Welcome to the Labs

Scissors Paper Rock!



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A ATLASSIAN amazon june 1988



Who are the tutors?

Who are you?

Log on

Log on and jump on the GPN website

girlsprogramming.network/adelaide-workshop

Click Content for your room. You can see:

- These slides (to take a look back or go on ahead).
- A link to our workbook in EdStem.
- A cheatsheet of python shortcuts!

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!





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









- Start with a partner
- 2. play scissors paper rock!
- If you win they become your cheer squad!
 And their squad becomes your squad!
- 4. Find a new partner!
- 5. Keep playing until there is only one person left!

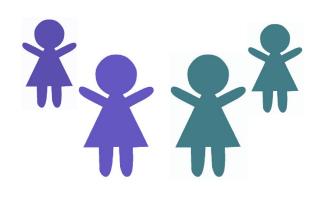


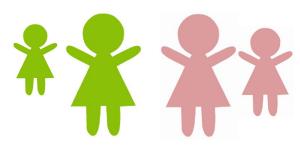




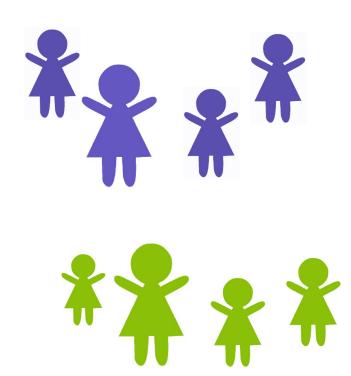


- Start with a partner
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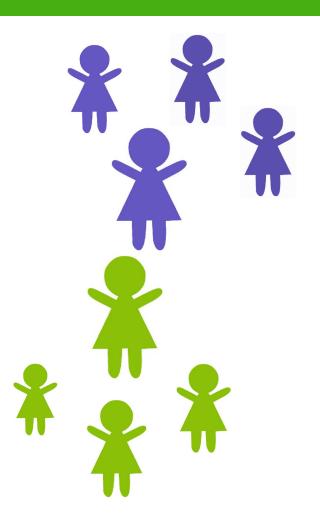


- 1. Start with a partner
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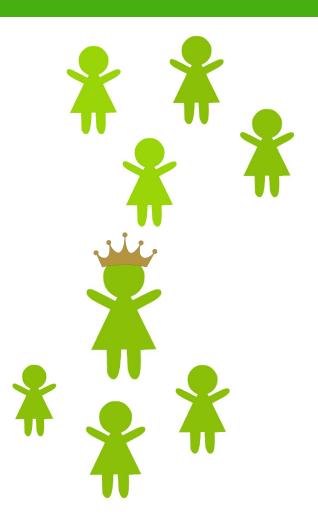


- Start with a partner
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 And their squad becomes your squad!
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- Start with a partner
- play scissors paper rock!
- If you win they become your cheer squad! And their squad becomes your squad!
- Find a new partner!
- Keep playing until there is only one person left!





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:

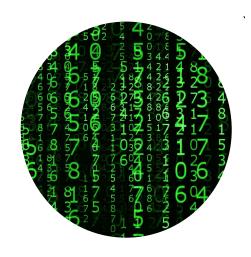
- We have to select a move (out of scissors, paper and rock)
- Our opponent has to select a move
- We need to know what combinations of move result in win, lose or tie.
- We need to compare our moves to see who won!
- We have to congratulate the winner!

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



Intro to programming

What is programming?



Programming is not a bunch of crazy numbers!

It's giving computers a set of instructions!



A special language

Humans have languages like English, French, Spanish, Mandarin And computers have languages like Python, Java, C and PHP



 $https://images.saymedia-content.com/.image/t_share/MTc0MTAyNzI3ODUxMjU1MjQx/how-to-easily-learn-a-language.jpg$



Problem solving

Programming is how we get computers to solve complicated problems for us, saving us both time and effort!

This might be solving maths problems or counting words in a paragraph!



People are smart, computers are dumb!

Computers do exactly what they're told. They follow instructions given to them in order, just like a cook following a recipe.





If the instructions are not in the correct order, we will end up with a mess!



Everyone/thing has strengths!



- Incomplete instructions are okay - we can fill in the blanks!
- Improves everyday



- Incomplete instructions are not okay
- Improves when you tell it how to

Intro to Python

Let's get coding!



