



5-Minute Refresher: Circuits

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Circuits – Key Ideas

- Electricity is an energy caused when electrons, tiny particles that orbit around the edge of atoms, move from one place to another.
- *Current* and *static* electricity are defined by how they occur; electricity either occurs in one place (static) or is constantly moving from one place to another (current).
- *Current* electricity occurs when there is a steady flow of electrons moving from one place to another.
- A **circuit** is a closed path or loop, which enables an electrical current to flow. In order for it to be considered a circuit, the charge must start and end at the same point.

Circuits – Key Ideas

- Most circuits are comprised of electrical wires, which carry a current of electricity powered by batteries or other power source.
- Electromotive Force or (EMF) is required to move electrons along. This is also referred to as *voltage*. An example of something that produces this force is a battery. Voltage is measured in numbers and can be high or low.
- Most circuits have an on and off switch, which creates a gap in the path that hinders the electrons from flowing thereby halting the electricity.
- *Conductors* are materials that allow electricity to freely flow through while *insulators* are those that do not allow electricity to pass through easily.

Circuits – Key Ideas

- Examples of conductors are copper metal, silver, gold, iron and aluminum. Examples of insulators are wool, rubber, plastic and paper.
- When a circuit is connected and uninterrupted, it is said to be a *closed* circuit. When it is interrupted, it is said to be an *open* circuit.

Circuits – Prior Knowledge

- Students will be familiar with the idea that lightning is a form of electricity.
- Students will be familiar with electricity traveling through power lines and/or power grids.
- Students will be familiar with various ways of powering electrical items such as with batteries, outlets, and light switches.
- Students will be familiar with the idea that electricity travels along a path or current.

Circuits – Learning Objectives for Grades K-3

- Students will be able to identify sources of electricity.
- Students will be able to draw and describe how current electricity is formed using a circuit.
- Students will be able to identify which objects are conductors and which are insulators of electricity.

Circuits – Learning Objectives for Grades 4-6

- The students will be able to build a model circuit, diagram and explain how a circuit is used to conduct current electricity.
- The students will be able to describe the ways in which conductors and insulators affect the path of electricity in a circuit.
- The students will predict, test and compare other classroom objects to see if they are conductors or insulators of electricity.

Circuits – Common Misconceptions

- Benjamin Franklin discovered electricity.
Reality: While scientists do not all agree on how or when electricity was discovered, they do agree that Benjamin Franklin discovered that lightning and electricity are related.
- Wood is an insulator.
Reality: Wood is a conductor of electricity. The molecules in wood are spread far apart so it is more difficult for electrons to travel through them. However, high voltage electricity can flow through wood.

Circuits – Additional Information

- A current of electrons will travel everywhere they can. Therefore, if a current has an option of two paths, it will choose both. However, all paths are not equal so the current will not travel equally through both paths.
- Our main sources of electricity originate at power plants and are made by generators. The generators are powered by coal, natural gas, water and wind.