KS3 Computer Science

Logic Gates 2

Name:

Class:

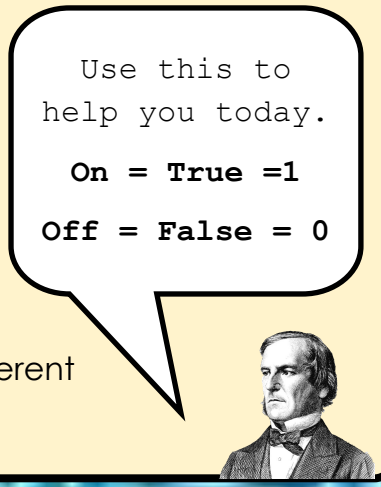
Teacher:

Logic Gates

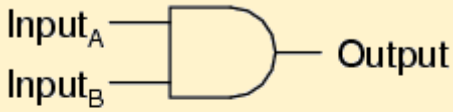
There are many different types of logic gate. In this lesson will be looking at:

- AND
- OR
- NOT

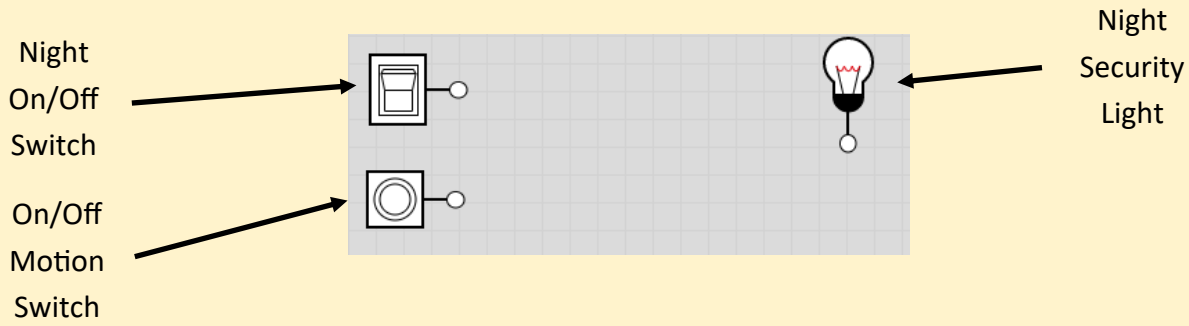
Inputting different **Boolean values** into the gates will result in different outputs.



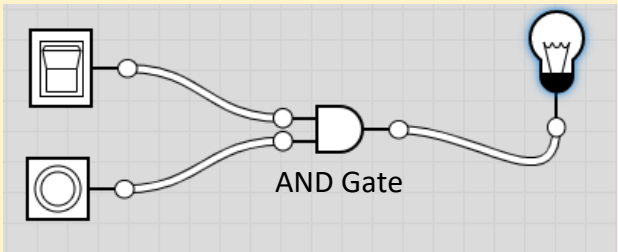
AND Gates



Imagine you are a security guard in a museum. You have a security light that you only want to come on at night when it detects motion in the room. You would need two switches for this to work.

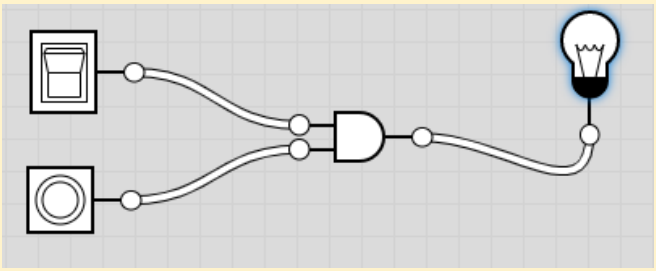


To get this to work we need to us and **AND** gate so the light only come on (Output = 1) when the Night ON/Off Swith is on (Input = 1) **and** the On/Off Motion switch is on (Input = 1).

