

Computational Thinking, Algorithms and Programming

Entry Level Computer Science

Variables

- ▶ A **value** that can **change**.
- ▶ Space in memory.

Example:

```
location = input("Please enter location")
numberOfPeople = input("Please enter number of people.")
if location == "Portugal" then
    price = 150
else
    price = 100
endif
totalPrice = numberOfPeople * price
print totalPrice
```

The variables are:

- location
- numberOfPeople
- totalPrice

An easy way to spot a variable is to look for an '='.

Selection

- ▶ Giving choice in a program and executing code based on a **condition**.

Example:

```
number = input("Please enter a number")
if number < 50 then
    price = 0.95
else
    price = 0.75
end if
total = price * number    print
total
```

The algorithm should allow a user to enter a number.

If the number is less than 50, then the price is £0.95, otherwise it will be £0.75.

The algorithm then takes the price and multiplies it by the original number entered by the user.

Iteration

- ▶ Repetition in a program.

Example:

```
print("Welcome to the lottery")

count = 0

while count != 6

    number = input("Please enter your next number")

    print(number)

    count = count + 1

end while

print("Thank you for choosing your numbers")
```

The algorithm should allow a user to enter six numbers.

After the sixth number is entered a message is displayed.

Units of data

Smallest



Largest

Name	Short Form	Precise Amount	Approximate Amount
Bit		1 bit	1 bit
Nibble		4 bits	4 bits
Byte		8 bits	8 bits
Kilobyte	KB	1024 bytes	1 thousand bytes
Megabyte	MB	1025 kilobytes	1 million bytes
Gigabyte	GB	1024 megabytes	1 billion bytes
Terabyte	TB	1024 gigabytes	1 trillion bytes

Data Types

Data Type	Definition	Examples
Integer	A whole number.	1, 5, -63, 247
Real numbers	A number with a decimal point	1.5, 3.14159, -0.47, 2.0
String	A block of text (designated with ' marks in Python). Any numbers contained within a string are treated as text and cannot be used in calculations	'Python', 'ICT', 'Hilbre High', '3'
Array (called List in Python)	A list of data stored in a structured way. Represented with [] in Python and values separated with a comma.	['Python', 'programming', 'is', 'awesome']
Boolean	The Boolean data type can only contain two values - either TRUE or FALSE. In terms of a number, logic FALSE is normally a 0, and logic TRUE is 1	logged_in = true

Commenting code

Why would a programmer want to comment their code?

- ▶ To make it easier to follow a program
- ▶ To explain how the code works
- ▶ To add versioning details
- ▶ To help programmers to edit someone else's code

Compression

Compression is the method computers use to make files smaller by reducing the number of bits (1's and 0's) used to store the information.

Why the need for compression?

- ▶ Reduce size
- ▶ Quicker to send compressed images
- ▶ Allows you to store more images on a storage device