2. Circuits and Logic

> *Every INPUT and OUTPUT of a computer is a type of information which can be represented as 1's and 0s or ON and OFF*

Simple Circuits

NOT Gate

A	Q
0	1
1	0

In this diagram, if we send *no* electrical signal (A) into the NOT gate, then Q equals *1* meaning it is ON.
If we turn A is ON then Q is OFF.

> *IF A = 1 THEN Q = 0*
> *IF A = 0 THEN Q = 1*

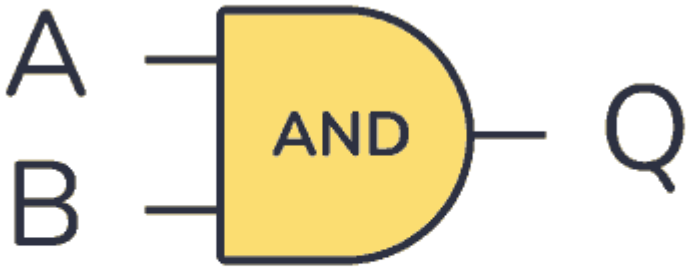
Whatever A goes into the NOT logic gate becomes the opposite of the value A. In mathematical terms, Q is the conjugate of A.

Here's what it looks like in python:

```
not True # Returns False
not False # Returns True
```

```
jush@ranedeer:~/Mr-Ranedeer-v3 $ python
Python 3.9.2 (default, Mar 12 2021, 04:06:34)
[GCC 10.2.1 20210110] on linux
Type "help", "copyright", "credits" or "licens
>>> not True
False
>>> not False
True
>>>
```

AND Gate



A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

In this simplest form, $Q = 1$ if A=1 and B=1, otherwise, if either A or B are 0 then Q is equal to 0.

Here's what it looks like in Python:

```
>>> False and False # 0 AND 0
False
>>> True and False # 1 AND 0
False
>>> False and True # 0 AND 1
False
>>> True and True # 1 AND 1
True
>>>
```

Other circuits

Other simple circuits will be covered later in the weeks, but notably...

> *Complex circuits with multiple logic gates can form complex calculations*

For example, you can create a circuit that takes 2 bits together creating an ADDER to calculate the sum of two bits. You can put circuits side-by-side to add together much larger numbers, this can also apply for subtraction and multiplication functions too with the right sequence of logic gates.

Source: (21) How Computers Work: Circuits & Logic - YouTube

See Also:
3. CPU, Memory, Input & Output
6. Computer Hardware