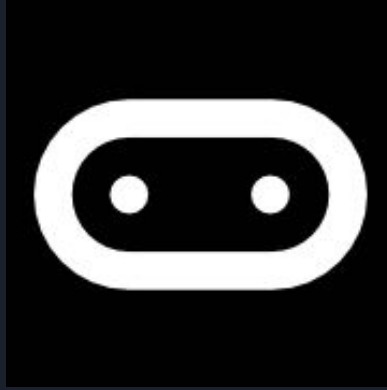iMAKE Innovation Center Presents:

Micro:bit
Virtual Workshops

By the iTeam

This week's lesson...

DESIGN THINKING:
Algorithms, Conditions and Variables

Ice Breaker!

Let's get to know each other with some fun facts about ourselves!

- What is your name?
- What are you looking forward to most about this week's workshop?
- What is something fun you did this past week?
- What kind of computer do you use?
- What is your favorite place to eat?

There are multiple ways to accomplish the same goal! *Think Creatively!*

The designing process starts with talking to others to determine what the goal is and how to possibly get there.

1. Learn from people.
2. Define the goal.
3. Envision an idea.
4. Make a prototype.
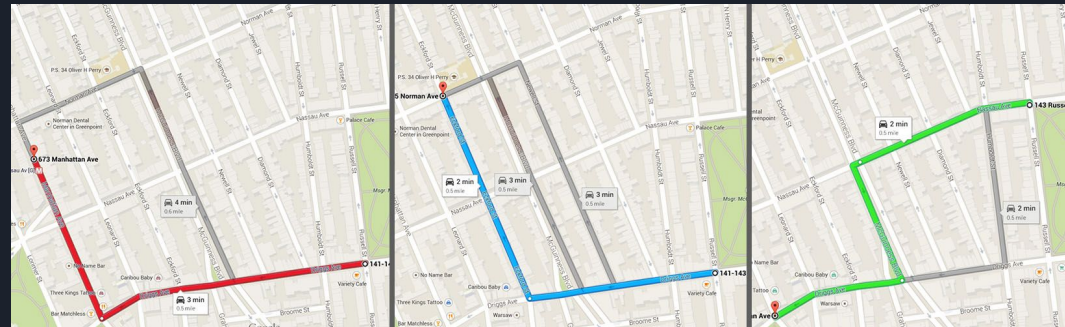5. Test your prototype.
6. Make it better.

