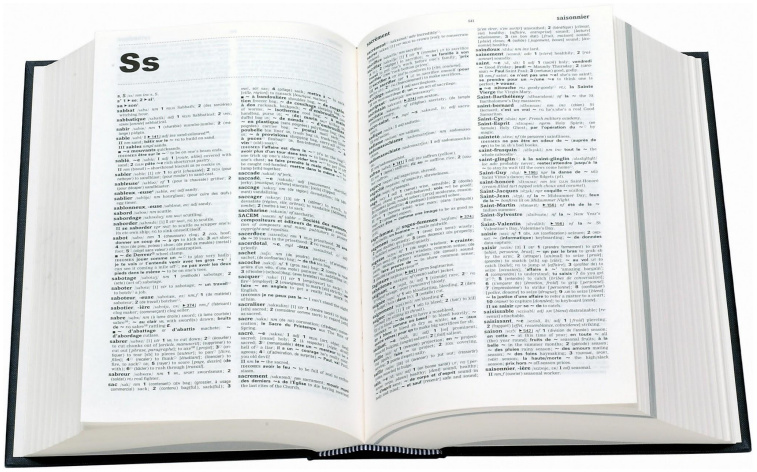
You now know all about **classes**!

Let's put what we learnt into our project

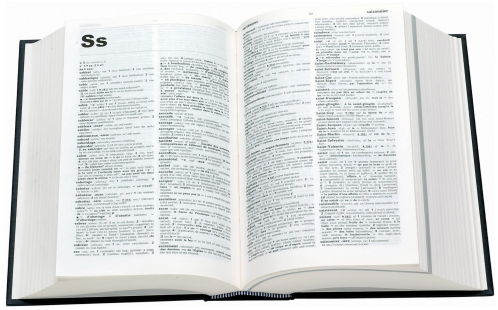
Try to do Parts 0-2

The tutors will be around to help!

Dictionaries



Dictionaries!

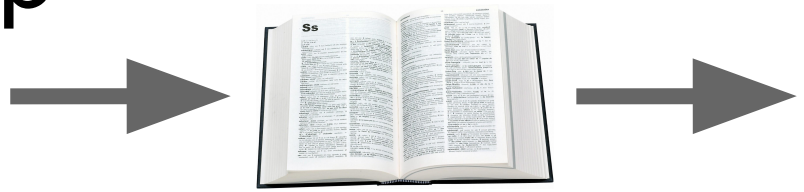


You know dictionaries!

They're great at looking up thing by a word, not a position in a list!

Look up

Hello



Get back

A greeting (salutation) said when meeting someone or acknowledging someone's arrival or presence.

Looking it up!

There are lots of times we want to look something up!

Competition registration

Team Name → List of team members

Phone Book

Name → Phone number

Vending Machine

Treat Name → Price

Looking it up!