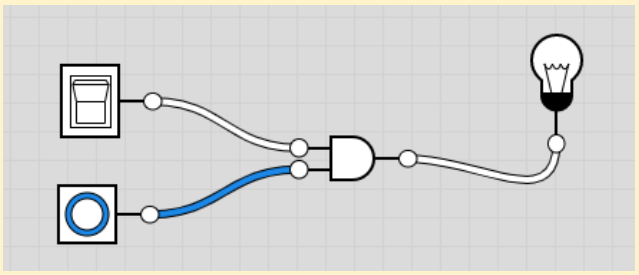


How It Works

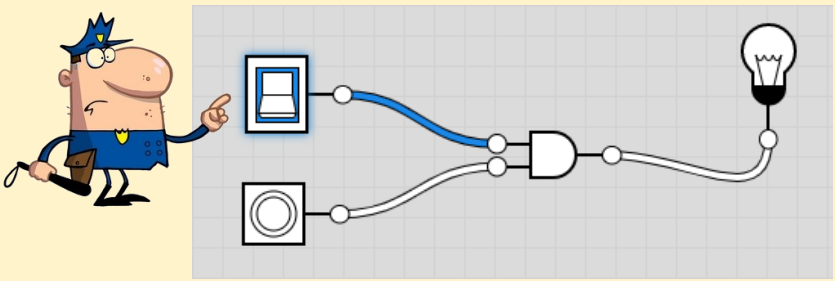
During the day the Night On/Off switch we be off (Input = 0)as we don't, need the light to come on. So the circuit would look like this;



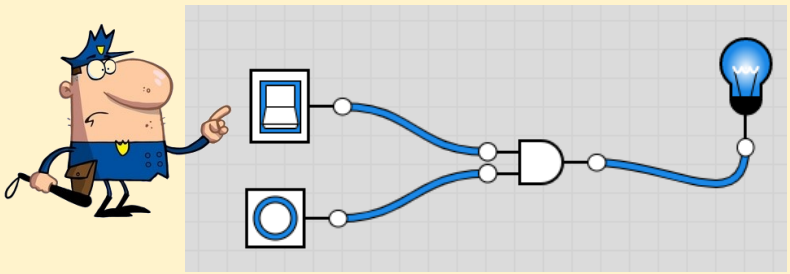
If the On/Off Motion Switch detects movement then it would switch to on (Input = 1). This is shown below:

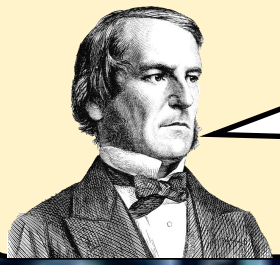


At night the Night ON/Off switch will be on (Input = 1). While there is no motion in the room the security light will not come on. This is shown below:



If the ON/Off Motion Switch detects movement it will switch to on (Input = 1) and the security light will turn on. This is shown below:

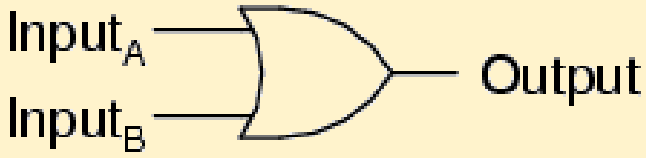




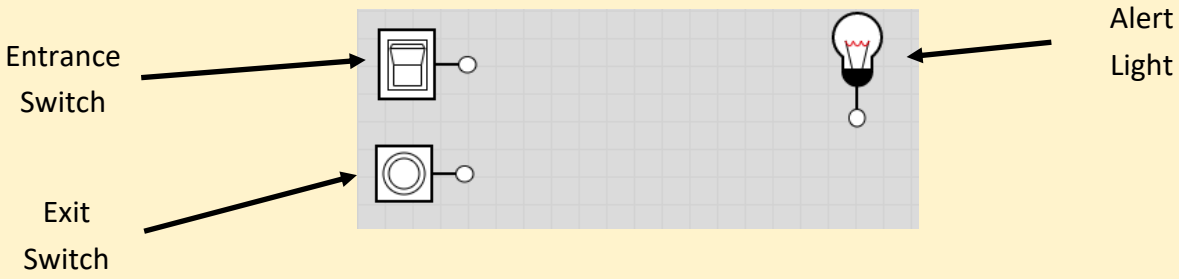
REMEMBER

AND gates need both inputs to be 1 for the output to be 1.