Signing up to Edstem

We are shifting all our courses to a new website called "Edstem" so here's an overview of how to sign up and how to use it.

First let's go through how to create an account.

- 1. Follow this link: https://edstem.org/au/join/TZCN8s
- 2. Type in your name and your personal email address
- Click Create Account
- Go to your email to verify your account
- Create a password
- 6. It should then take you to the courses home page.

If you don't have access to your email account, ask a tutor for a GPN edStem login



Getting to the lessons

- 1. Once you are in the course, you'll be taken to a discussion page.
- Click the button for the lessons page (top right looks like a book)



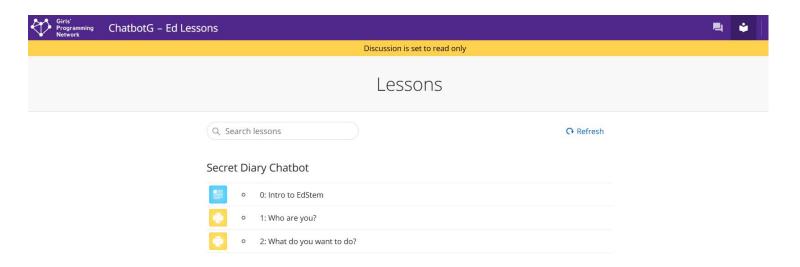
The Anatomy of the workbook

The main page:

- Heading at the top that tells you the project (SPR)
- List of "Chapters" they have icons that looks like this:



To complete your project, work through the chapters one at a time





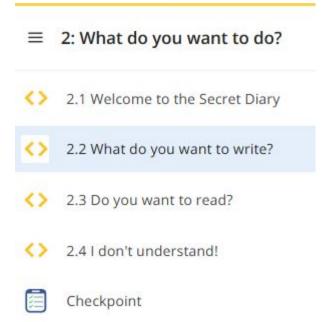
Inside a Chapter

Inside a chapter there are two main types of pages:

Lessons - where you will do your coding.
 They have this icon:



Each chapter has a checkpoint to complete to move to the next chapter. Make sure you scroll down to see all the questions in a checkpoint.



How to do the work

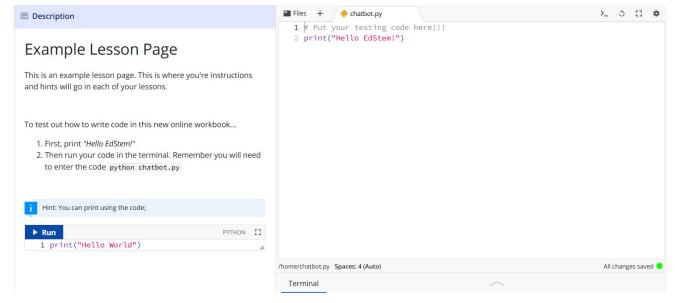
In each lesson there is:

- A section on left with instructions
- A section on right for your code

You will need to **copy your code from the last lesson**, then follow the instructions to change your code

There are also Hints and Code Blocks to help you







Some shortcuts...

There are a couple things you can do to make copying your code from one page to another easier.

- 1) Ctrl + A Pressing these keys together will select all the text on a page
- 2) **Ctrl** + **C** Pressing these keys together will copy anything that's selected
- 3) Ctrl + V Pressing these keys together will paste anything you've copied

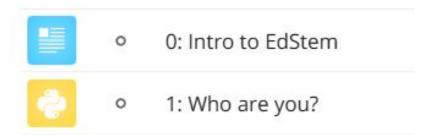
Need help with EdStem?



There is a section at the top of your workbook that explains how to use EdStem if you get stuck and need a reminder!

It's called 0: Intro to EdStem

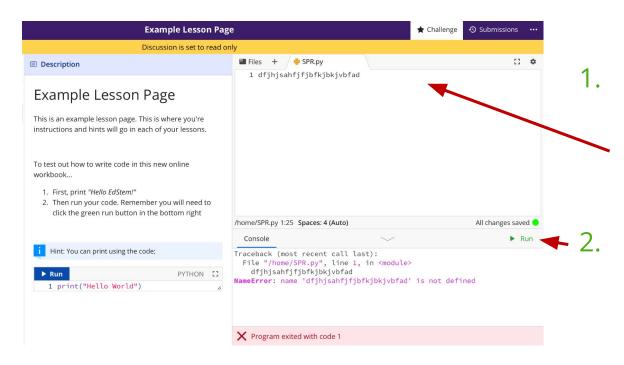
Secret Diary Chatbot



Go to Part 0 and have a look!



