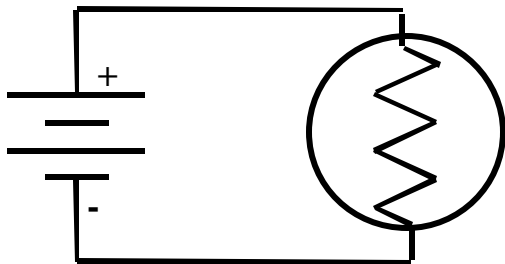


Electricity - A Simple Circuit

This experiment examines the circuit shown below. It demonstrates how electricity flows from a simple battery to a resistive light bulb.

This experiment requires the following materials:

- 9-volt battery
- 9-volt battery connector
- light bulb with wires



1. Attach one end of the incandescent bulb wire to one wire of the 9-volt battery connector.
2. Attach the other wire of the light bulb to the other battery connector wire.
3. Attach your 9-volt battery to the 9-volt battery connector.
4. Observe the light and its brightness. You have created a closed circuit where current is flowing from the battery to the light bulb and back to the battery. The battery actually has a chemical reaction that creates this current flow.
5. Remove the connection between the battery connector and the light bulb, remembering which side was attached to which.
6. Attach the other side of the light bulb to the first side of the battery connector, and then connect the other side. Do

you notice any difference in the intensity of the light? Does anything look different?

It does not matter which way the current flows through the light bulb, the same heat will be generated and the same light will be produced.

Using Ohm's law, we can calculate the current of our circuit. If $V = 9$ volts, $R = 180$ ohms, then: $I = V / R = 9 \text{ volts} / 180 \text{ ohms} = 0.050 \text{ amps} = 50 \text{ milliamps}$.

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Light Emitting Diodes

One special electronics device is a light-emitting diode (LED). This device converts electrical current into visible light, but as opposed to the light bulb used earlier, only heats up or excites a gas inside the device and does not rely on heat for its light. Like a typical diode, it allows current to flow from the anode (positive side) to the cathode. The cathode side is typically notched, and the cathode wire is typically shorter than the anode.

This experiment demonstrates the properties of a light emitting diode (LED). You may need to conduct these experiments in a room with dimmed lights in order to view the LED light.

This experiment requires the following materials:

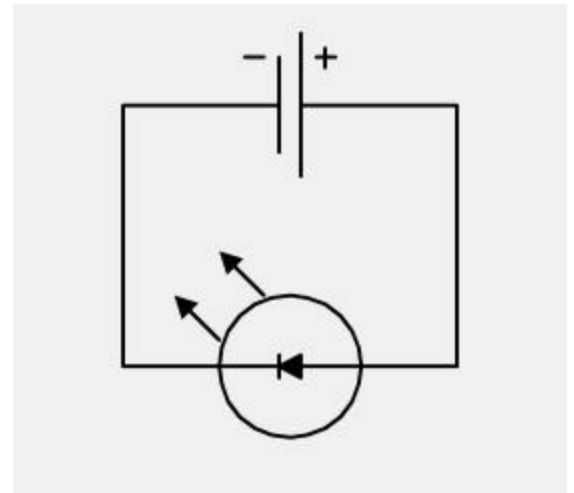
- 9-volt battery
- 9-volt battery connector
- one integrated LED



1. Attach the red colored wire of the battery connector to the longer wire of the LED.
2. Attach the black wire of the battery terminal to the shorter wire of the LED.
3. Attach the battery to the battery connector. Observe that the light shines brightly.
4. Touch the device to see if it is hot.
5. Remove the LED from the battery connector and attach the red wire to the shorter wire of the LED, and the black wire to the longer wire of the LED. Does the diode light any more?

This experiment shows that the diode only allows current to flow in one direction. Notice that the LED only lights when the cathode side of the LED, the side with the notch, is towards the negative terminal of the battery.

The LED in the kit is actually an integrated LED, meaning that in the plastic lens there is both a small 100 ohm resistor as well as a diode. The resistor is used to ensure that an infinite amount of current does not flow through the LED.



Perform other experiments with the wires, resistors, and switches.

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