Phone Book

Name → Phone number

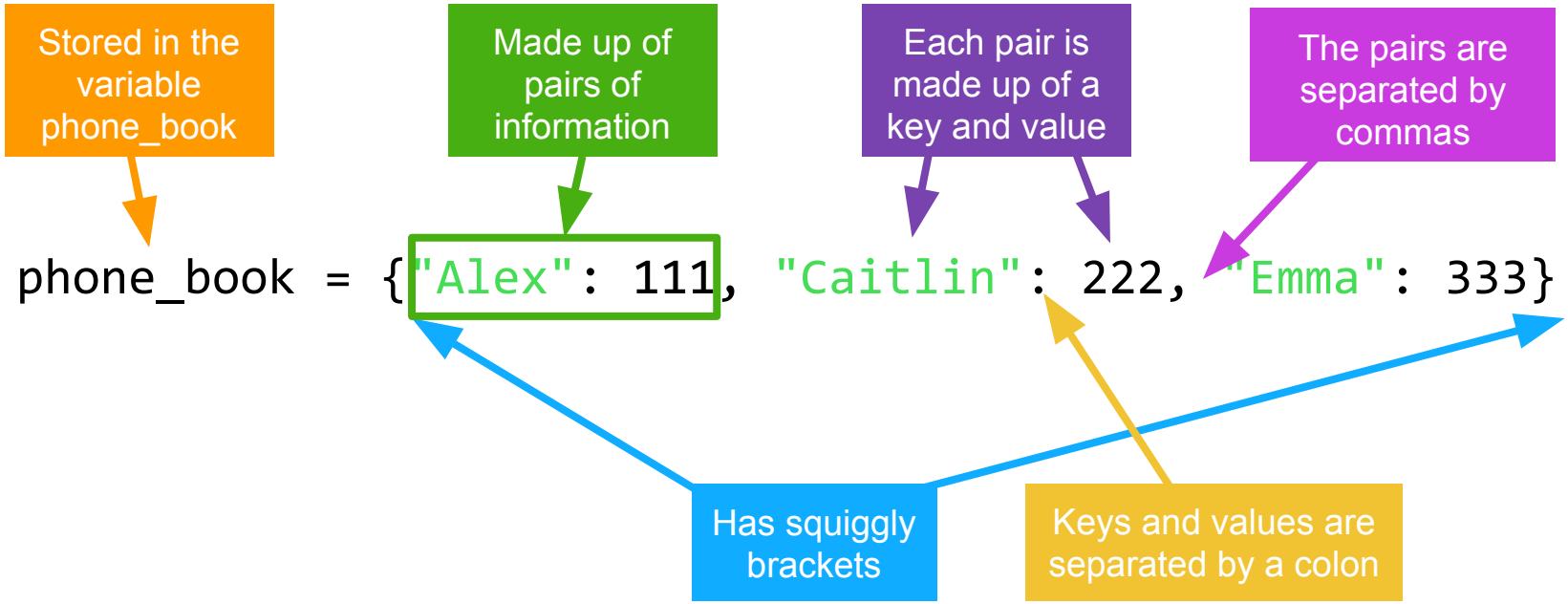
Key

Value

We can use a dictionary for anything with a key → value pattern!

Dictionaries anatomy!

This is a python dictionary!



This dictionary has Alex, Caitlin and Emma's phone numbers

Playing with dictionaries!

Let's try using the phone book in IDLE

1. **Copy in the dictionary! Add your own made up phone number!**

```
phone_book = {"Alex": 111, "Caitlin": 222, "Emma": 333}
```

2. **Try this:** `phone_book["Alex"]`

3. **How would you look up Emma's phone number?**

4. **Look up the name of someone who is not in the phone book? What happens?**

Save it for later!

Sometimes we don't need the info right now.

Let's store it in a variable and use it later!

1. **Look up Alex's phone number and store it in a variable**

```
alexs_number = phone_book["Alex"]
```

2. **Print out a message using alexs_number**

```
print("Alexs number is: ", alexs_number)
```

3. **Repeat task 1 and 2 for another person in the phone book!**

Tuples!

Some data sticks together!

Tuples are like lists that you can't edit or add too!

It's a:

- **list of items**
- **in round brackets**
- **separated by commas**

Tuples are a way of grouping data!

```
("January", "1st")
("December", "25th")
("April", "25th")
```

Tuples in dictionaries!

We can use tuples as the key to a dictionary

1. **Copy in the dictionary! Add your own made up phone number!**

```
phone_book = {("January", "1st"): "New Years",
              ("December", "25th"): "Christmas Day",
              ("April", "25th"): "ANZAC Day"}
```

2. **Try this:** `phone_book[("January", "1st")]`

3. **How would you look up what happens on the 25th of April**

4. **What happens if you we do:** `phone_book[("25th", "December")]`

Project time!

You now know all about dictionaries!

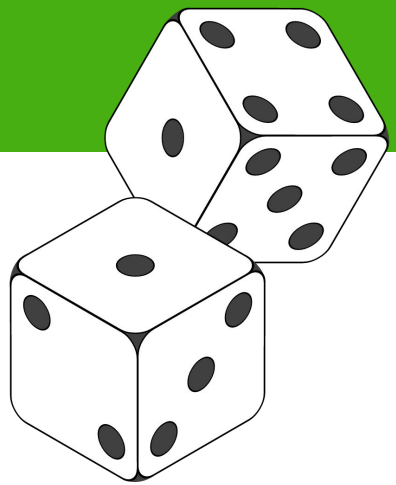
Let’s put what we learnt into our project

Try to do Part 3

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!

We want the computer to be random sometimes!

