Year 8 Binary

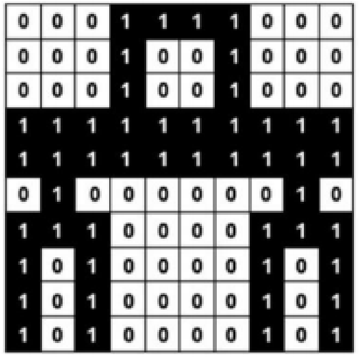
Bit	The smallest amount of data (stands for ***b**inary dig**it***) (0 or 1).
Byte (B)	8 bits
Kilobyte (KB)	1024 bytes
Megabyte (MB)	1024 kilobytes
Gigabyte (GB)	1024 megabytes
Terabyte (TB)	1024 gigabytes
Petabyte (PB)	1024 terabytes

What is binary?

Binary numbers or binary code are used by computers and digital devices to talk to each other. It is used to give commands to the computer or a way to enter data (information).

A	01000001	N	01001110
B	01000010	O	01001111
C	01000011	P	01010000
D	01000100	Q	01010001
E	01000101	R	01010010
F	01000110	S	01010011
G	01000111	T	01010100
H	01001000	U	01010101
I	01001001	V	01010110
J	01001010	W	01010111
K	01001011	X	01011000
L	01001100	Y	01011001
M	01001101	Z	01011010

```
001111000111001011111110001110
000111110011111111011111110000
1111011111011111111111110001111
011101100000010011001110111111
100000111011111101110111111011
100010010011111100010001100000
110011001011100111111111111111
111100001000010101111111110001
110000100111100100001100000000
```



0	0	0	1	1	1	1	0	0	0
0	0	0	1	0	0	1	0	0	0
0	0	0	1	0	0	1	0	0	0
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
0	1	0	0	0	0	0	0	1	0
1	1	1	0	0	0	0	1	1	1
1	0	1	0	0	0	0	1	0	1
1	0	1	0	0	0	0	1	0	1
1	0	1	0	0	0	0	1	0	1

We use the alphabet to write letters or words to communicate. Computers use binary code.

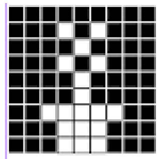


Image 1

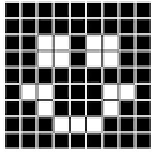


Image 2

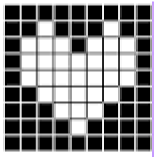


Image 3

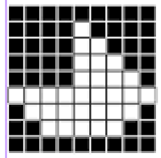


Image 4

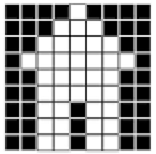


Image 5

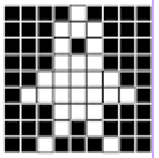


Image 6

Converting from binary to denary

128	64	32	16	8	4	2	1
0	1	0	1	1	0	0	1

1. Write the binary table.
2. Put the 0s and 1s into the table.
3. If a number has a 0 under it, don't add the number on.
4. If a number has a 1 under it, add that number onto the total.

In this example, we have 1s under 64, 16, 8, and 1, so:

64 + 16 + 8 + 1 = **89**

Therefore, 01011001 in binary is 89 in denary!

There are only 10 types of people in the world: Those who understand binary and those who don't

Converting from denary to binary

1. Write the binary table.
2. Start from the left hand side of the table.
   a. If the number is **larger** than the number in the table, put a 0 under it and move onto the next number
   b. If the number is **smaller** than the number in the table, put a 1 under it and take that number away from your number
3. Repeat step 2 until all of the columns have a 1 or a 0 under them..

