

**Title: AND GATES****Materials:**

- [1] 7408 2-input AND gate IC
- [1] led with 150Ω resistor
- [3] logic switches

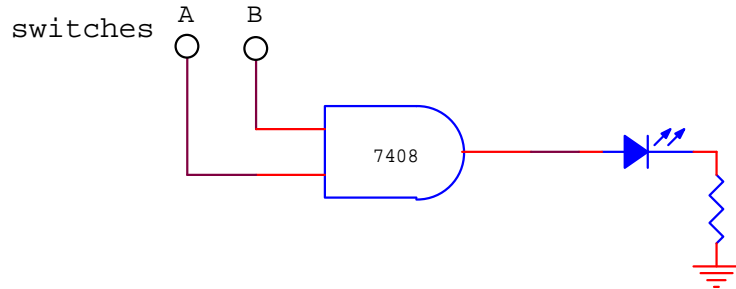
**Procedure:**

1. Insert the 7408 IC into the breadboard.
2. Connect power to the 7408 IC: red wire for +5V ( $V_{cc}$ ) and the black wire for GND.
3. Refer to Fig. 3-3. Wire the 2-input AND circuit. Refer to the pinout diagrams you've been given. Notice that the 7408 actually contains 4 AND gates in the one *dip* (dual inline package).
4. Move input switches A and B to each combination in the left part of the truth table in Table 3-3. Record the results (an ON or OFF) in the Light column, Table 3-3.
5. Record the binary digits 0 or 1 in the Binary column, Table 3-3. If the light is ON, record a binary 1. If the light is OFF, record a binary 0. **Get Instructor's Signature.**
6. Wire the second to fourth AND gates in the 7408 IC.
7. Test each AND gate and record the results in Table 3-3(a). Record the results as a binary 0 or 1.
8. If any of the results are incorrect, contact your instructor to see if you need a new IC. **Get Instructor's Signature. (for gates 2-4, you should have a separate pair of switches and an led for each gate)**
9. Refer to Fig. 3-4. Wire the 3-input AND gate.
10. Fill out the truth table in Table 3-4. Record a 0 for low voltage and a 1 for high voltage. **Get Instructor's Signature.**

**Questions** (answer on a separate piece of paper – “**Draw**” means **you must use a template**):

1. **Draw** a single logic symbol for a 3-input AND gate. Label the inputs A, B, and C; label the output Y.
2. **Draw** a logic symbol diagram of a 4-input AND gate using three 2-input AND gates.
3. In this experiment a LOW voltage at the input switch stood for a \_\_\_\_\_ (logical 0 or logical 1)?
4. In this experiment a HIGH voltage (near +5V) stood for a \_\_\_\_\_ (logical 0 or logical 1)?
5. Make a truth table for a 4-input AND gate. Label the inputs A, B, C, and D; label the output Y.
6. When powering the IC in this experiment, the  $V_{cc}$  is connected to the \_\_\_\_\_ (high, low) of the power supply.
7. The AND gate's unique output is a \_\_\_\_\_(0, 1) which only occurs when \_\_\_\_\_ (all, some) inputs are \_\_\_\_\_ (high, low).

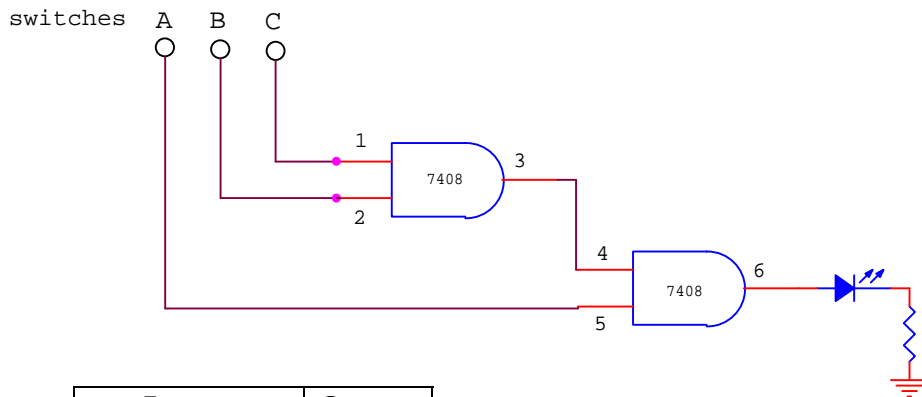
Fig. 3-3. Wiring a 2-input AND gate.



Inputs				Output	
A		B		Light	Binary
Voltage	Binary	Voltage	Binary		
low	0	low	0		
low	0	high	1		
high	1	low	0		
high	1	high	1		

Table 3-3 2-input AND gate

Fig. 3-4. Wiring a 3-input AND gate



Inputs		Outputs		
A	B	Second AND gate	Third AND gate	Fourth AND gate
0	0			
0	1			
1	0			
1	1			

Table 3-3(a) Truth Table for 7408

Inputs			Output
A	B	C	
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Table 3-4 3-input AND gate