Let's make a mistake!



Type by button
 mashing the keyboard
 here e.g.

ks@674dbkjSDfkl

Click in the Run panel here to run your code!

Did you get a big ugly error message?



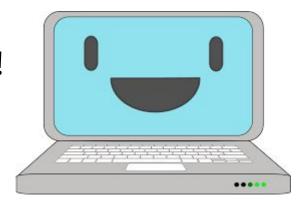
Mistakes are great!

SyntaxError: tax

Good work you made an error!

No module ror.

- Programmers make A LOT of errors!
- Errors give us hints to find mistakes
- Run your code often to get the hints!!
- Mistakes won't break computers!



Keyerror:
Hairy Potters

AttributeError:
'NoneType' object
has no attribute
'foo'

TypeError: Can't convert 'int' object to str implicitly

We can learn from our mistakes!

```
Traceback (most recent call last):
   File "C:/Users/Madeleine/Desktop/tmp.py", line 9, in<module>
        print("I have " + 5 + " apples")

TypeError: can only concatenate str (not "int") to str

1. What went wrong

2. Which bit of code didn't code is
```

We read error messages from bottom to top



Write some code!

Type this into the code window

Then press Run!

print('hello world')

Did it print:

hello world

???



Try writing some maths into python! After typing each line, test it out by clicking in the Terminal window.

1.
$$print(1 + 5)$$

2.
$$print(2 - 7)$$

3.
$$print(2 * 8)$$

Try writing some maths into python! After typing each line, test it out by clicking in the Terminal window.

- 1. print(1 + 5)
 6
- 2. print(2 7)
- 3. print(2 * 8)
- 4. print(12 / 3)



Try writing some maths into python! After typing each line, test it out by clicking in the Terminal window.

```
1. print(1 + 5)
6
```

- 2. print(2 7)
 -5
- 3. print(2 * 8)
- 4. print(12 / 3)

Try writing some maths into python! After typing each line, test it out by clicking in the Terminal window.

```
1. print(1 + 5)
2. print(2 - 7)
3. print(2 * 8)
   16
```

Python the calculator!

Try writing some maths into python! After typing each example, run by clicking in the Terminal window.

```
1. print(1 + 5)
2. print(2 - 7)
   -5
3. print(2 * 8)
   16
4. print(12 / 3)
```

A calculator for words!?

What do you think these bits of code do? **Try them and see!**

```
print("cat" + "dog")
```

```
print("tortoise" * 3)
```

Calculator for... words!?

What do you think these bits of code do? **Try them and see!**

```
print("cat" + "dog")
catdog

print("tortoise" * 3)
```



Calculator for... words!?

What do you think these bits of code do? **Try them and see!**

```
print("cat" + "dog")
catdog
print("tortoise" * 3)
```

tortoisetortoise



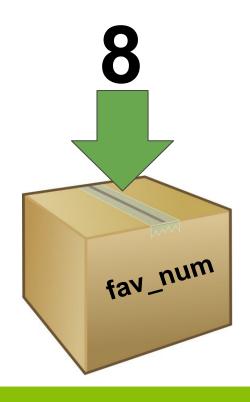
No Storing is Boring!

It's useful to be able to remember things for later!
Computers remember things in "variables"

Variables are like putting things into a **labeled cardboard box**.

Let's make our favourite number 8 today!

In our code we would write fav_num = 8





Instead of writing the number 8, we can now use **fav_num** in our code.



