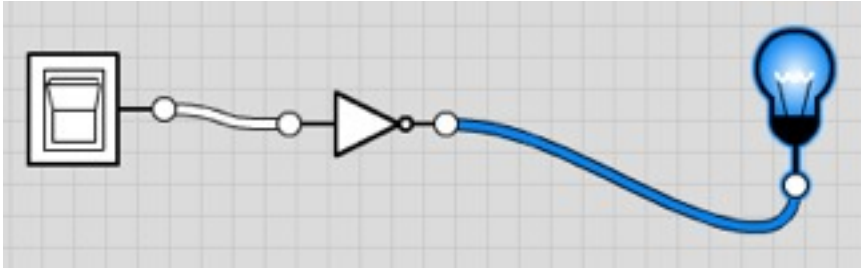


# NOT gate

( $P = \text{NOT } A$ )

2

Create this circuit



Copy this truth table

Input	Output
0	
1	

Complete the truth table

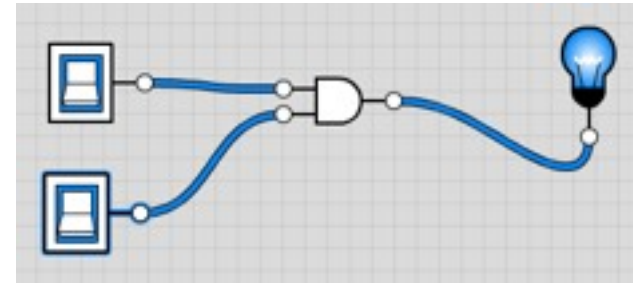
Describe how this gate works

# AND gate

( $P = A \text{ AND } B$ )

3

Create this circuit



Copy this truth table

Input A	Input B	Output
0	0	
0		

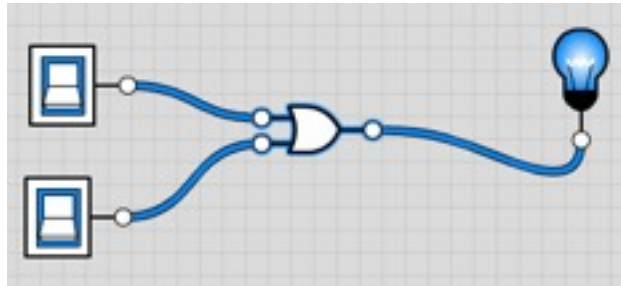
Complete the truth table

Describe how this gate works

# OR gate

$$P = A \text{ OR } B$$

Create this circuit



Copy this truth table

Input A	Input B	Output
0	0	
0		

Complete the truth table

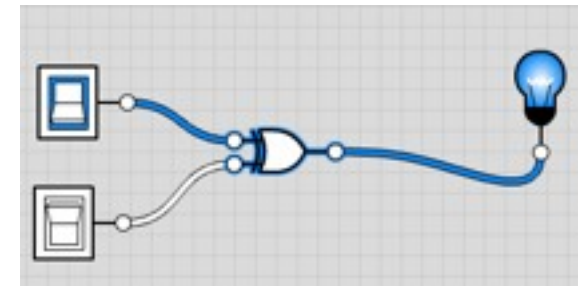
Describe how this gate works

3

# XOR gate

$$P = A \text{ XOR } B$$

Create this circuit



Copy this truth table

Input A	Input B	Output
0	0	
0		

Complete the truth table

Describe how this gate works

3

# Car Door

4

Create a circuit to make the internal light come on when a car door is opened.

The car door should come on when either the left door (A) is opened, the right door (B) is opened, or both.

Screenshot your logic circuit

Copy this truth table

Input A	Input B	Output
0	0	
0		

Complete the truth table

Write the logical statement for this circuit

# Nuclear Launch

4

Create a circuit to launch nuclear missiles only when two separate keys (A and B) are both turned to on at the same time.

Screenshot your logic circuit

Copy this truth table

Input A	Input B	Output
0	0	
0		

Complete the truth table

Write the logical statement for this circuit

# Landing Light

4

Create a circuit to make an upstairs landing light come on if the downstairs switch (A) is switched on, or if the upstairs switch (B) is switched on. If both switches are on then the light should switch off.

Screenshot your logic circuit

Copy this truth table

Input A	Input B	Output
0	0	
0		

Complete the truth table

Write the logical statement for this circuit

# Fridge Light

4

Create a circuit to switch on the light inside a fridge if the circuit (A) is broken by the door opening. If the circuit is connected (and A is on) then the light should stay off.

Screenshot your logic circuit

Copy this truth table

Input	Output
0	
1	

Complete the truth table

Write the logical statement for this circuit

# Burglar Alarm

6

A burglar alarm has 3 inputs -

- A (the main on/off switch)
- B (a door sensor)
- C (a motion sensor).

Once the alarm is set to ON, either sensor A or B can trigger the alarm.

Screenshot your logic circuit

Copy this truth table

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

Complete the truth table

Write the logical statement for this circuit

# Electric Oven

5

An electric oven has two inputs -

- A (the main on/off switch)
- B (a thermostat)

Once the oven is switched on the thermostat gives a '0' signal while the oven is cold and a '1' signal if the oven is too hot.

Screenshot your logic circuit

Copy this truth table

Input A	Input B	Output
0	0	
0		

Complete the truth table

Write the logical statement for this circuit

# Car Park (3 spaces)

7

A car park has 3 pressure sensors to check if a car is present (0 if empty, 1 if full). A light switches on if there is an empty space available.