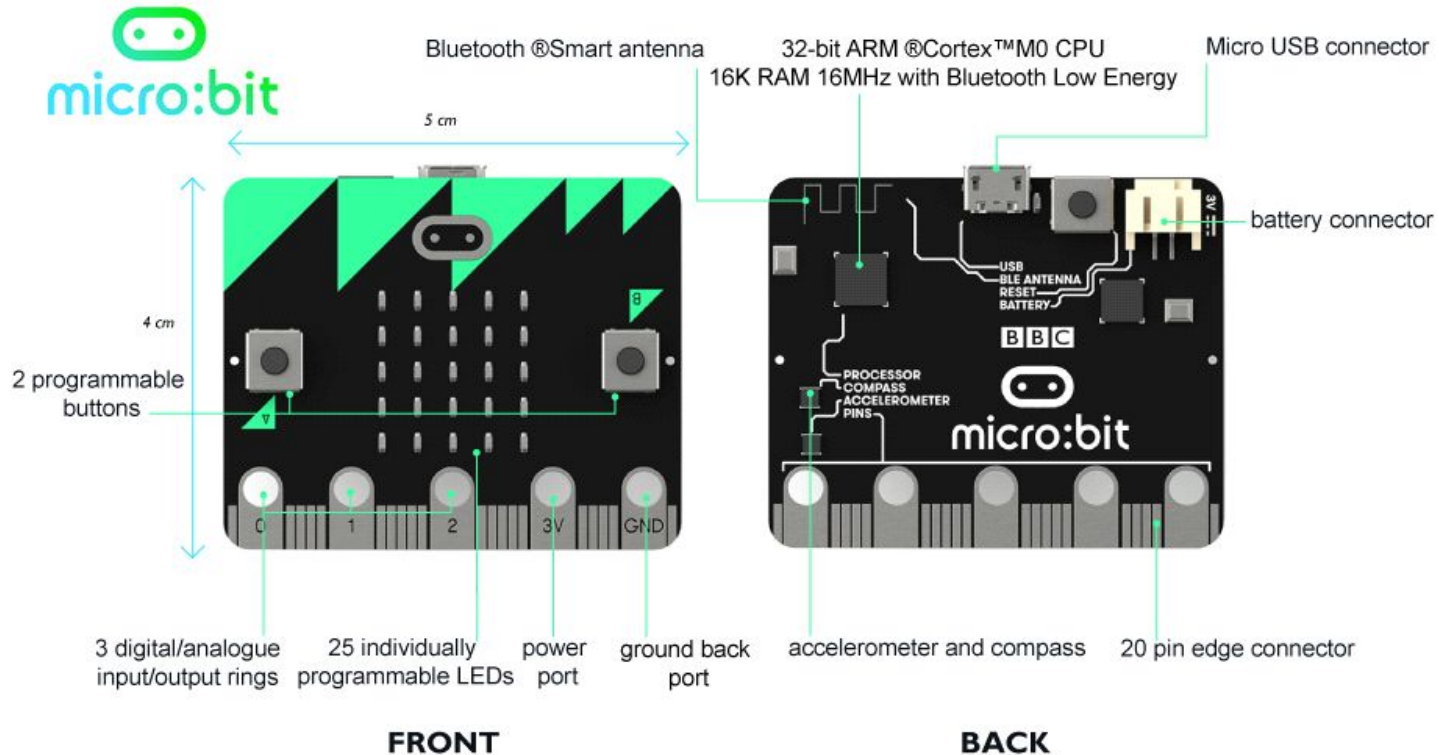# What a Computer needs for an Algorithm

- Every computer needs the 4 essential parts:

  - The central processing unit (CPU)
    - AKA "Processor"
  - The random access memory (Memory)
    - AKA "RAM"
  - The input
  - The output
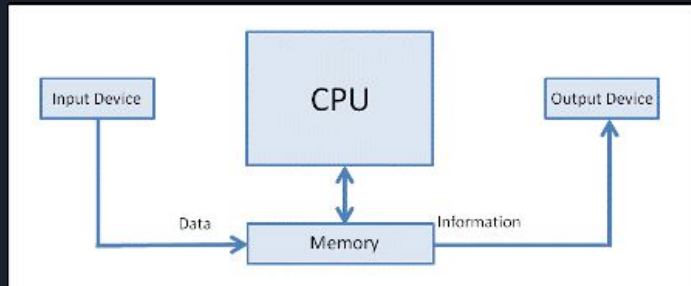
- Algorithms are a set of instructions fed to a computer that provide on output based on the given input.

- **For example:**
  - The origin and destination is the input.
  - The algorithm is what calculates the fastest route using the CPU and the Memory.
  - The map directions below is the output.

microbit Diagram

Bluetooth ®Smart antenna

32-bit ARM ®Cortex™M0 CPU
16K RAM 16MHz with Bluetooth Low Energy

Micro USB connector

battery connector

5 cm

4 cm

2 programmable buttons

USB
BLE ANTENNA
RESET
BATTERY

BBC

PROCESSOR
COMPASS
ACCELEROMETER
PINS

micro:bit

3 digital/analogue input/output rings

25 individually programmable LEDs

power port

ground back port

accelerometer and compass

20 pin edge connector

FRONT

BACK

What is a Variable?
How can we use them?

How it looks in Micro:bit

- A **variable** is like a bucket that we can store valuable information in.
    - Number variable: holds numerical data (numbers only)
    - String variable: holds letters and numbers (alphanumeric)

- We change the **variable** to whatever we want and it can be saved to the computer permanently.

