Digital Logic and Minecraft Implementation

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1 Digital Logic Basics

Basic Concepts of Digital Logic

- Digital logic uses binary system (0 and 1)
- 0 represents low voltage (Low)
- 1 represents high voltage (High)
- These states can be implemented through circuits

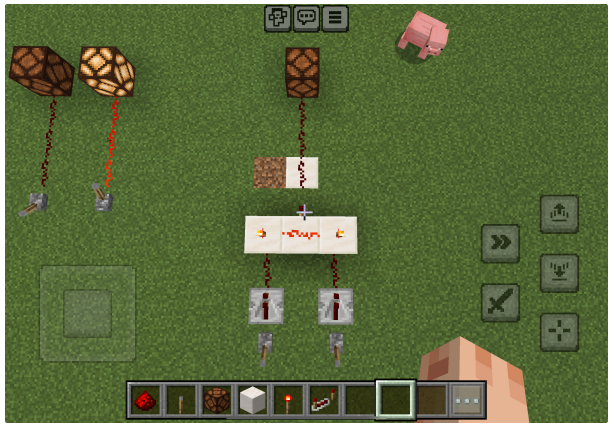
Figure: Example of 0 and 1 in Minecraft Redstone Circuit

Basic Logic Gates

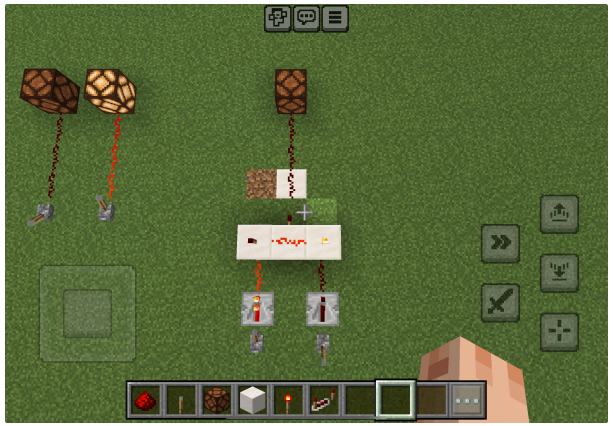
- AND Gate: Output is 1 only when both inputs are 1
- OR Gate: Output is 1 when any input is 1

AND Gate in Minecraft

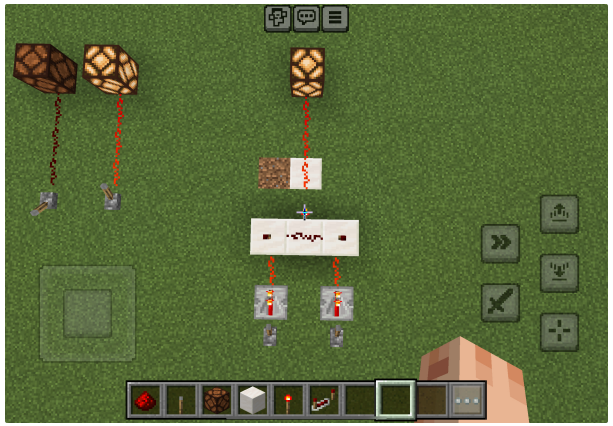
- The AND gate outputs 1 only when both inputs are 1.
- In Minecraft, you can use redstone components to build an AND gate.
- Below are examples of different input combinations and their outputs:



Input: 0, 0



Input: 0, 1



Input: 1, 1

Figure: AND Gate in Minecraft: Different Input Combinations

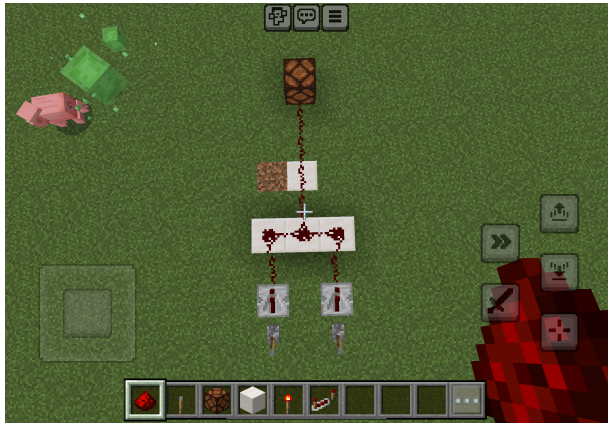
Logic Gate Truth Tables

AND Gate

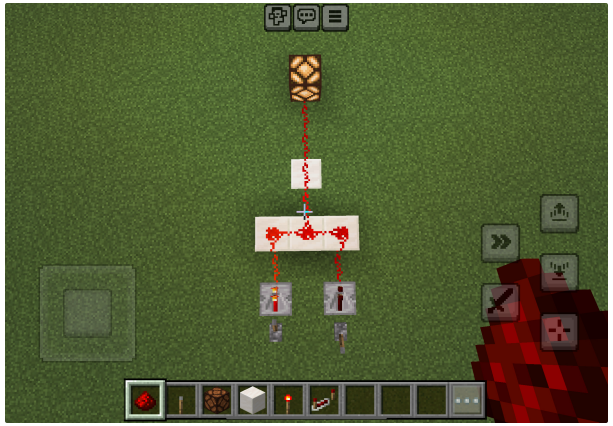
Input A	Input B	Output
0	0	0
0	1	0
1	0	0
1	1	1

OR Gate in Minecraft

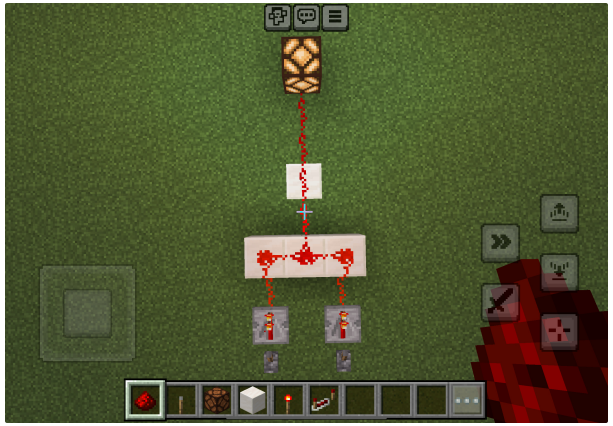
- The OR gate outputs 1 when any input is 1.
- In Minecraft, you can use redstone to build an OR gate.
- Below are examples of different input combinations and their outputs:



Input: 0, 0



Input: 0, 1



Input: 1, 1

Figure: OR Gate in Minecraft: Different Input Combinations

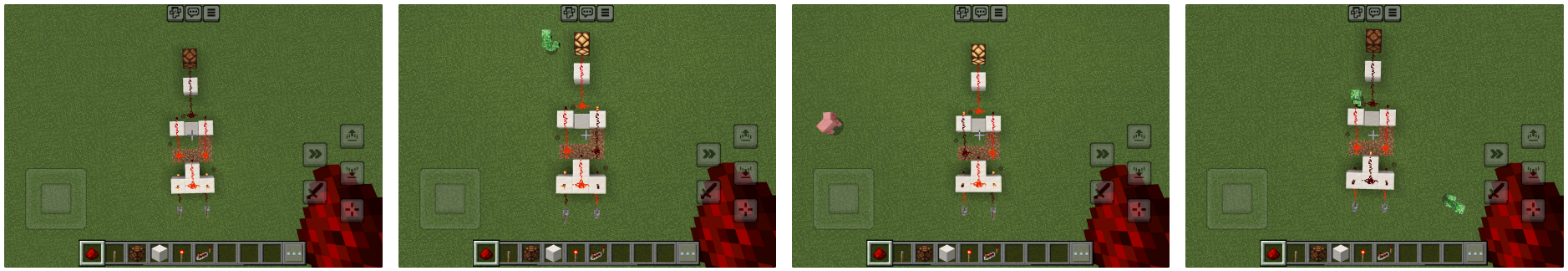
Truth Table of OR Gate

Truth Table

Input A	Input B	Output
0	0	0
0	1	1
1	0	1
1	1	1

XOR Gate in Minecraft

- The XOR (exclusive OR) gate outputs 1 only when the two inputs are different.
- In Minecraft, you can use redstone to build an XOR gate.
- Below are examples of different input combinations and their outputs:



Input: 0, 0 | Input: 0, 1 | Input: 1, 0 | Input: 1, 1

Figure: XOR Gate in Minecraft: Different Input Combinations

Truth Table of XOR Gate

Truth Table

Input A	Input B	Output
0	0	0
0	1	1
1	0	1
1	1	0

From Logic Gates to Computers

- By combining basic logic gates such as AND, OR, and XOR, we can build more complex circuits like adders.
- An adder is a fundamental building block for arithmetic operations in computers.
- By stacking and connecting these adders and other logic circuits, we can construct a functional computer.
- This is the foundation of digital electronics and how computers are built from simple components.

Thank You

Thank you for listening!