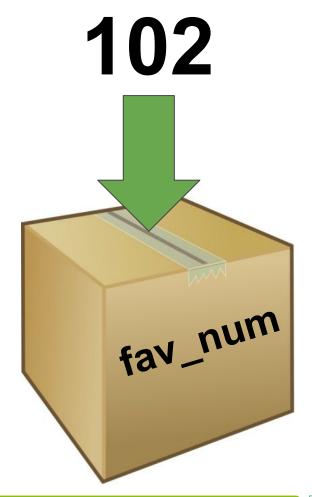
Wherever the computer sees **fav_num**, it will use the **number 8**

Variables are useful for storing things that change

(i.e. things that "vary" - hence the word "variable")

What if we changed fav_num to **102**.

fav_num = 102



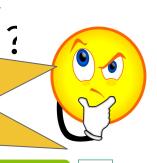
We're able to use our code for a new purpose, without rewriting everything:



We're able to use our code for a new purpose, without rewriting everything:



But writing 8 is much shorter than writing fav_num???

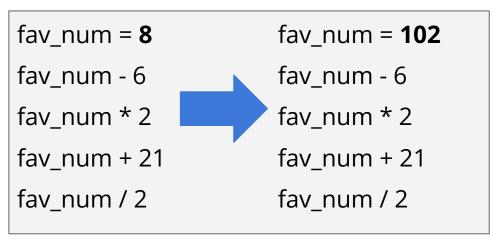


No variables VS using variables





1 Change



Reusing variables

We can replace values in variables:

```
animal = "dog"
print("My favourite animal is a " + animal)
animal = "cat"
print("My favourite animal is a " + animal)
animal = animal + "dog"
print("My favourite animal is a " + animal)
```

What will this output?

Reusing variables

We can replace values in variables:

```
animal = "dog"
print("My favourite animal is a " + animal)
animal = "cat"
print("My favourite animal is a " + animal)
animal = animal + "dog"
print("My favourite animal is a " + animal)
```

```
My favourite animal is a dog
My favourite animal is a cat
My favourite animal is a catdog
```



Your turn!

```
>>> x = 3
>>> print(x)
>>> print(x + x)
>>> y = x
>>> print(y)
>>> y = y + 1
>>> print(y)
```

Your turn!

```
>>> x = 3
>>> print(x)
3
>>> print(x + x)
>>> y = x
>>> print(y)
>>> y = y + 1
>>> print(y)
```

Your turn!

```
>>> x = 3
>>> print(x)
3
>>> print(x + x)
6
>>> y = x
>>> print(y)
>>> y = y + 1
>>> print(y)
```

Your turn!

```
>>> x = 3
>>> print(x)
3
>>> print(x + x)
6
>>> y = x
>>> print(y)
3
>>> y = y + 1
>>> print(y)
```

Your turn!

```
>>> x = 3
>>> print(x)
3
>>> print(x + x)
6
>>> y = x
>>> print(y)
3
>>> y = y + 1
>>> print(y)
4
```

Different data!

There are lots of types of data! Our main 4 ones are these:

Strings

Things in quotes used for storing text

Ints

Whole numbers we can do maths with

Floats

Decimal numbers for maths

Booleans

For True and False

Adding a comment!

Sometimes we want to write things in our file that the computer doesn't look at. We can use **comments** for that!

Sometimes we want to write a note for a people to read

```
# This code was written by Vivian
```

And sometimes we want to not run some code (but don't want to delete it!)

```
# print("Goodbye world!")
```

Try it!

- 1. Add a comment to your hello.py file
- Run your code to make sure it doesn't do anything extra!



It's more fun when we get to interact with the computer!

Try out this code to get the computer to ask you a question!

```
my_name = input('What is your name? ')
print('Hello ' + my_name)
```

What do you think happens?



```
my_name = input('What is your name? ')
print('Hello ' + my_name)

What do you think happens?
What is your name? Maddie
Hello Maddie
```

```
Writing input tells
                                                 This is the question
Store the answer
                         the computer to
                                                 you want printed to
 in the variable
                       wait for a response
                                                     the screen
   my_name
        my_name = input('What is your name? ')
        print('Hello ' + my_name)
        What do you think happens?
        What is your name? Maddie
                                                 We can use the answer
        Hello Maddie
                                                 the user wrote that we
                                                    then stored later!
```





How would we ask somebody for their favourite type of cake?

How would we print their answer?

Give it a try on your own computer first!

What cake do you like? chocolate chocolate cake for you!



How would we ask somebody for their favourite type of cake?

How would we print their answer?

Give it a try on your own computer first!

```
flavour = input("What cake do you like? ")
```

```
What cake do you like? chocolate chocolate cake for you!
```



How would we ask somebody for their favourite type of cake?

