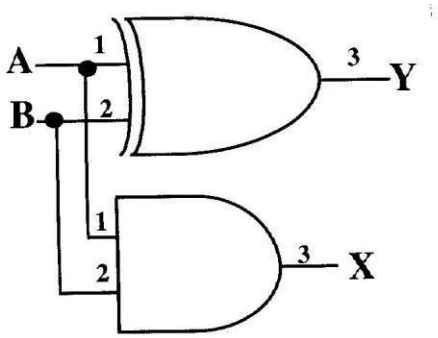
Lab: Half Adder – Circuits that do Math

Adders combine multiple gates to allow the computer to add two binary digits. A Half adder is a circuit that will accept a two-bit binary input and give the binary sum as well as a carry digit. A full adder has three inputs, two binary digits, as well as a carry digit from a previous operation.

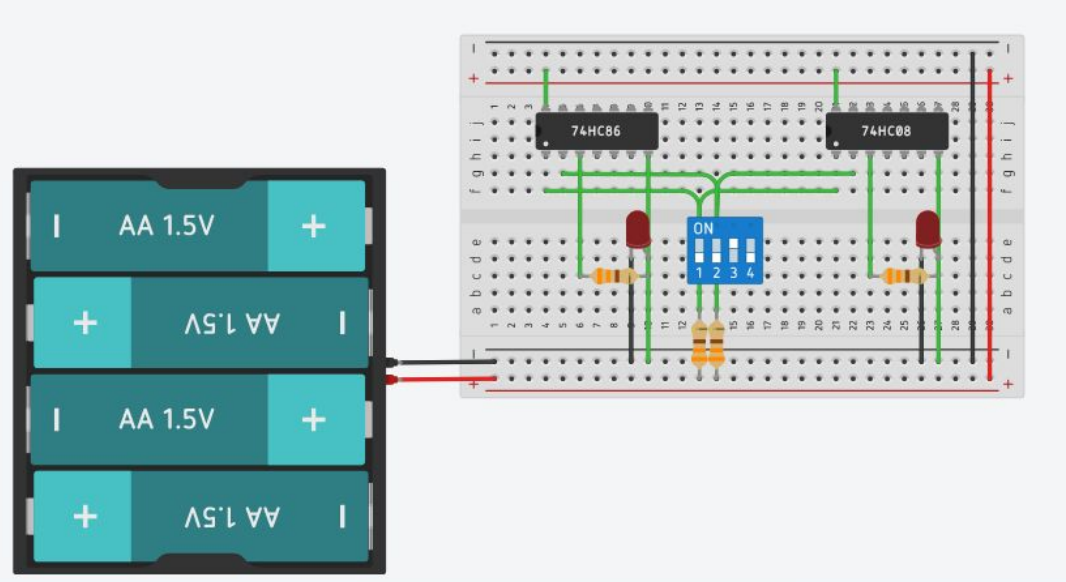
Building a Half Adder

1. Construct the following circuit. Don't forget to connect each chip to power and ground. Use two LED's in your schematic. One LED is for X and the other is for Y. Use different colours. A and B are inputs in the circuit and will be wired using the DIP switch as in your previous lab.