Example: 42

In this example, we start from 32 as the other numbers are too large. We put a 1 under 32, leaving 10 remaining. Adding 8 and 2 together makes 10, so this must be our answer:

128	64	32	16	8	4	2	1
0	0	1	0	1	0	1	0

Key vocabulary	
Python	A high level programming language.
Programming	The process of writing computer programs.
Code	The instructions that a program uses.
Sequence	Parts of the code that run in order and the pathway of the program reads and runs very line in order.
Selection	Selects a pathways through the code based on whether a condition is true
Iteration	Code is repeated (looped), either ***while*** something is true or ***for*** a number of times
Algorithm	A set of rules/instructions to be followed by a computer system
Variable	A value that will change whilst the program is executed. (eg. temperature, speed)
Comparative Operator	When comparing data, an operator is used to solve the equality such as <>, != or ==
Syntax	The punctuation/way that code has to be written so that the computer can understand it. Each programming language has its own syntax.
Data Type	This indicates how the data will be stored. The most common data types are integer, string, and float/real.
String	A collection of letters, numbers or characters. (eg, Hello, WR10 1XA)
Integer	A whole number. (eg. 1, 189)
Float/Real	A decimal number, not a whole number. (eg. 3.14, -26.9)
Boolean	1 of 2 values. (eg. True, False, Yes, No)

Comparative Operators	
==	Equal to
!=	Not equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

Year 8 Python

The scheme intends to familiarise pupils with the Python programming environment and syntax, and equip pupils with the skills and knowledge to write simple programs.
They use previous knowledge based on Kodu and scratch programming.

Print ***Displays content on screen***

```
>>> print("Hello World")
Hello World
```

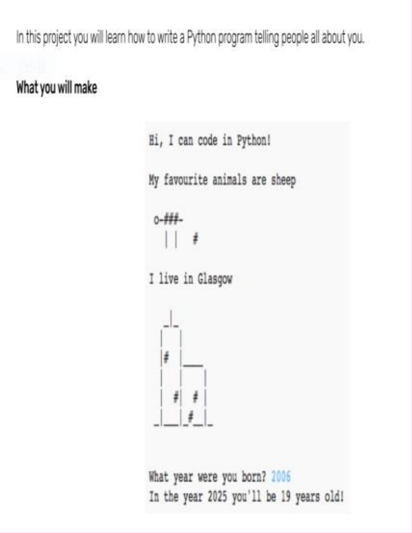
Variables ***Place to store data in a program***

```
>>> text = "Hello"
>>> name = "Mia"
>>> print(text, name)
Hello Mia

>>> print(text, "your name is", name)
Hello your name is Mia
```

```
9. Sep 09:31 bin -> usr/bin
21. Sep 15:50 boot
19. Sep 09:32 dev
21. Sep 15:52 etc
30. Sep 2015 home
7 30. Sep 2015 lib -> usr/lib
34 23. Jul 10:01 lib64 -> usr/lib
96 1. Aug 22:45 lost+found
096 30. Sep 2015 mnt
16 21. Sep 15:52 opt
0 21. Sep 08:15 private -> /home/encrypted
4096 12. Aug 15:37 proc
560 21. Sep 15:50 root
7 30. Sep 2015 run
4096 30. Sep 2015 sbin -> usr/bin
0 21. Sep 15:51 srv
300 21. Sep 15:45 sys
```

Python -> English	
`print('hello!')`	Prints a value on screen (in this case, hello!)
`input('')`	Inputs a value into the computer.
`x=input('')`	Inputs a value and stores it into the variable x.
`x=int(input(''))`	Inputs a value into x, whilst also making it into an integer.
`print(str(x))`	Prints the variable x, but converts it into a string first.
`if name == "Fred":`	Decides whether the variable 'name' ha a value which is equal to 'Fred'.
`else:`	The other option if the conditions for an if statement are not met (eg. name = 'Bob' when it should be Fred)
`elif name == "Tim"`	elif (short for else if) is for when the first if condition is not met, but you want to specify another option.
`#`	# is used to make comments in code – any line which starts with a # will be ignored when the program runs.

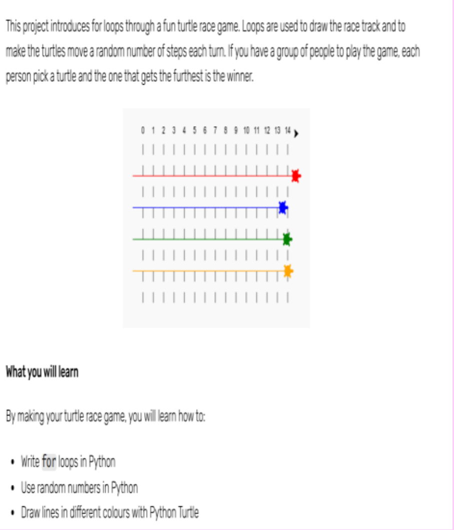
What will you make.



