

Name:

Date:

Class:

Background Knowledge: Logic Gates – Teacher Cheat Sheet

Consider language... The word “and” is “et” and “y”. But what is the meaning? Users of English, French, and Spanish have a shared meaning for the respective term. They understand on or off. Logic gates are fundamental building blocks (the “words”) of digital circuits. They perform basic operations based on the inputs and produce a single binary output. The output is determined by the specific type of logic gate and the combination of inputs.

Here are some common types of logic gates:

- **AND gate:** The output is 1 (true) only if all inputs are 1. Otherwise, the output is 0 (false).
- **OR gate:** The output is 1 if at least one input is 1. The output is 0 only if all inputs are 0.
- **NOT gate (Inverter):** It has only one input and one output. The output is the opposite of the input. Thus, if the input is 1, the output is 0, and if the input is 0, the output is 1.
- **NAND gate:** This is a combination of an AND gate followed by a NOT gate. The output is the opposite of an AND gate. The output is 0 only if all inputs are 1. Otherwise, the output is 1.
- **NOR gate:** This is a combination of an OR gate followed by a NOT gate. The output is the opposite of an OR gate. Thus, the output is 1 only if all inputs are 0. Otherwise, the output is 0.
- **XOR gate (Exclusive OR):** The output is 1 if the inputs are different (one is 0 and the other is 1). The output is 0 if the inputs are the same.
- **XNOR gate (Exclusive NOR):** This is a combination of an XOR gate followed by a NOT gate. This is the opposite (inverter) of an XOR gate. The output is 1 if the inputs are the same (both are 0 or both are 1). The output is 0 if the inputs are different.

These gates are represented by specific symbols in circuit diagrams and are used to build complex digital systems.

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