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

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 = ["eggs", "bread", "apples", "milk"]
```

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 = ["eggs", "bread", "apples", "milk"]
>>> 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 4

The tutors will be around to

For Loops

Looping through lists!

What would we do if we wanted to print out this list, one word at a time?

```
words = ['This', 'is', 'a', 'sentence']

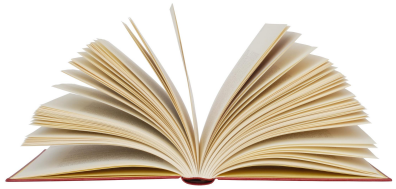

print(words[0])
print(words[1])
print(words[2])
print(words[3])
```

What if it had a 100 items??? That would be BORING!

For Loops

For loops allow you to do something for **each** item in a **group** of things

There are many real world examples, like:



For each page in this book:

    Read

For each chip in this bag of chips:

    Eat

Looping over a list of ints

We can loop through a list:

```
numbers = [1, 2, 3, 4]
for i in numbers:
    print(i)
```

```
What's going to happen?
```

Looping over a list of ints

We can loop through a list:

```
numbers = [1, 2, 3, 4]
for i in numbers:
    print(i)
```

```
What's going to happen?
>>> 1
>>> 2
>>> 3
>>> 4
```

- Each item of the list takes a turn at being the variable i
- Do the body once for each item
- We're done when we run out of items!

Practice Time!

1. Make a new file called yummy.py

2. Copy in this list

```
>>> fruits = ['apple', 'banana', 'mango']
```

3. Add **2 lines of code** that makes your program print out this.
   Use a for loop!

```
>>>Yummy apple
>>>Yummy banana
>>>Yummy mango
```

HINT!

```
numbers = [1, 2, 3, 4]
for i in numbers:
    print(i)
```

How does it work??

Somehow it knows how to get one fruit out at a time!!

It's like it knows english!

```
fruits = ['apple', 'banana', 'mango']
for fruit in fruits:
    print('yummy ' + fruit)
```

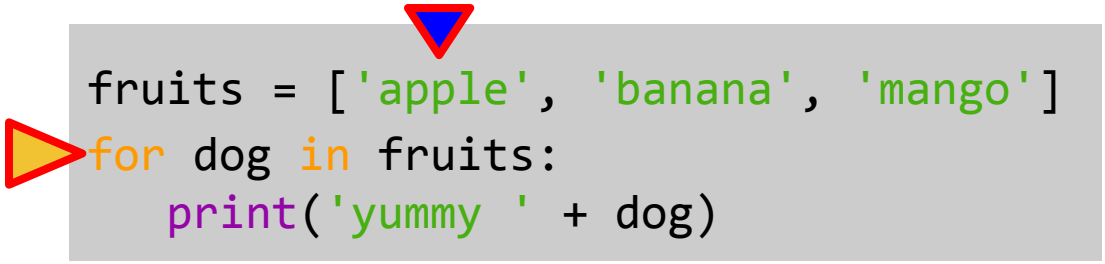
But fruit is just a variable! We could call it anything! Like dog!

```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

```
>>>Yummy apple
>>>Yummy banana
>>>Yummy mango
```

How does it work??

Everything in the list gets to have a turn at being the dog variable



```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

Let's set dog to to the first thing in the list!
dog is now 'apple'!

How does it work??

Everything in the list gets to have a turn at being the dog variable

```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

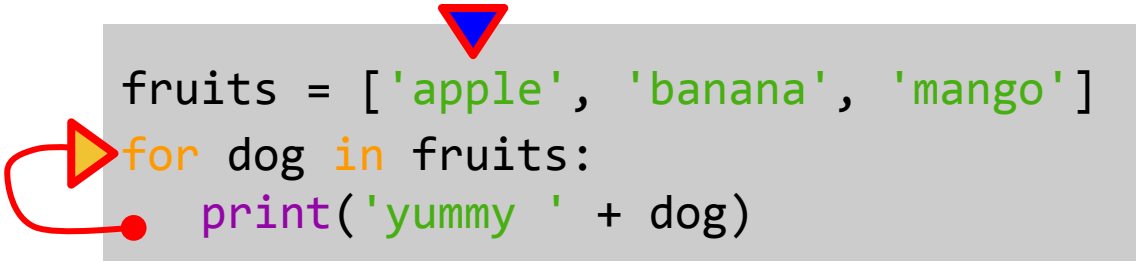
```
>>>Yummy apple
```

Let's set dog to to the first thing in the list!

```
dog is now 'apple'!
print('yummy ' + dog)
```

How does it work??

