

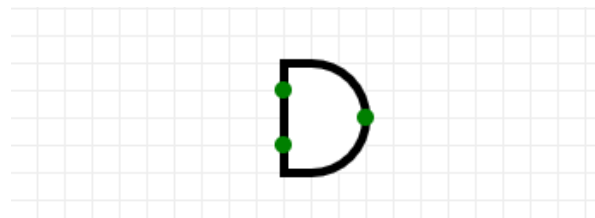
Logic circuits

For the tasks below, you will need to open a browser window and visit <https://logic.ly/demo/>.

Task 1 A circuit with the AND logic gate

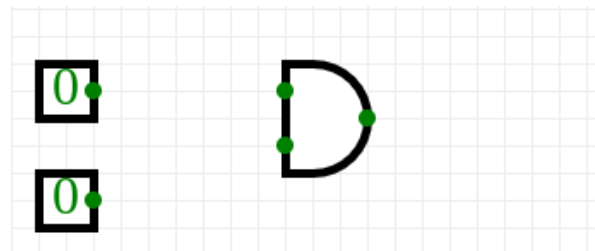
The AND gate

1. Go to 'Circuit elements' on the left.
2. Click on **Gates**.
3. Click on the AND gate.
4. Place an AND gate on the canvas.



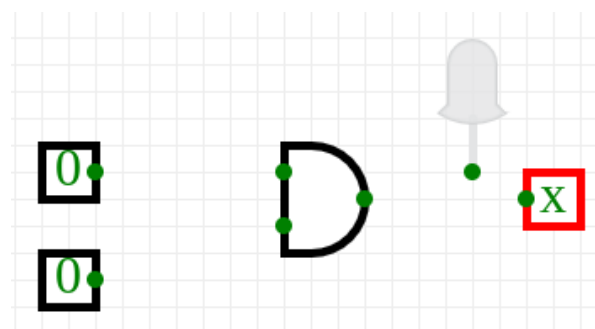
The inputs to the AND gate

5. Go to 'Circuit elements' on the left.
6. Click on **Input**.
7. Click on the 'Input' box.
8. Place an input box on the canvas, to the left of the AND gate.
9. Repeat steps 7–8 to add a second input.



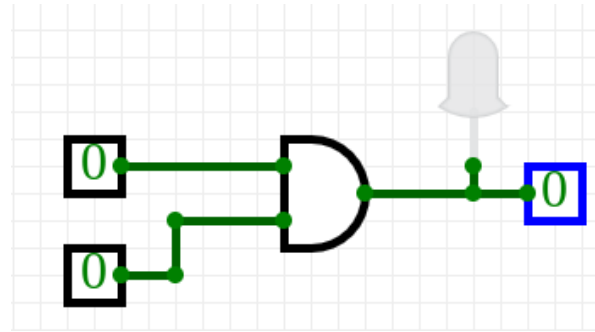
The output of the AND gate

10. Go to 'Circuit elements' on the left.
11. Click on **Output**.
12. Click on the 'Output' box.
13. Place an output box on the canvas, to the right of the AND gate.
14. Click on the 'Digital LED'.
15. Place an LED on the canvas, to the right of the AND gate.



The output of the AND gate

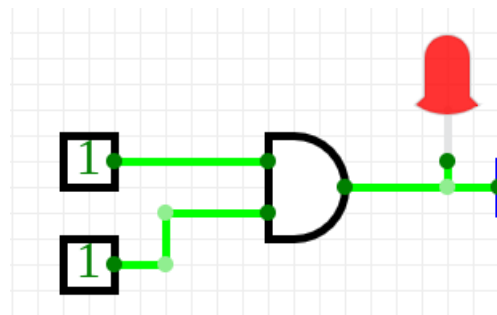
16. Connect the first input box to one of the inputs of the AND gate (by click-dragging on the connectors, i.e. the little green circles).
17. Connect the second input box to the other input of the AND gate.
18. Connect the output of the AND gate to the output box.
19. Connect the output of the AND gate to the digital LED.



You can flip an input from false (0) to true (1) and vice versa by clicking on the input box.

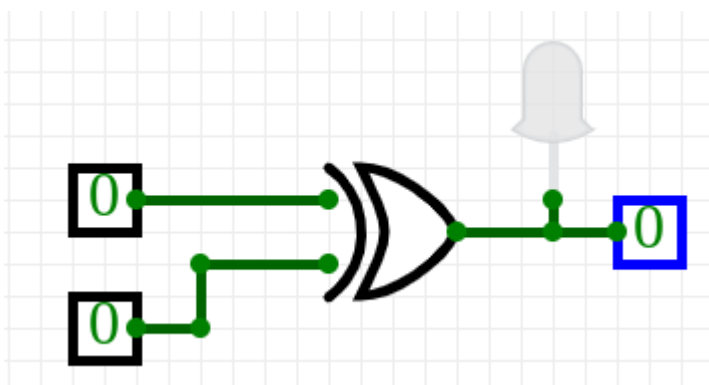
Verify that the output is true (1) and the light is turned on only when both of the inputs are true (1). The table below contains all the input combinations that you should try.

first input A	second input B	AND output A and B
false	false	false
false	true	false
true	false	false
true	true	true



Task 2 A new logic gate

Create the logic circuit below.



This is identical to the logic circuit that you created in the previous task, except that the AND logic gate has been replaced with an XOR logic gate. This is a new logic operation.

You can flip an input from false (0) to true (1) and vice versa by clicking on the input box.

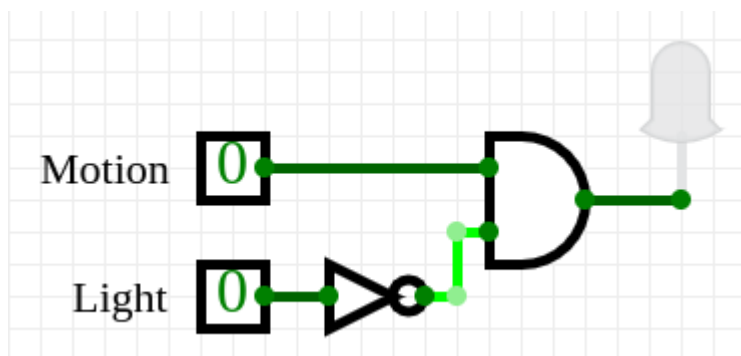
Try all the input combinations in the table below and fill in the table with the corresponding output.

first input A	second input B	XOR output A xor B
false	false	
false	true	
true	false	
true	true	

Before, we described how the result of the OR operator is true if at least one of its inputs is true. How would you describe the result of the XOR logic operator with words?

Task 3 Security light

For the logic circuit below, there is a **single combination of input values** that will turn on the output LED.



You can use logical reasoning to deduce what this combination will be, or you can create the circuit and try out the different combinations of input values. Write your answer in the table below, and provide a brief explanation for your answer.

input motion	input light	output
		true