How would we print their answer?

Give it a try on your own computer first!

```
flavour = input("What cake do you like? ")
print(flavour + "cake for you"!)
```

```
What cake do you like? chocolate chocolate cake for you!
```



Project time!

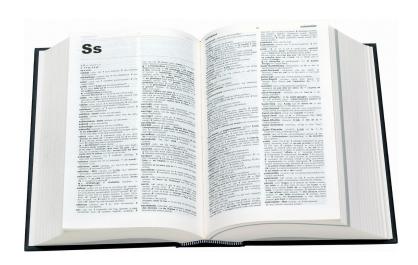
You now know all about printing and variables!

Let's put what we learnt into our project Try to do Part 0 - Part 2

The tutors will be around to help!

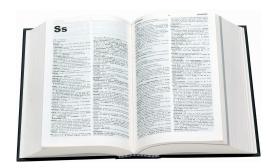


Dictionaries



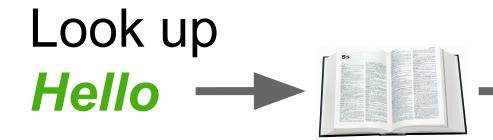


Dictionaries!



You know dictionaries!

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



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!



Team Name → List of team members



Phone Book

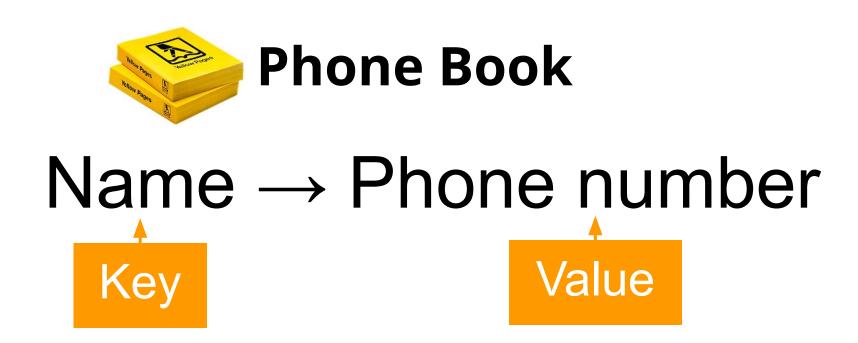
Name → Phone number



Vending Machine

Treat Name → Price

Looking it up!

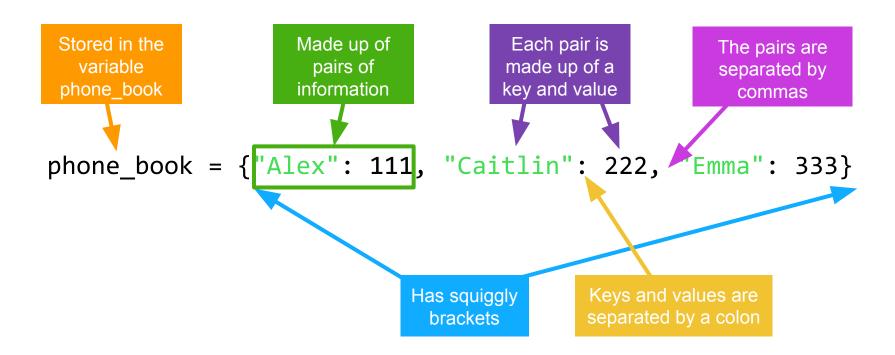


We can use a dictionary for anything with a <u>key → value</u> pattern!



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 EdStem

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

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

- 2. Try this: print(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 date!

- 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!



Conditions let us make decision.

First we test if the condition is met!

Then maybe we'll do the thing



If it's raining take an umbrella

Yep it's raining

..... take an umbrella



Computers store whether a condition is met in the form of

True and False

$$3 + 2 == 5$$

Computers store whether a condition is met in the form of

True and False



Computers store whether a condition is met in the form of

True and False



Computers store whether a condition is met in the form of

True and False



Computers store whether a condition is met in the form of

True and False



Computers store whether a condition is met in the form of

True and False



Computers store whether a condition is met in the form of

True and False



Python has some special comparisons for checking if something is **in** something else.

```
>>> "A" in "AEIOU"
```

>>> "Z" in "AEIOU"

>>> "a" in "AEIOU"

```
>>> animals = ["cat", "dog", "goat"]
```

>>> "banana" in animals

>>> "cat" in animals



So to know whether to do something, they find out if it's True!

