

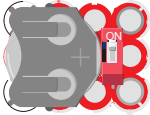


Teaching notes

The switch is an important building block

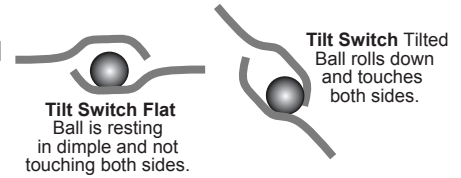
In a circuit diagram, a switch is drawn as a "door" that opens and closes the circuit. Switches come in many different shapes and forms and can be found in every device with electricity.

BATTERY WITH ON/OFF SWITCH



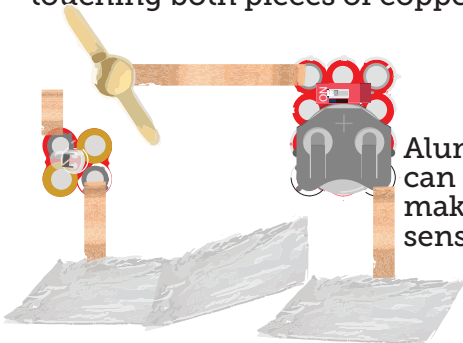
The lectrify kits come with two switches. The battery has an On/Off switch. The tilt switch has a metal ball bearing in it that closes the circuit when the switch is tilted.

TILT SWITCH

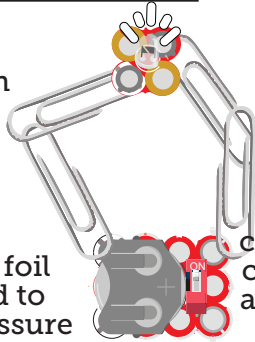


Get creative with your switches

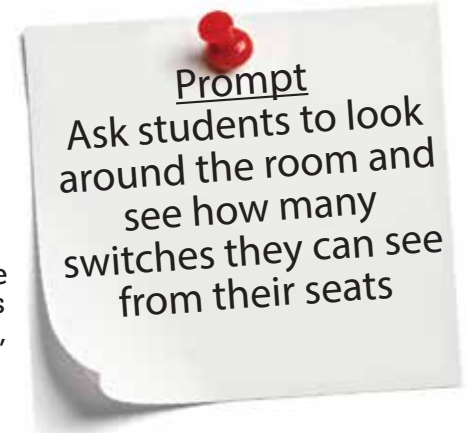
In this circuit, the brad can function as the switch closing the circuit when touching both pieces of copper tape.



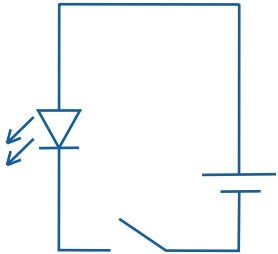
Aluminum foil can be used to make a pressure sensitive switch



This paperclip bracelet does not look like it has a switch but the air gap between the clips when it is loose can be thought of as a switch. Tight= On, Loose=Off



Advanced: Explore how switches enable logic

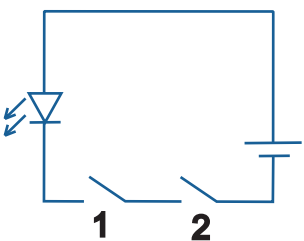


In a simple circuit, the switch is the part of the circuit we control and is our INPUT, and the light is the OUTPUT, (what the circuit does). Even a simple circuit allows us to collect data as in the following table.

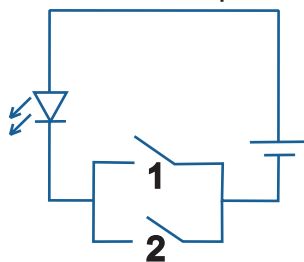
INPUT (Switch)	OUTPUT (Light)	We shorten ON/OFF to I/O	INPUT (Switch)	OUTPUT (Light)
OFF	OFF		0	0
ON	ON	1	1	

When we use two switches, we now have two inputs and this allows us to explore the most common logic circuits in computers: AND and OR. An AND circuit is done when we put two switches in series and the OR when they are done in parallel.

2 Switches in series



2 Switches in parallel



When the switches are in series, both switches must be on for the light to turn on. We call this an AND circuit because both Switch 1 AND Switch 2 need to be on for the light to turn on.

When the switches are in parallel, we observe that the light turns on when Switch 1 OR Switch 2 or both switches are on. This is called an OR circuit.

AND and OR are building blocks for many programming ideas and important circuits to learn.

INPUT		OUTPUT
Switch 1	Switch 2	Light
0	0	0
1	0	0
0	1	0
1	1	1

INPUT		OUTPUT
Switch 1	Switch 2	Light
0	0	0
1	0	1
0	1	1
1	1	1