Everything in the list gets to have a turn at being the dog variable



```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

```
>>>Yummy apple
```

Let's set dog to to the first thing in the list!

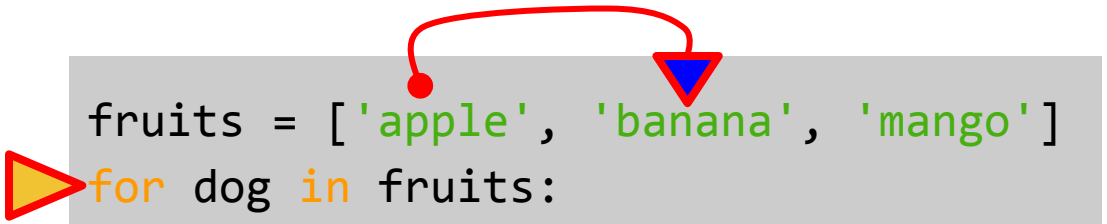
dog is now 'apple'!

```
print('yummy ' + dog)
```

We're at the end of the loop body, back to the top!

How does it work??

Everything in the list gets to have a turn at being the dog variable



```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

```
>>>Yummy apple
```

Let's set dog to to the first thing in the list!
dog is now 'apple'!
print('yummy ' + dog)
We're at the end of the loop body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'banana'!

How does it work??

Everything in the list gets to have a turn at being the dog variable

```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

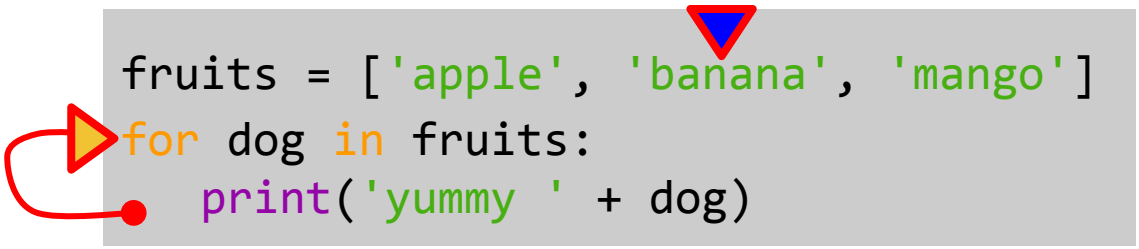
```
>>>Yummy apple
>>>Yummy banana
```

Let's set dog to to the first thing in the list!
dog is now 'apple'!
`print('yummy ' + dog)`
We're at the end of the loop body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'banana'!
`print('yummy ' + dog)`

How does it work??

Everything in the list gets to have a turn at being the dog variable



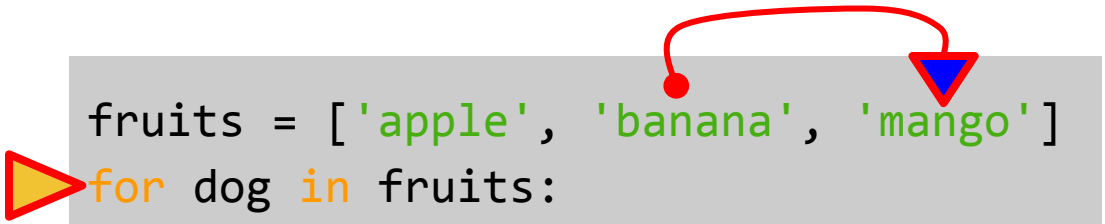

```
>>>Yummy apple
>>>Yummy banana
```

Let's set dog to to the first thing in the list!
dog is now 'apple'!
`print('yummy ' + dog)`
We're at the end of the loop body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'banana'!
`print('yummy ' + dog)`
Out of body, back to the top!

How does it work??

Everything in the list gets to have a turn at being the dog variable



```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

```
>>>Yummy apple
>>>Yummy banana
```

Let's set dog to to the first thing in the list!
dog is now 'apple'!
`print('yummy ' + dog)`
We're at the end of the loop body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'banana'!
`print('yummy ' + dog)`
Out of body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'mango'!