OR Gate

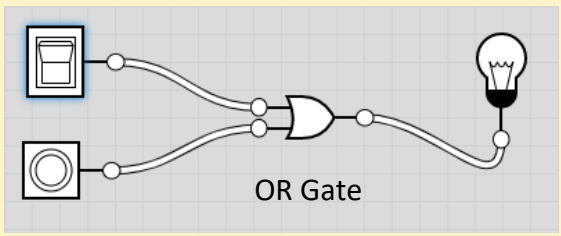


Imagine we are in the same museum. Now you are working at the main entrance and exit. You now have two switches - an **entrance** and **exit** switch.



Now you want the light to come on when people are going in or out. This means that the light only comes on when the entrance switch is on **or** the exit switch is on.

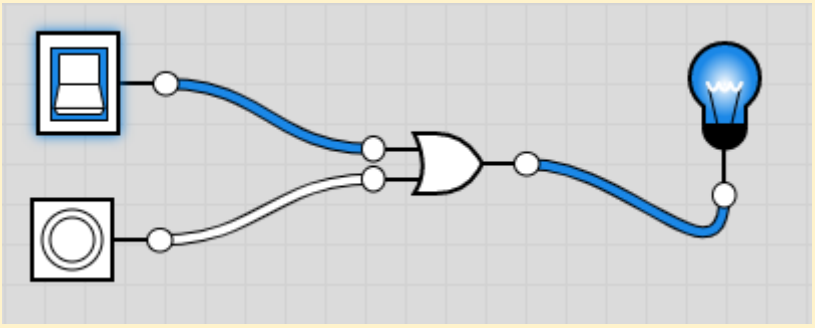
To do this we need to add an **OR gate** to the circuit. So it looks like this:



This gate will only let through a signal if either of its legs are on, so in the **above** circuit the light is off as both switches are off because no one is going in or out.

How It Works

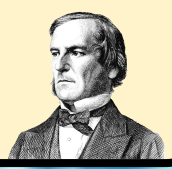
If a person is **entering** the museum the entrance will be on (Input = 1) so the circuit will look like this:



REMEMBER

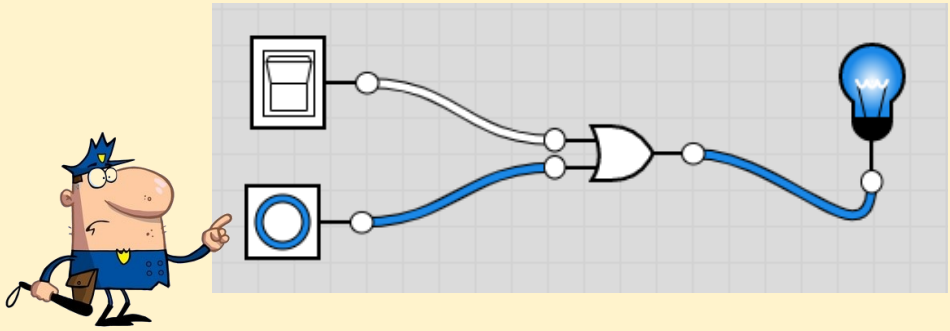
On = True =1

Off = False = 0

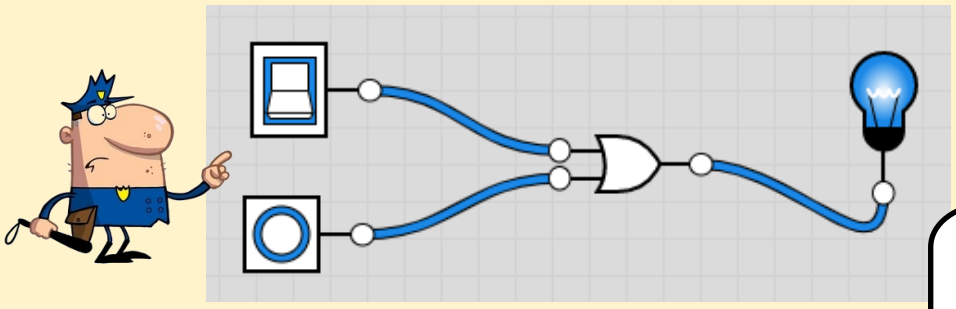


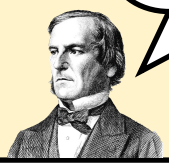
OR Gate

If a person is **exiting** the museum will be on (Input = 1) the circuit will look like this:



If a person is **entering** and another is **exiting** (Both inputs = 1) the circuit will look like this:

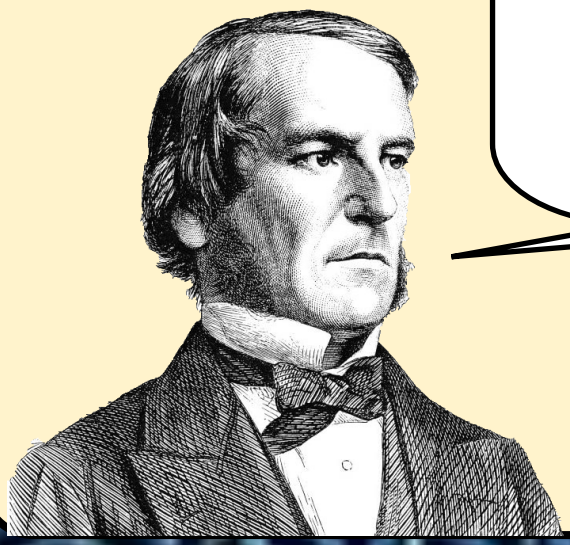




REMEMBER

On = True =1

Off = False = 0

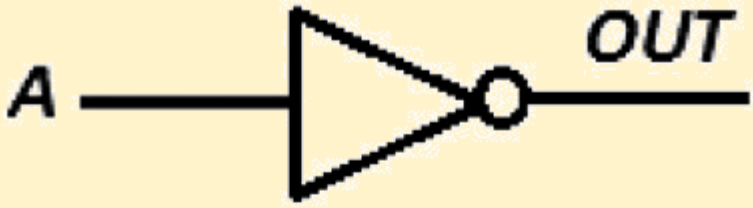


REMEMBER

OR gates need **at least** of the inputs to be 1 to get and output of 1

NOT Gate

T





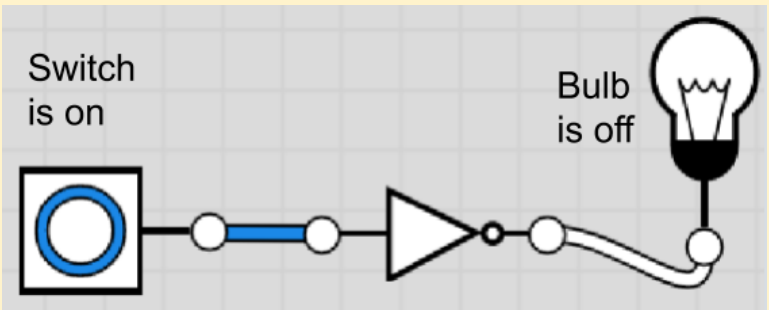
he museum has just received a Fabrochet Egg. and it must be kept safe. You have placed a switch under the egg which is connected to an alarm. The switch will stay on all the while it is pressed. If the egg is taken it will turn off the switch and the alarm will come on.

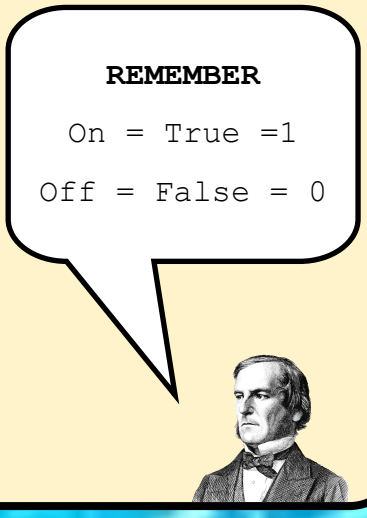


For this to work we need to use a **NOT** gate. A NOT gate changes its input. If the switch is on (input = 1) then the output will be off (output = 0) and vice versa.

