Electricity flows through circuits: paths of conductors (usually wires). Any break in the circuit will cause the circuit to fail, just like a break in a pipe lets water leak out of a water system.

A closed circuit has no breaks: the light lights up.

An open circuit has a break in it: the light will not light up.

Electricity works a lot like water. Often imagining how water would work in a circuit will tell you how electricity will work as well.

Circuit diagrams

Circuit diagrams are a short-cut method of drawing circuits. They don’t need to be perfectly draw, but they can be drawn wrong.

<table>
<thead>
<tr>
<th>Battery</th>
<th>Capacitor</th>
</tr>
</thead>
</table>

These components look similar, but are very different and have different functions.

The diagram on the right is a faster way of drawing the circuit on the left. (Notice the direction of the battery, which is important)

<table>
<thead>
<tr>
<th>Electrical Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire</td>
<td>paths for electricity to flow.</td>
</tr>
<tr>
<td>Battery</td>
<td>pushes electricity through circuit.</td>
</tr>
<tr>
<td>Light bulb</td>
<td>lights up; resists electricity.</td>
</tr>
<tr>
<td>Switch</td>
<td>turns electricity on and off</td>
</tr>
<tr>
<td>Resistor</td>
<td>resists flow of electricity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipes</td>
</tr>
<tr>
<td>Pump</td>
</tr>
<tr>
<td>No equivalent</td>
</tr>
<tr>
<td>Valve</td>
</tr>
<tr>
<td>Restriction in a pipe</td>
</tr>
</tbody>
</table>

3 Quantities of a Circuit

Voltage Pushes Electrons

The ends of a battery are oppositely charged. This creates a force, pushing electrons through the circuit.

Voltage is measured in Volts.

Current Flows Through Circuits

The flow of electrons we call current which travels through closed circuits.

Current is measured in Amps.

Resistance Resists Current Flow

Devices in the circuit do work, which slows down (restricts) current.

Resistance is measured in Ohms.

These three quantities are linked in any circuit. Change one of them and one or both of the others will change.
1. Open circuit  
2. Closed circuit  
3. Circuit diagram  
4. Voltage  
5. Current  
6. Resistance

Which of the following are correct?

A. Slows down the flow of electricity.  
B. A short-hand way of drawing electrical circuits.  
C. A circuit with a break in it; no electricity will flow.  
D. Pushes electricity through a circuit.  
E. Electricity can flow through this.  
F. The flow of electricity through a circuit.

Which of the following are correct?

A.  
B.  
C.  
D.  
E.

Label the diagram:

A.  
B.  
C.  
D.  
E.

Draw a circuit diagram (starting on the left) with a battery, a resistor, a light bulb, and a switch. Make sure it is a closed circuit, connected with wires.

In the Lab

Start by making a circuit with a battery, light bulb, and switch. Turn on the switch to be sure the circuit is correct (light comes on). Next connect an alligator clip wire to either side of the switch. Touch the free ends of the alligator clip wires together to be sure the light still turns on. If not find the problem. When correct, use the free ends as probes to complete the following task.

Connect alligator clip wires to either side of the battery. Take a light bulb out of the holder. Circle the letter of the following diagrams that light up the light bulb.

Using the electrical circuit above, test which of these are conductors (C) or insulators (I)

<table>
<thead>
<tr>
<th>Material</th>
<th>Conductors</th>
<th>Insulators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>Paperclip</td>
<td>Cloth</td>
</tr>
<tr>
<td>Lock Nut</td>
<td>Glass</td>
<td>Wood</td>
</tr>
<tr>
<td>Penny</td>
<td>Plastic</td>
<td>Rubber</td>
</tr>
</tbody>
</table>

Where are the two parts of a light bulb that must be touched complete the light bulb circuit?

Create in the lab and draw the diagram for the following circuit: battery; light bulb; switch; complete the circuit (close the circuit). What happens if you reverse (turn around) the battery? (You must reverse the whole battery holder.)