How does it work??

Everything in the list gets to have a turn at being the dog variable

```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

```
>>>Yummy apple
>>>Yummy banana
>>>Yummy mango
```

Let's set dog to to the first thing in the list!
dog is now 'apple'!
print('yummy ' + dog)
We're at the end of the loop body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'banana'!
print('yummy ' + dog)
Out of body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'mango'!
print('yummy ' + dog)

How does it work??

Everything in the list gets to have a turn at being the dog variable

```
fruits = ['apple', 'banana', 'mango']
for dog in fruits:
    print('yummy ' + dog)
```

```
>>>Yummy apple
>>>Yummy banana
>>>Yummy mango
```

Let's set dog to to the first thing in the list!
dog is now 'apple'!
print('yummy ' + dog)
We're at the end of the loop body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'banana'!
print('yummy ' + dog)
Out of body, back to the top!

Let's set dog to to the next thing in the list!
dog is now 'mango'!
print('yummy ' + dog)
Out of body, and out of list!!
We're done here!

Generating a List!

Sometimes you don't care about what is in the list!

You just want to repeat 10 times or a 1000 times!

Doing this is boring.....

```
numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

But python will make a list of things for you!
Try this!

1. In IDLE type

```
list(range(50))
```

2. In your yummy.py file, add this after your yummy fruit!

```
for num in range(50):
    print(num)
```

Project Time!

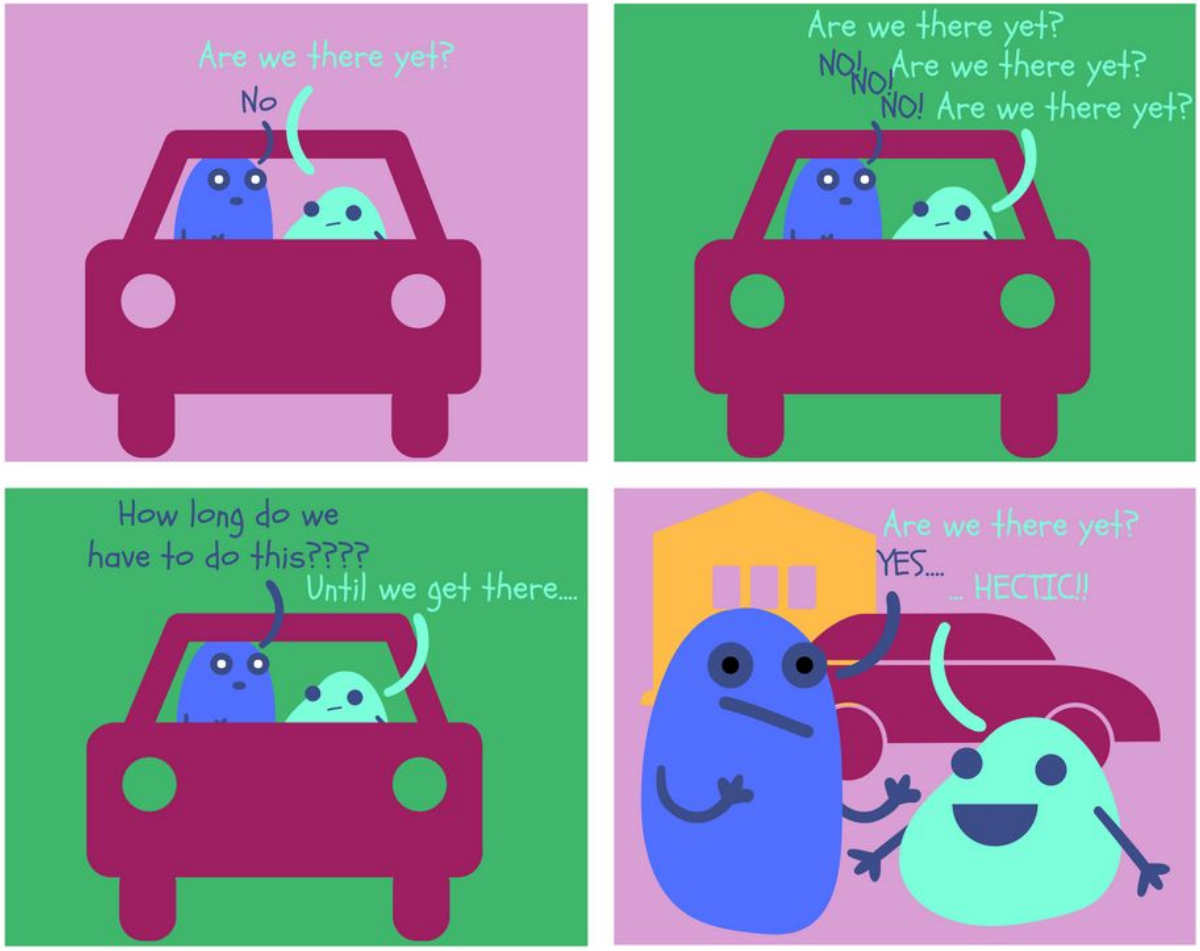
Now you know how to use a for loop!

```
Try to do Parts 5 and6
...if you are up for it!
```

