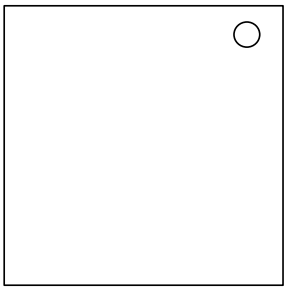
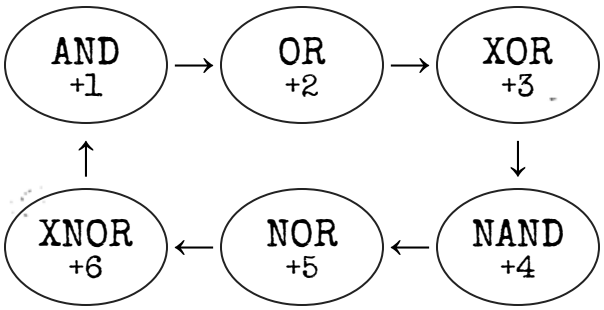
On the Subject of Logic Gates



There are only 10 types of bomb experts: those who understand logic gates, and those who don't.

The module contains a circuit of 7 logic gates, lettered A through G. (See next page for a description of logic gates). The circuit has 8 inputs and 1 output. Press the arrow buttons to cycle through different input configurations. Each input configuration has 8 LEDs that are either on or of. When you've determined the gate type of each of the gates, cycle the input to a configuration that will set the output on, and press the 'Check' button. If it didn't power the circuit output, you'll be given a strike.



- Gates A, B, C and D each have an output LED. By cycling through the inputs, you can determine the gate type for each of them.
- One of the gate types in the diagram above will occur 2 times (referred to as the duplicate), the other five gate types will occur only 1 time.
- To find the gate type of gate E:
  - Start at the gate type of gate A in the diagram above.
  - Take the +*n* number of the gate type of gate B. Take that many steps following the arrows.
  - If this gate type already occurs, and you already found the duplicate, continue taking steps until you find a valid gate type.
- To find the gate type of gate F:
  - Start at the gate type of gate E in the diagram above.
  - Take the +*n* number of the gate type of gate C. Take that many steps following the arrows.
  - If this gate type already occurs, and you already found the duplicate, continue taking steps until you find a valid gate type.
- To find the gate type of gate G:
  - Start at the gate type of gate F in the diagram above.
  - Take the +*n* number of the gate type of gate D. Take that many steps following the arrows.
  - If this gate type already occurs, and you already found the duplicate, continue taking steps until you find a valid gate type.

A logic gate is an elementary building block of a digital circuit. Most logic gates have two inputs and one output. At any given moment, every input and every output is either off (0, false) or on (1, true).

There are seven basic logic gates: NOT, AND, OR, XOR, NAND, NOR and XNOR. The NOT gate has one input and one output. The others have two inputs and one output. Inputs are normally drawn on the left, outputs on the right.

NOT	Has only one input. It reverses the logic state of the input. The output is "true" when the input is "false. The output is "false" when the input is "true". This gate will not be used in the module directly.
AND	The output is "true" when both inputs are "true." Otherwise, the output is "false."
OR	The output is "true" if either or both of the inputs are "true" both inputs are "true." If both inputs are "false," then the output is "false."
XOR	(Exclusive-OR) The output is "false" if both inputs are "false" or if both inputs are "true." Another way of looking at this circuit is to observe that the output is 1 if the inputs are different, but 0 if the inputs are the same.
NAND	The NAND gate operates as an AND gate followed by a NOT gate. The output is "false" if both inputs are "true." Otherwise, the output is "true."
NOR	The NOR gate operates as an OR gate followed by a NOT gate. Its output is "true" if both inputs are "false." Otherwise, the output is "false."
XNOR	(Exclusive-NOR) The XNOR gate operates as an XOR gate followed by a NOT gate. Its output is "true" if the inputs are the same, and "false" if the inputs are different.

INPUT		OUTPUT					
		AND	OR	XOR	NAND	NOR	XNOR
0	0	0	0	0	1	1	1
0	1	0	1	1	1	0	0
1	0	0	1	1	1	0	0
1	1	1	1	0	0	0	1