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")</pre>
```



So to know whether to do something, they find out if it's True!

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
That's the condition!</pre>
```



So to know whether to do something, they find out if it's True!

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")</pre>
```

That's the condition!

Is it True that fave_num is less than 10?

- Well, fave_num is 5
- And it's True that 5 is less than 10
- So it is True!

So to know whether to do something, they find out if it's True!

```
fave_num = 5
if True

print("that's a small number")
```

Put in the answer to the question

Is it True that fave_num is less than 10?

- Well, fave_num is 5
- And it's True that 5 is less than 10
- So it is True!

So to know whether to do something, they find out if it's True!

```
fave_num = 5
if True
    print("that's a small number")

What do you think happens?
>>>
```



So to know whether to do something, they find out if it's True!

```
fave_num = 5
if True
    print("that's a small number")

What do you think happens?
>>> that's a small number
```



How about a different number???

```
fave_num = 9000
if fave_num < 10:
    print("that's a small number")</pre>
```



Find out if it's True!

```
fave_num = 9000
if False
    print("that's a small number")
```

Put in the answer to the question

Is it True that fave_num is less than 10?

- Well, fave_num is 9000
- And it's not True that 9000 is less than 10
- So it is False!



How about a different number???

```
fave_num = 9000
if fave_num < 10:
    print("that's a small number")</pre>
```

What do you think happens?

```
>>>
```



How about a different number???

```
fave_num = 9000
if fave_num < 10:
    print("that's a small number")</pre>
```

What do you think happens?

>>>



```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
... controls this line</pre>
```

Actually

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
    print("and I like that")
    print("A LOT!!")</pre>
```

This line ...

... controls anything below it that is indented like this!

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
    print("and I like that")
    print("A LOT!!")</pre>
```

What do you think happens?

```
>>>
```



```
fave_num = 5
if fave_num < 10:</pre>
    print("that's a small number")
    print("and I like that")
    print("A LOT!!")
>>> that's a small number
>>> and I like that
>>> A LOT!!
```

```
word = "GPN"
if word == "GPN":
   print("GPN is awesome!")

What happens??
```



```
word = "GPN"
if word == "GPN":
    print("GPN is awesome!")

What happens??
    >>> GPN is awesome!
```

Else statements

```
word = "GPN"
if word == "GPN":
  print("GPN is awesome!")
           What happens??
           >>> GPN is awesom
                              But what if we want
                              something different
                              to happen if the
                              word isn't "GPN"
```

Else statements

```
word = "Chocolate"
                                                else
if word == "GPN":
                                              statements
  print("GPN is awesome!")
                                           means something
                                            still happens if
else:
                                           the if statement
  print("The word isn't GPN :(")
                                              was False
               What happens??
```

Else statements

```
word = "Chocolate"
                                               else
if word == "GPN":
                                             statements
  print("GPN is awesome!")
                                          means something
                                            still happens if
else:
                                           the if statement
  print("The word isn't GPN :(")
                                             was False
               What happens??
               >>> The word isn't GPN :(
```

Elif statements

```
word = "Chocolate"
                                              elif
if word == "GPN":
                                           Means we can
  print("GPN is awesome!")
                                           give specific
                                          instructions for
elif word == "Chocolate":
                                            other words
  print("YUMMM Chocolate!")
else:
  print("The word isn't GPN :(")
               What happens??
```

Elif statements

```
word = "Chocolate"
                                              elif
if word == "GPN":
                                           Means we can
  print("GPN is awesome!")
                                           give specific
                                          instructions for
elif word == "Chocolate":
                                           other words
  print("YUMMM Chocolate!")
else:
  print("The word isn't GPN :(")
               What happens??
               >>>YUMMM Chocolate!
```

Simple Conditions!

We've learned about simple conditions like this one before.

They're really useful when you only want something to happen sometimes.