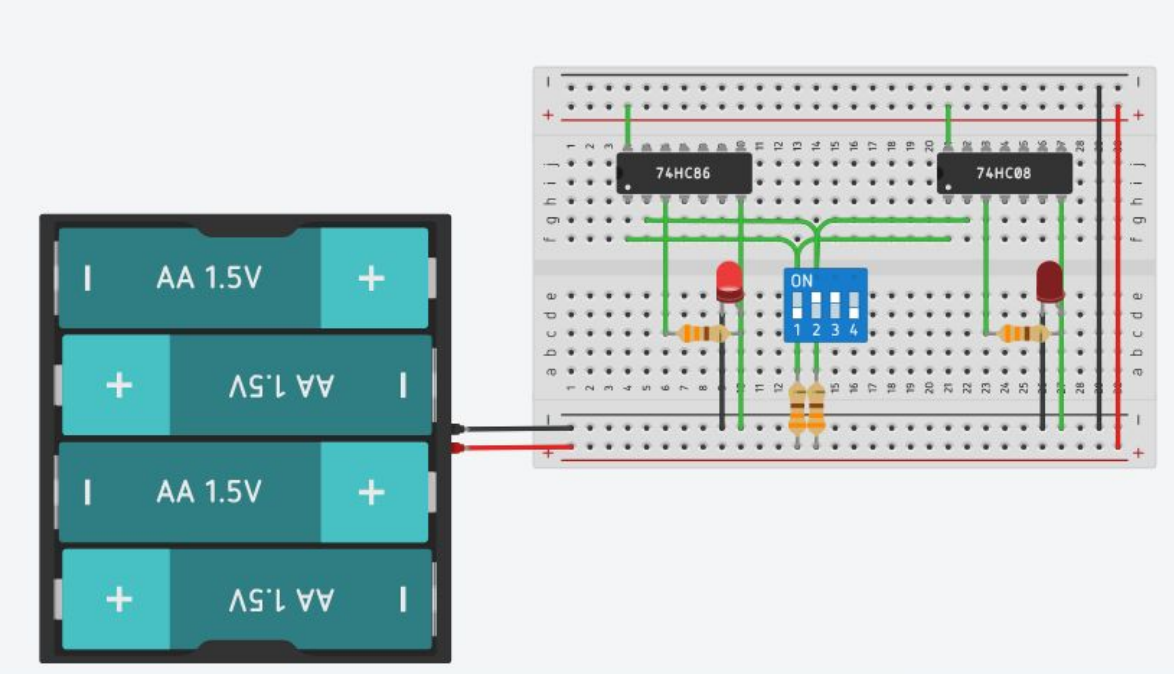


Paste a picture of your Tinkercad circuit below. Show every combination of inputs for A and B.

