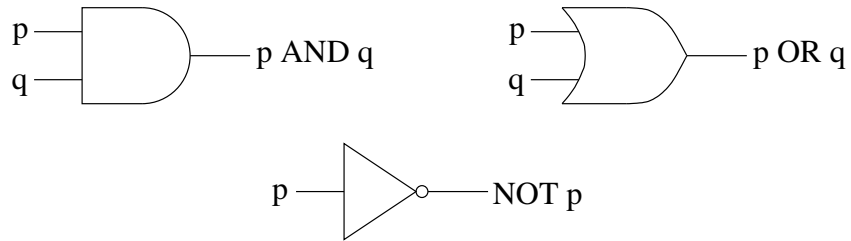


Logic gates Math 42

Logic gates are a tool used to create an abstract model of electronic circuits in terms of logical operations.

The basic idea is to think of a circuit as having inputs and outputs that take the value TRUE or FALSE. The inputs are then processed through various *logic gates* that perform logical operations, resulting in the output.

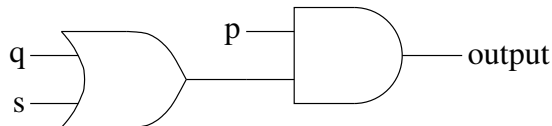
Standard gates include AND, OR, and NOT gates, shown below, with inputs on the left and outputs on the right:



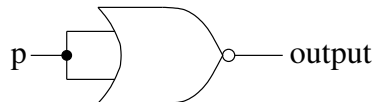
Other gates include the NAND and NOR gates:



Compound logical operations are performed by combining gates in the proper sequence. For example, the following circuit has an output of p AND (q OR s):



Note that, ignoring questions of physical implementation, inputs can be duplicated and used as inputs at more than one input location, or more than one gate. For example, consider the following circuit:



The notation indicates that the input p is duplicated and is used as both inputs to the NOR gate. Comparing columns 2 and 4 of the following truth table:

p	NOT p	p OR p	NOT (p OR p)
T	F	T	F
F	T	F	T

we see that the output of the circuit is equal to NOT p .