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
>>>
```

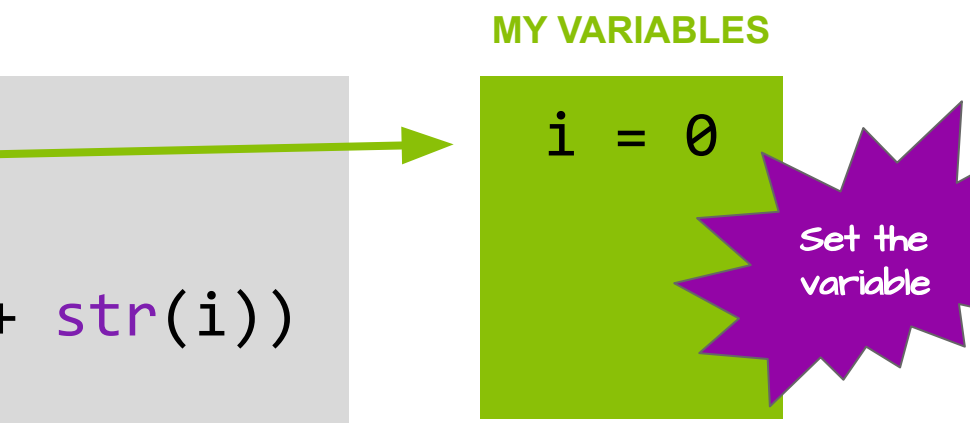
Introducing … `while` loops!

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
```



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
```

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 is 0
```

Introducing ... `while` loops!

One step at a time!

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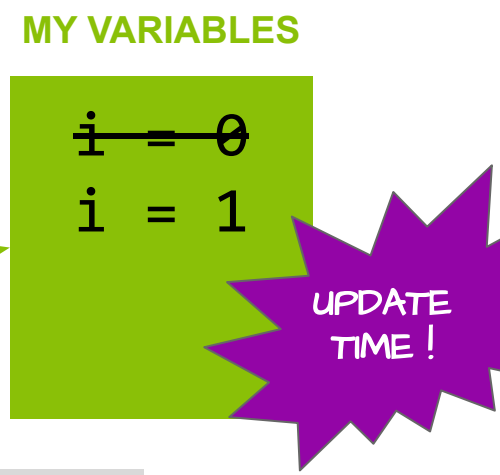



```
i is 0
```

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

```
i is 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

```
i is 0
```

Introducing … `while` loops!

One step at a time!


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

MY VARIABLES

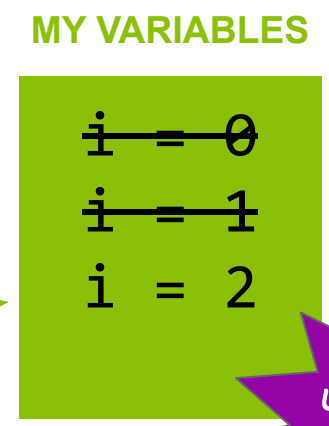
~~i = 0~~
i = 1

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

Introducing ... `while` loops!

One step at a time!

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




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

Introducing … `while` loops!

One step at a time!


```
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!


```
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!


```
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
i is 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!


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

MY VARIABLES

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

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

Introducing ... `while` loops!

