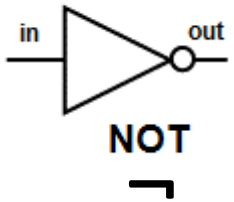
Computing GCSE – 2.4

J276/02 – Computational Logic

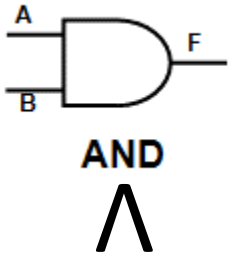
KEY VOCABULARY	
Logic	A system designed to perform a specific task according to strict principles.
Logic Gates	The physical switches inside an electronic device which are able to perform the calculations a computer needs to carry out on electronic signals
Truth Table	A tabular representation of the possible inputs and outputs from a given logic gate, or collection of gates
Boolean	Mathematical *TRUE or FALSE*
Operator	A mathematical symbol in computing
+	Addition [1+2=3]
-	Subtraction [2-1=1]
/	Division [5 / 2=2.5]
*	Multiplication [2 * 2 = 4]
^	Exponentiation, raising a number to the power of… [3^3 = 3 * 3 * 3 = 27]
MOD	Modulus division. To divide a number by another, but only return the *remainder* [10 MOD 3 = 1]
DIV	Integer Division. To divide a number by another, but only return the *number of full sets.* [10 DIV 3 = 3]

LOGIC GATES

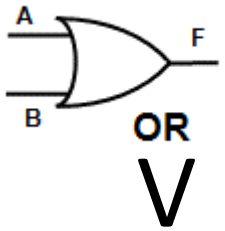
These gates take inputs (usually labelled A, B, C etc, and provide a single output. In this case labelled F, but could be another letter. Each gate is shown with its TRUTH TABLE



Input	Output
I	F
0	1
1	0



Inputs		Output
A	B	F
0	0	0
1	0	0
0	1	0
1	1	1

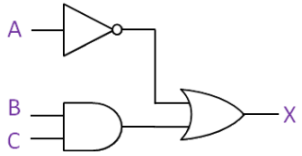


Inputs		Output
A	B	F
0	0	0
1	0	1
0	1	1
1	1	1

COMBINED GATES

Logic gates can be combined in any order to provide a range of computational possibilities. Inside a CPU, the physical switches are logic gates, and but combining them in different sequences, computers can undertake incredibly complex mathematics with these very simple tools.

(NOT A) OR (B AND C)



A	B	C	NOT A	B AND C	X = (NOT A) OR (B AND C)
0	0	0	1	0	1
0	0	1	1	0	1
0	1	0	1	0	1
0	1	1	1	1	1
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	0	0	0
1	1	1	0	1	1