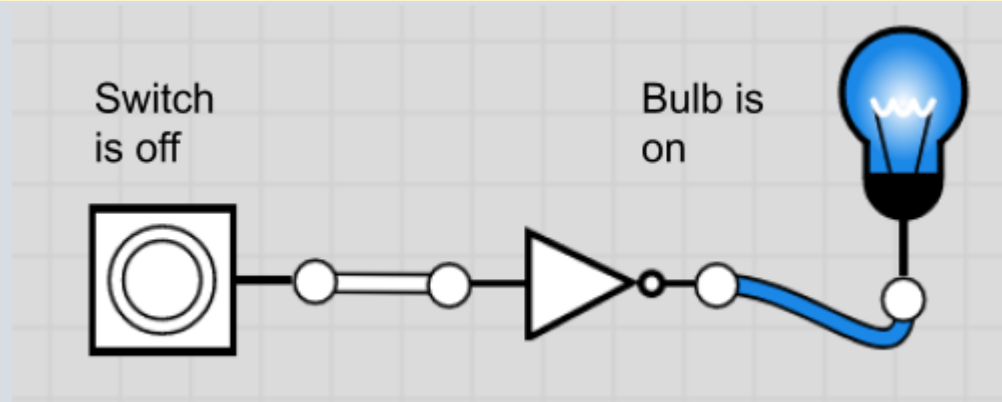
How It Works

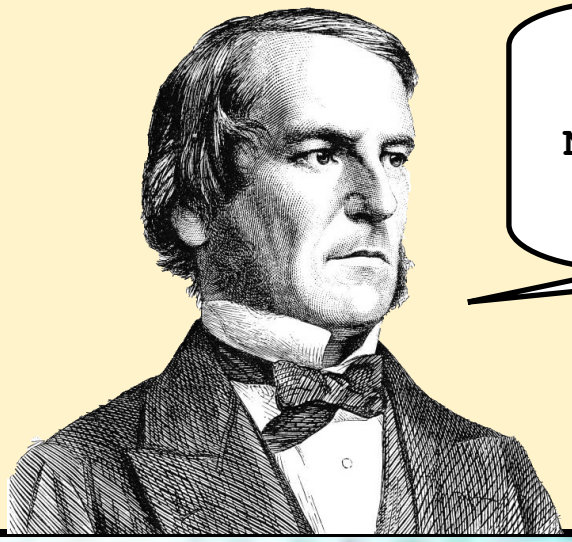
So when the egg is pressing down on the switch (input = 1) the not gate turns the alarm off (output = 0). This is how the circuit would look:





When the egg is removed the switch is now off (input = 0) and the alarm will turn on (input = 1). This is how the circuit will look:



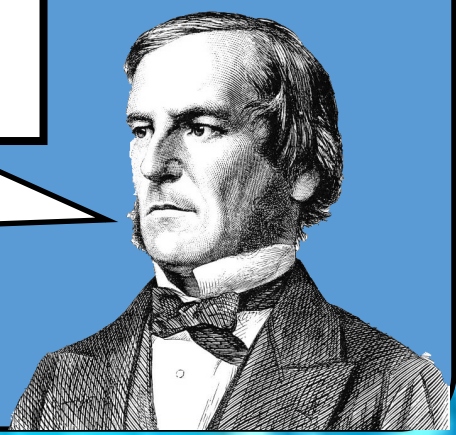


REMEMBER

NOT gates change a 0 to a 1 and a 1 to a 0



If you want to know more watch this video.

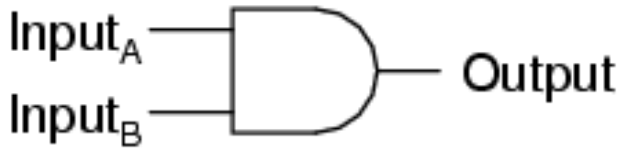


Activity 1

Knowledge

Question 1

Name the logic gate by ticking the correct box.

Logic Gate Symbol	AND	OR	NOT
	○	○	○
	○	○	○
	◉	○	○

Question 2

Fill in the missing words.

On = = 1

Off = False =

Question 3

Tick the box that relates to the correct statement.