One step at a time!

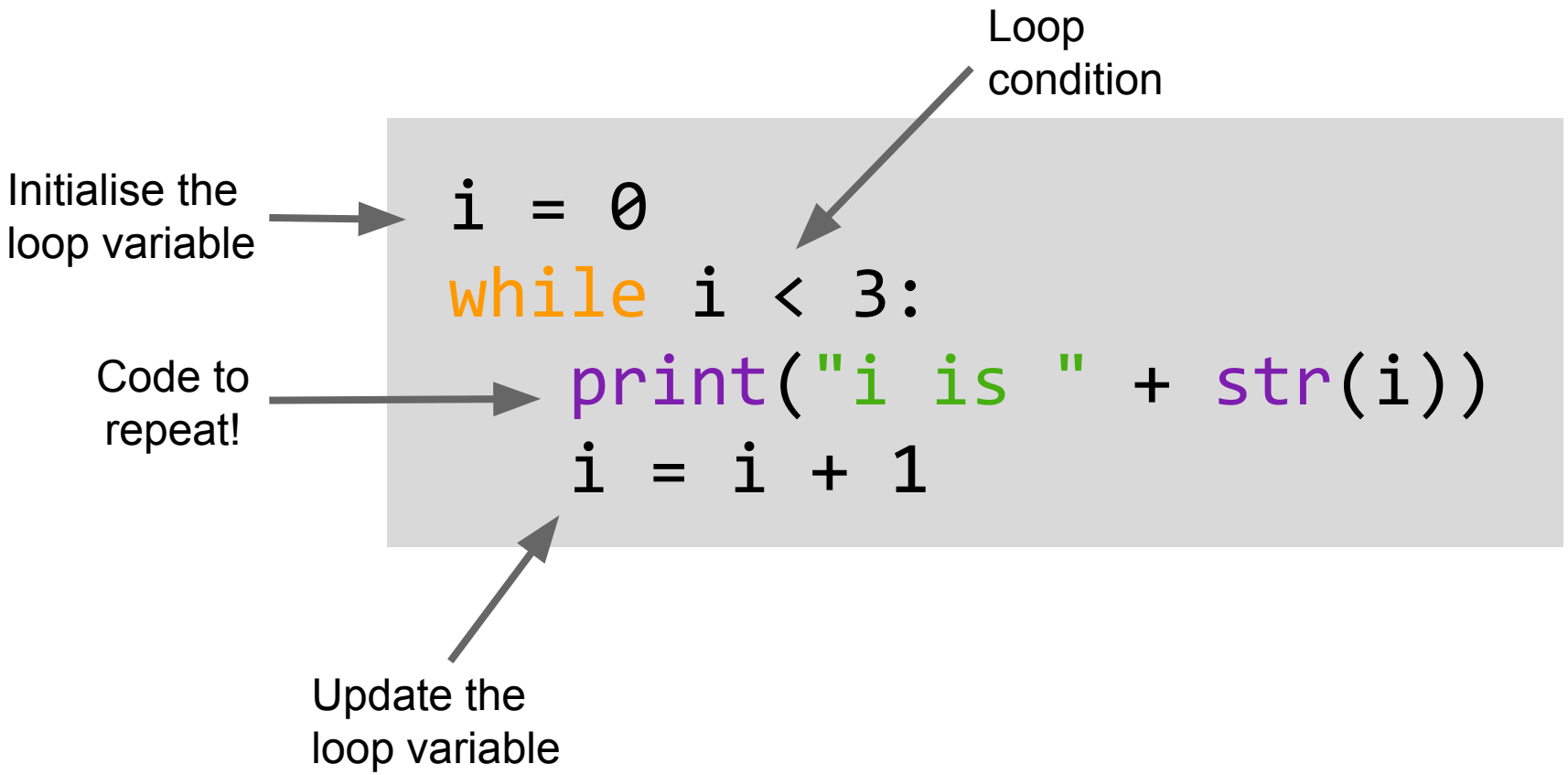

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

MY VARIABLES

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


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

Introducing … `while` loops!



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))
```

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

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?")
```

Project Time!

while we're here:

Try to do Part 7!

And the extensions

The tutors will be around to help!

Tell us what you think!

Click on the

End of Day Form

and fill it in now!