In this project you will learn how to write a Python program telling people all about you.

What you will make

```
Hi, I can code in Python!

My favourite animals are sheep

 o-###-
   ||  #

I live in Glasgow

   _|_
  |   |
  |#  |___
  |   |   |
  |  #| # |
 _|___|_#_|_

What year were you born? 2006
In the year 2025 you'll be 19 years old!
```



This project introduces for loops through a fun turtle race game. Loops are used to draw the race track and to make the turtles move a random number of steps each turn. If you have a group of people to play the game, each person pick a turtle and the one that gets the furthest is the winner.

What you will learn

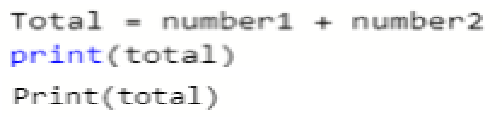
By making your turtle race game, you will learn how to:

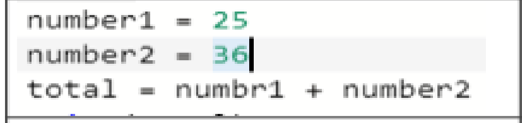
- Write `for` loops in Python
- Use random numbers in Python
- Draw lines in different colours with Python Turtle

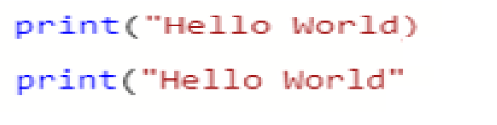
Python Essentials Support Sheet

The following information sheet includes some of the most common pitfalls that programmers make in Python. You may find this useful throughout the course.

Common Mistakes

 Total = number1 + number2
print(total)
Print(total)
	Capital letters in variables names and commands

 number1 = 25
number2 = 36
total = numbr1 + number2
	Spelling of variable names and commands

 print("Hello World) print("Hello World"	Brackets and braces come in pairs, make sure that they are opened and closed.

Assignment Operators

Description	Operator
Assign	=
Add then reassign	+=
Subtract then reassign	-=
Divide then reassign	/=
Mod then reassign	%=
Integer divide then reassign	//=

Relational Operators

Description	Operator
Equal to	==
Less than	<
Greater than	>
Not equal to	!=
Less than or equal to	<=
Greater than or equal to	>=

Frequently used commands

Command	Comment
print()	Used to display to the screen
input()	Allows user to enter value
int()	Converts value to integer
str()	Converts value to string

if <criteria>:
…
elif <criteria>:
…
else:
…
	Selection statement used to give choices (or paths) that the program can follow depending on a decision.

for <criteria>: …	Count controlled iteration, when you know how many iterations need to take place.
while <criteria>: …	Condition controlled iteration, when you don't know how may iterations need to take place.

Using Files

Reading to File	Writing to File	Append to File

# 'r' opens for reading 	
file= open('file name.txt', 'r')
for line in file:
print(line)
file.close()
	#'w' will overwrite the text file
	file= open('file name.txt', 'w')
	file.write(data)
	file.close()
		#'a' will append new data to the text file
		file = open('file name.txt', 'a')
		file.write(data)
		file.close()

Subroutines

Procedure	Function

def <name>():
…
<name>()
	def <name>(parameters):
	…
	return parameters
	<name>(parameters)

Returns no value Must be initialised to run.	Returns a value Must be initialised to run.

Lists

Code	Comment
names = ["John", "Cathy", "Asif", "Maisie", "William", "Tracy"]	Creates a list called names containing 7 strings
names.append("Adam ")	Adds "Adam" as the last item in the list
names[0]	Gets or sets the 1st item in the list (e.g. "John")
names[2:4]	Gets a slice of the list (items "Asif" & "Maisie")