```
weather = "raining"
if weather == "raining":
   print("Take an umbrella!")
```



Complex Conditions!

But what if you want to only take an umbrella if it's raining and you're going outside?

You might do it like this:



```
weather = "raining"
location = "outside"
if weather == "raining":
   if location == "outside":
     print("Take an umbrella!")
```



Complex Conditions!

But what if you want to only take an umbrella if it's raining and you're going outside?

You might do it like this:



```
weather = "raining"
location = "outside"
if weather == "raining":
  if location == "outside":
    print("Take an umbrella!")
```

But that starts to get messy quickly.



AND

Instead you can do it like this!

```
weather = "raining"
location = "outside"
if weather == "raining" and location == "outside":
    print("Take an umbrella!")
```

This is easier to read and stops things getting messy, especially if you have lots of conditions to check.



Project Time!

You now know all about if and else!

See if you can do Part 4

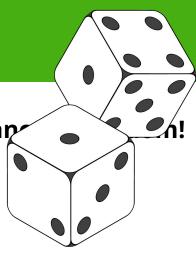
The tutors will be around to help!



Random!

That's so random!

There's lots of things in life that are up to chap





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 = ["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!

Raaaaaaaaandom! Can you handle that?

Let's try use it in our project!

Try to do Part 5

The tutors will be around to



For loops allow you to do something for a number of times or for each item in a group

There are many real world examples, like:



For each page in this book: Read



For each chip in this bag of chips: Eat



```
number = 10
for i in range(number):
    #Do something
```





```
This i is a temporary variable which will count how many times we have looped.

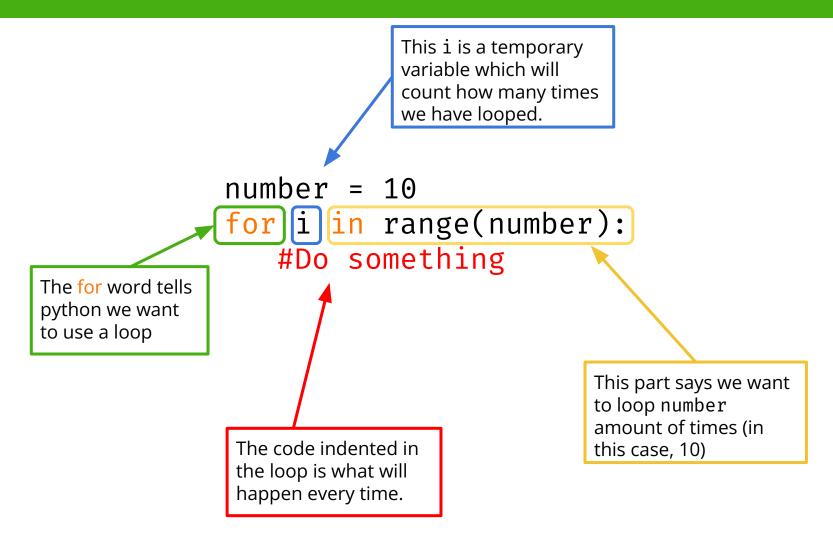
number = 10

for i in range(number):

#Do something

The for word tells python we want to use a loop
```

```
This i is a temporary
                                  variable which will
                                  count how many times
                                  we have looped.
                 number = 10
                  for | in range(number):
                      #Do something
The for word tells
python we want
to use a loop
                                                     This part says we want
                                                     to loop number
                                                     amount of times (in
                                                     this case, 10)
```



Looping how many times?

We can loop through a list:

```
friends = 4
for i in range(friends):
    print("Hello friend!")
```

What's going to happen?

Looping how many times?

We can loop through a list:

```
friends = 4
for i in range(friends):
    print("Hello friend!")
```

What's going to happen?

We do what's in the for loop as many times as what is in the "range"

Looping how many times?

We can loop through a list:

```
friends = 4
for i in range(friends):
    print("Hello friend!")
```

What's going to happen?

```
>>> Hello friend!
>>> Hello friend!
>>> Hello friend!
>>> Hello friend!
```

We do what's in the for loop as many times as what is in the "range"

Asking a question with a number answer!

It's common to ask the user to enter a number

Input always gives us a string of text

We need to turn the **string** into a number before we can use it as a range in a for loop

We do this by using **int()**

```
no_of_turns = int(input("How many times: " "))
for i in range(no_of_turns)
    Do something
```



Project Time!

Now you know how to use a for loop!

Try to do Part 6

...if you are up for it!

And Extension parts 7-11

The tutors will be around to help!



Tell us what you think!

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