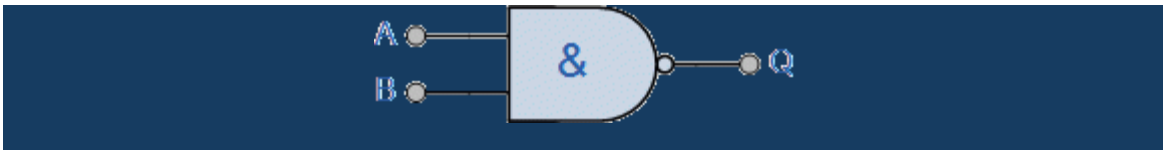
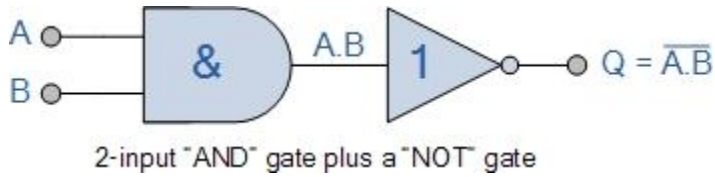


Logic NAND Gate Tutorial

The Logic NAND Gate is a combination of a digital logic AND gate and a NOT gate connected together in series

The NAND (Not – AND) gate has an output that is normally at logic level “1” and only goes “LOW” to logic level “0” when **ALL** of its inputs are at logic level “1”. The **Logic NAND Gate** is the reverse or “*Complementary*” form of the AND gate we have seen previously.

Logic NAND Gate Equivalence



The logic or Boolean expression given for a logic NAND gate is that

for *Logical Addition*, which is the opposite to the AND gate, and which it performs on the *complements* of the inputs. The Boolean expression for a logic NAND gate is denoted by a single dot or full stop symbol, (.) with a line or *Overline*, (¯) over the expression to signify the NOT or logical negation of the NAND gate giving us the Boolean expression

of: A.B = Q.

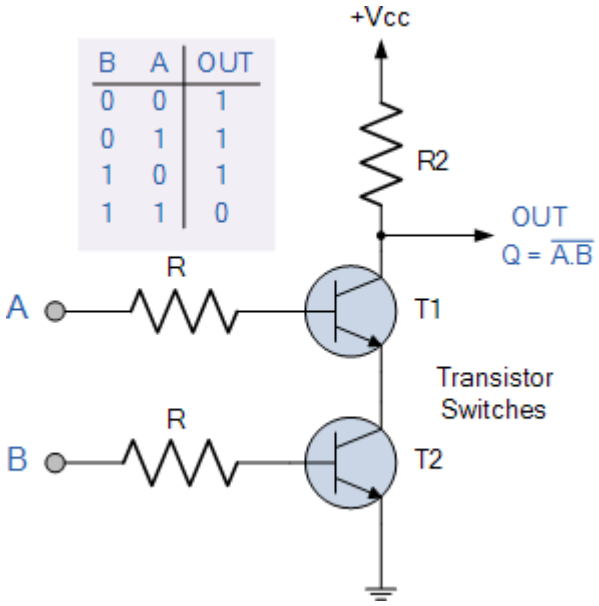
Then we can define the operation of a 2-input digital logic NAND gate as being:

“If both A and B are true, then Q is NOT true”

Transistor NAND Gate

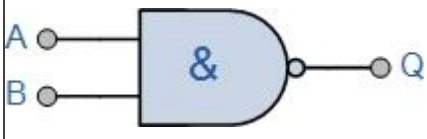
A simple 2-input logic NAND gate can be constructed using RTL Resistor-transistor switches connected together as shown below with

the inputs connected directly to the transistor bases. Either transistor must be cut-off “OFF” for an output at Q.



Logic NAND Gates are available using digital circuits to produce the desired logical function and is given a symbol whose shape is that of a standard AND gate with a circle, sometimes called an “inversion bubble” at its output to represent the NOT gate symbol with the logical operation of the NAND gate given as.

The Digital Logic “NAND” Gate 2-input Logic NAND Gate

Symbol	**Truth Table**		
 **2-input NAND Gate**	**B**	**A**	**Q**
	0	**0**	**1**
	0	**1**	**1**
	1	**0**	**1**