Screenshot your logic circuit

Copy this truth table

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

Complete the truth table

Write the logical statement for this circuit

# Car Park (2 spaces)

5

A car park has 3 pressure sensors to check if a car is present (0 if empty, 1 if full). A light switches on if there is an empty space available.

Screenshot your logic circuit

Copy this truth table

Input A	Input B	Output
0	0	
0		

Complete the truth table

Write the logical statement for this circuit

# Sidewinder

6

A sidewinder missile can only be launched from a fighter jet when the Master Arm Switch (A) is set to on, the targeting computer has a positive lock (B) and the pilot presses the trigger (C).

Screenshot your logic circuit

Copy this truth table

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

Complete the truth table

Write the logical statement for this circuit

# Pet Feeder

5

A night-time pet feeder dispenses food when the light sensor (A) says it is dark (0) and a pressure sensor (B) is activated by the pet (1).

Screenshot your logic circuit

Copy this truth table

Input A	Input B	Output
0	0	
0		

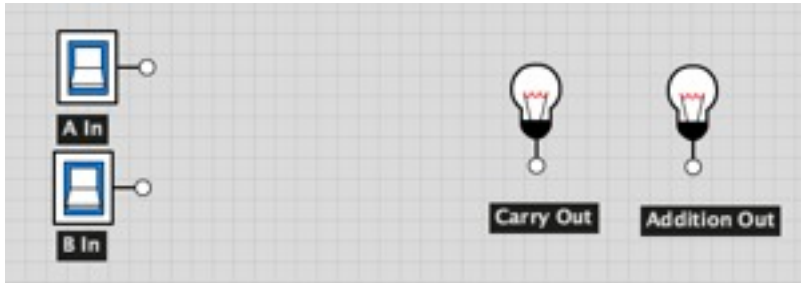
Complete the truth table

Write the logical statement for this circuit

# Half Adder

6

A half adder takes two input digits (A and B) and adds them ( $0 + 1 = 01$ ,  $1 + 0 = 01$  and  $1 + 1 = 10$ )



Build and screenshot your logic circuit

Copy this truth table

Complete the truth table

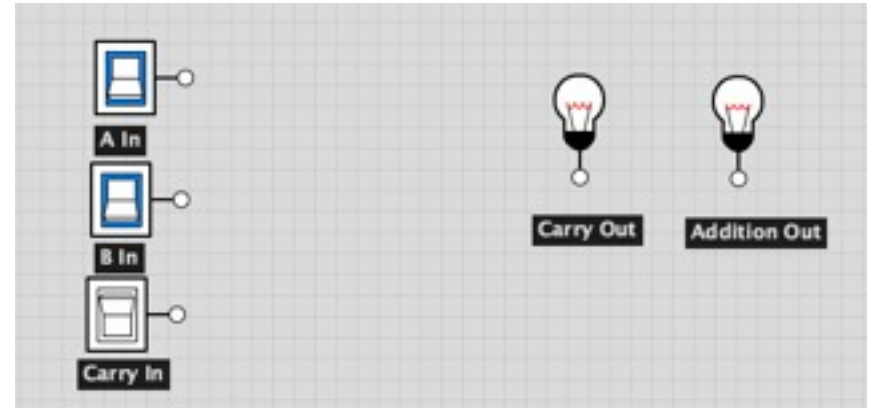
Input A	Input B	Carry	Addition
0	0	0	
0	0	1	
0	1	0	
0	1		

Write the two logical statements for this circuit

# Full Adder

10

A full adder takes two input digits (A and B) AND a carry bit (C) and then adds them



Build and screenshot your logic circuit

Copy and complete the truth table

Write the two logical statements

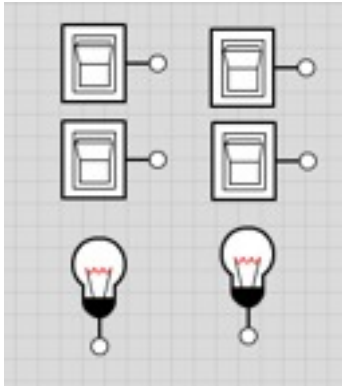
Input A	Input B	Input C	Carry Out	Addition Out
0	0	0		
0	0	1		
0	1	0		
0	1			
1				



## 2-bit Adder

12

A 2-bit adder adds two 2-digit binary numbers together



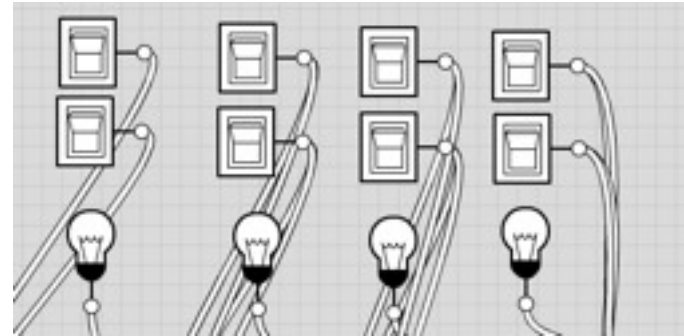
Build and screenshot your logic circuit

Test it fully!

## 4-bit Adder

30

A 4-bit adder adds two 4-digit binary numbers together



Build and screenshot your logic circuit

Test it fully!