Beginners - Intro to Programming

Intro to Programming

- Programming is a series of instructions for a computer written by a human
- These instructions can be:
  - maths operations
  - reading in input (e.g. from the keyboard)
  - producing output (e.g. showing things on the screen)
  - plus much more!
- Programs are written in a language (a style and series of rules for program instructions)
  - We will be using a language called Python

Program design

- Plan out the logic and structure of your solution prior to actual programming
- Design tools like pseudocode and flowcharts are valuable

Python

- Download python from python.org like and install like any other program
- Quickest and easiest way to start - IDLE (IDE for python)
  - Opens a python shell window, indicated by a “>>>”
  - Useful for quickly trying and testing bits of code
- Create a file to code a python program
  - Opens a python editor window
  - Save (Ctrl+S) and run (F5) the code
  - Output appears in shell window

Programming fundamentals - variables

- A **variable** is a store/representation of a value in your program, that can change over time
  - Think of it like a bucket that can hold a value!

```
# These lines beginning with '#' are comments. They explain things, and don't affect the program.

# First, assign the value 2 to a variable called a
a = 2

# Then assign 3 to a variable called b
b = 3

# Assign a variable c the result of addition between a and b. In this case, c will have the value 5!
c = a + b
```

Programming fundamentals - data types and data structures

Data types are like ‘categories’ of data used to determine how variables are stored and how they can be used.

● Integer (int)	whole number	2, -500, 4353634
● Float (float)	decimal number	3.14159, -0.3, 25.0
● String (str)	sequence of characters	‘Hello world’, ‘25’, ‘ ‘
● Boolean (bool)	true or false value	True, False

Data structures are like ‘containers’ used to organize or group data

● List []	sequence array	refer to items by their index
● Dictionary {}	associative array	key/value pairs

Programming fundamentals - control structures

Selection statements control the flow of execution

- If-Then statements - controlled by boolean expressions

Iteration statements allow you to repeatedly run a block of code

- While loops - condition controlled, useful for if you don’t know how many times you want a block of code to run
- For loops - counter controlled, useful when you want to loop a certain number of times, or once for each item in a data structure

Programming fundamentals - functions and modules

Functions are like ‘mini programs’ that make programming easier and cleaner

- Some are built-in like print(), input(), len(), sum(), int(), str() etc.
- Some are only available as part of a module that you need to import
- All languages allow you to define your own functions

Modules are

- Standard library modules and external modules

Program example - dice game

Beginner Activities