- **UNDERSTAND:**
    - once a number variable, always a number variable.
    - once a string variable, always a string variable

5

Variable: number_A

2

Variable: number_B

5

Variable: number_A

+

2
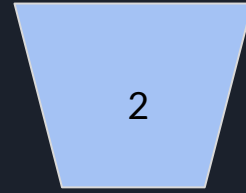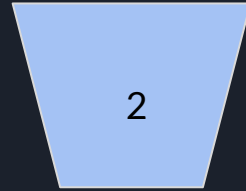
Variable: number_B

=

3 7

Variable example
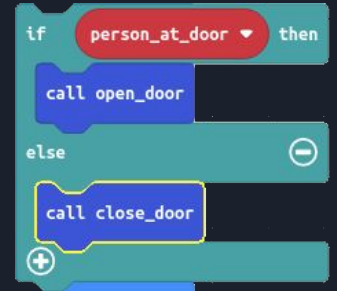
What are Conditionals (If This, Then That)
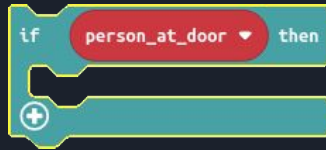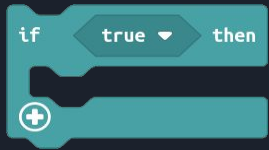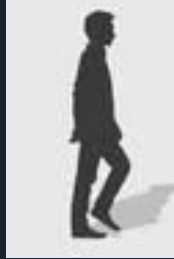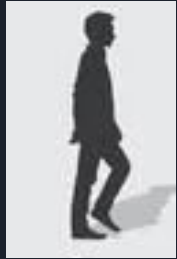
How it looks in Micro:bit

- In Computer Science we use conditionals to handle our decisions.
- It is very important to make our program precise.
- An example of a conditional that we will use today is an IF and Else statement.

Here is short video on conditionals! :)

IF & ELSE statement example

Example of if & else Statement

Who is older?

Random Number Generator
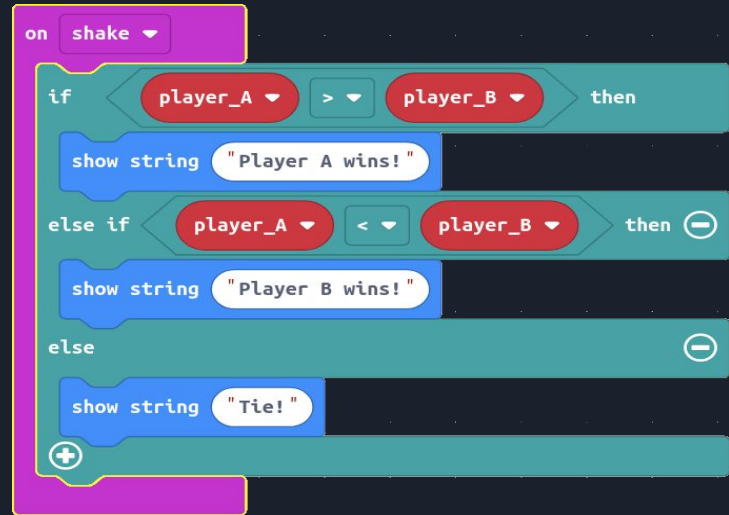
- In computer programs, sometimes you want to generate random numbers.

- With pick random you can get a random whole number in a specified range.

- Some real word examples of using random number generators are dice rollers and random person picker.

Activity! Roll a Die and Dice War

Next week's lesson…

- Push the concepts we learned about this week further.
- Learn more conditional methods, variables and mathematical operators.
- Learn what is an iterative loop.

Challenge: Create a Board Game Dice Roller

- In Monopoly and other board games, you are required two roll two dice to play.
- Create a program in Micro:bit that rolls two dice using input buttons A and B.
- Shake the Micro:bit to get the sum of the two dice rolled.

- Once completed, you now have a digital dice set in your pocket (virtually speaking)!