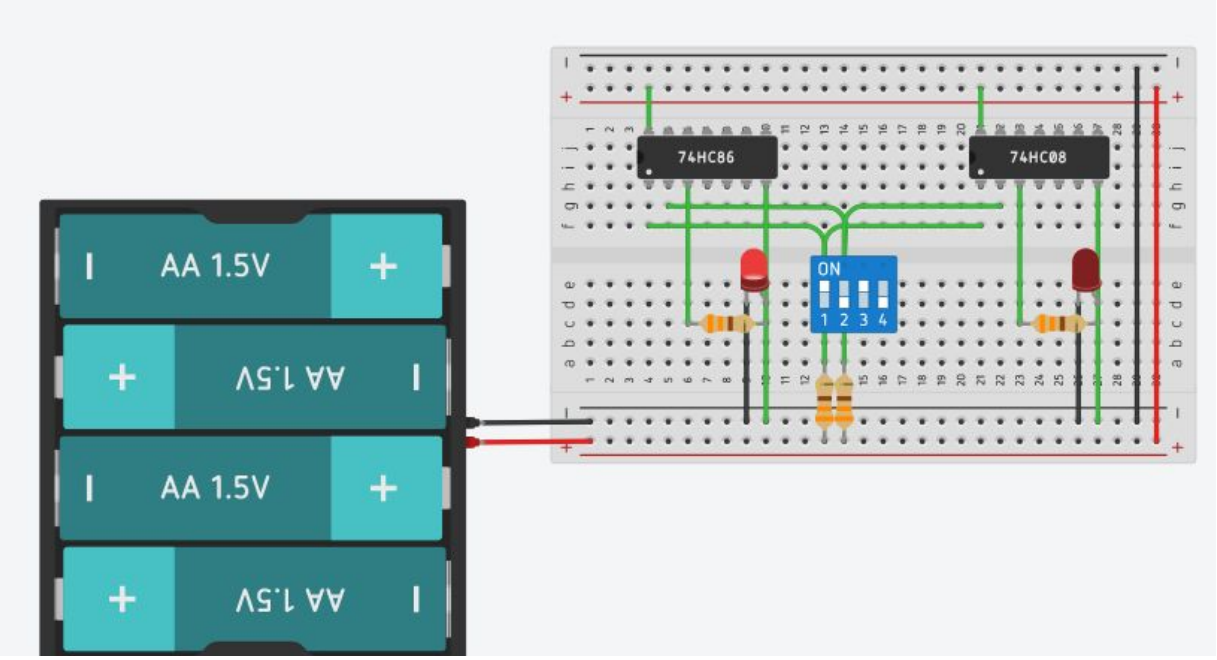
A=0 and B=0



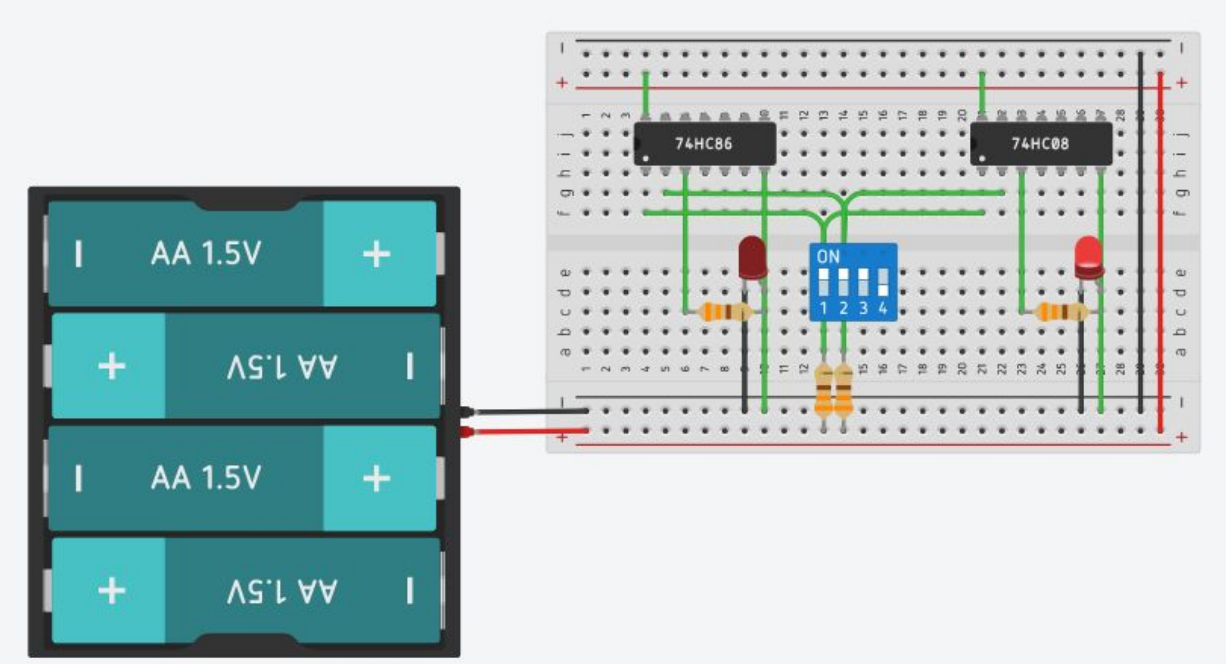
A=0 and B=1



A=1 and B=0



A=1 and B=1



3. Complete the truth table:

A	B	Y	X
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

4. What does each of the inputs represent?

Each input represents the sum of a two bit binary digit. For instance if both are on it would be (1+1), if both are off it would be (0+0), if one if they are on it would be (1+0).

5. What does each of the outputs represent?

Each output represents the carry digit of a binary sum.