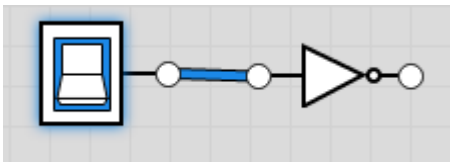
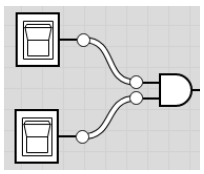
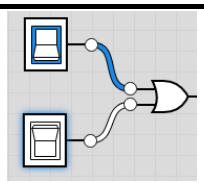
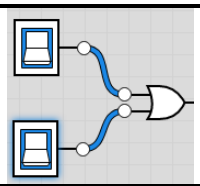
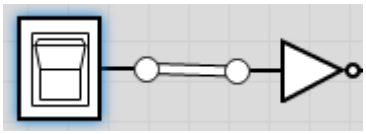
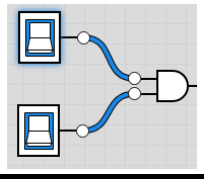
Statement	AND	OR	NOT
At least on input needs to be 1 for an output of 1	○	○	○
Both input need to be 1 for an output of 1	○	○	○
Turns a 1 into a 0 and a 0 into a 1	○	○	○

Question 4

For each of the logic gates below decide if the output is a 1 or a 0.

To help you:

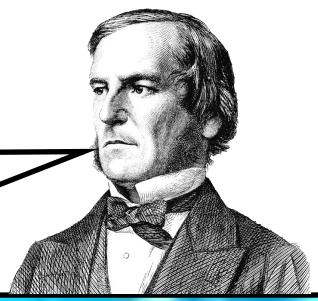
SWITCH	ON/OFF	BOOLEAN VALUE
	ON	1
	OFF	0

Logic Circuit	0	1
		
		
		
		
		
		

REMEMBER

On = True =1

Off = False = 0

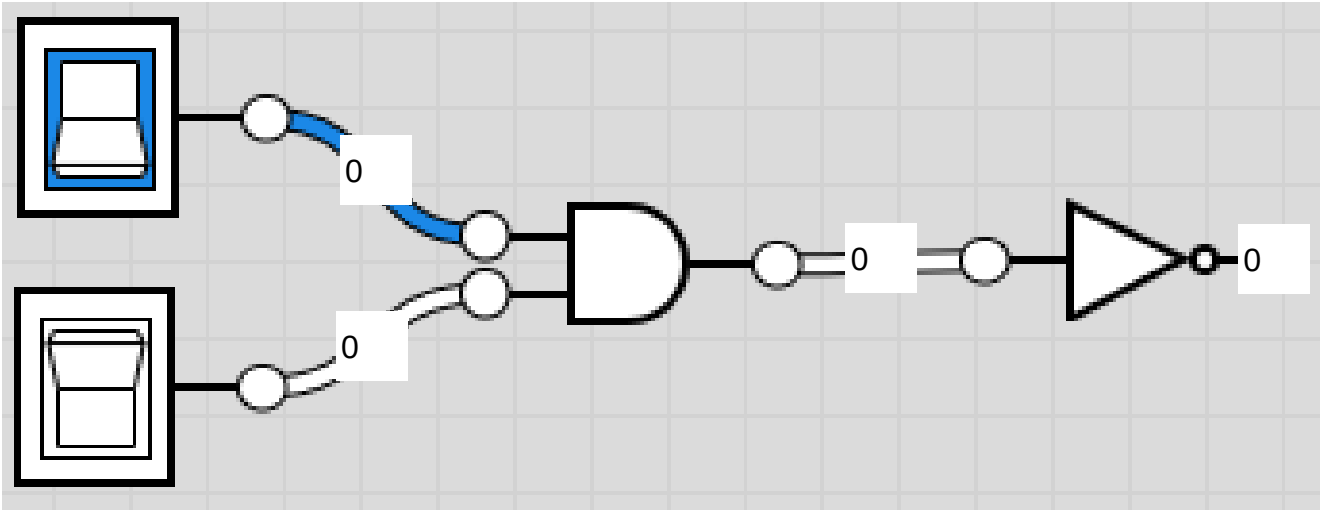


ACTIVITY 2: House Point

Advanced Logic Gates

For each of the logic gates below fill in the missing boxes to see if you can find what the output will be.

Question 1



Question 2

