

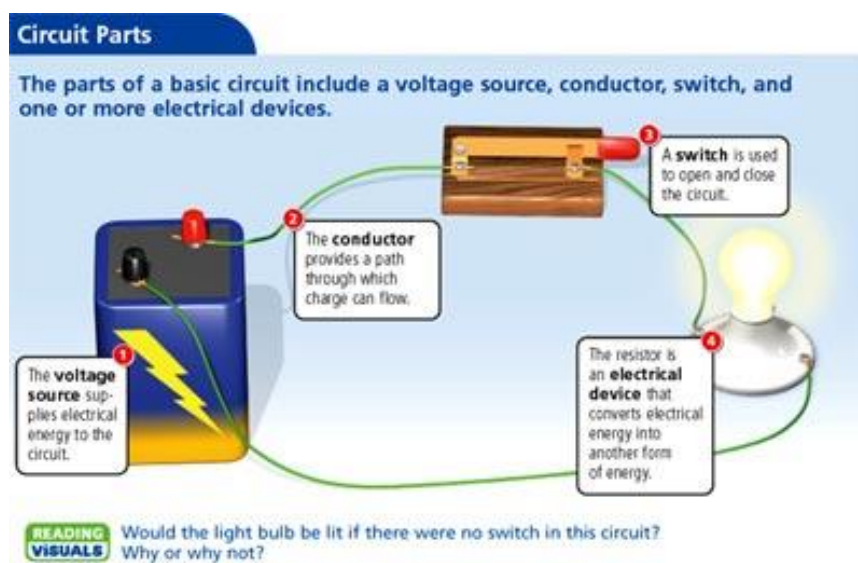
SECTION 1 (PP. 667-674): MATERIALS CAN BECOME ELECTRICALLY CHARGED.

Georgia Standards: S8P5b – Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy; S8CS4c – Learn and use standard safety procedures when conducting scientific investigations.

1. Electric charge flows in a loop.

A **circuit** is a closed path through which a charge can flow. It has at least four basic parts

- **Voltage Source**; the voltage source in a circuit provides the electric potential for charge to flow through the circuit. Batteries are often the voltage sources in a circuit. A power plant may also be a voltage source. When you plug an appliance into an outlet, a circuit is formed that goes all the way to a power plant and back.
- **Conductor**; a circuit must be a closed path in order for charge to flow. That means that there must be a conductor, such as wire, that forms a connection from the voltage source to the electrical device and back.
- **Switch**; a switch is a part of a circuit designed to break the closed path of charge. When a switch is open, it produces a gap in the circuit so that the charge cannot flow.
- **Electrical Device**; an electrical device is any part of the circuit that changes electrical energy into another form of energy. A **resistor** is an electrical device that slows the flow of charge in a circuit. When the charge is slowed, some energy is converted to light or heat. A light bulb is an example of a resistor.

**2. Current follows the path of least resistance.**

Conductors, such as many metals, have a lower resistance than the materials around them, and provide a path through which charge will flow. **Insulators** have high resistance.

- A **short circuit** is a path that allows current to go where it is not intended, and may become dangerous.
- In a **grounded circuit**, a 3rd wire leads stray current into the ground.

3. Safety devices control current.

Fuses and circuit breakers open a circuit when the level of current becomes dangerously high, thereby stopping the flow of charge.

- **Fuses** have to be replaced when they blow out.
- **Circuit breakers** can be used over and over again.
- A **ground-fault circuit interrupter** (GFCI) outlet can be reset repeatedly. It breaks a circuit when it detects a change in current.

SECTION 2 (PP. 675-680): CIRCUITS MAKE ELECTRIC CURRENT USEFUL.

Georgia Standards: S8P5b – Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy; S8CS2a – Follow correct procedures for use of scientific apparatus.

1. Circuits are constructed for specific purposes.

Circuits are designed to be used for specific purposes, such as lighting bulbs, moving motors, and performing calculations.

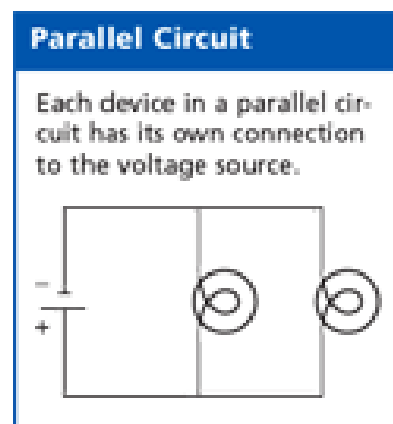
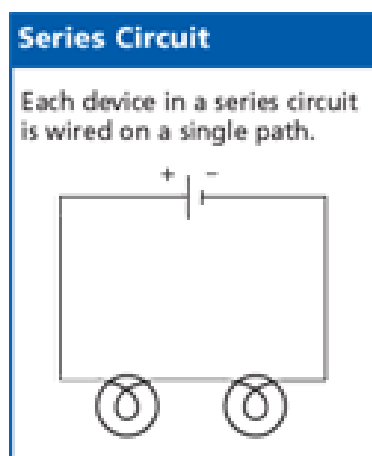
2. Circuits can have multiple paths.

In a **series circuit**, current follows a single path.

- Every element in a series circuit must be functional, or the whole circuit stops working.
- Every resistor added to a series circuit **decreases the current** available to each device.
- The voltages of batteries in series **add** together.

In a **parallel circuit**, current flows in multiple paths.

- If an element in a parallel circuit is not functional, the other elements still work.
- Every device on a parallel circuit gets **full current**.
- The voltages of batteries in a parallel series **do not add** together.



3. Circuits convert electrical energy into other forms of energy.

Circuit elements can convert electrical energy into other forms of energy. They make electrical energy useful.

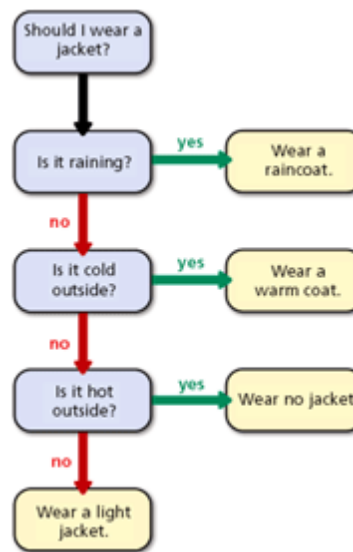
SECTION 3 (PP. 681-691): ELECTRONIC TECHNOLOGY IS BASED ON CIRCUITS.

Georgia Standards: S8P5b – Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.

1. Electronics use coded information.

An **electronic device** uses electric current to represent coded information. Many electronic devices use a **binary code**.

- **Digital** electronic devices, such as computers, use a binary code consisting of 1's and 0's.



- **Analog** signals, such as sound waves, can be converted to digital information that computers recognize.

2. Computer circuits process digital information.

Integrated circuits are highly complex, tiny circuits. They are usually built on chips made of silicon. They provide processing in computers, cars, calculators, and other devices. **Computer hardware** is the physical environment required to do computer work. **Computer software** is the set of instructions and languages required to run the equipment. Personal computers have parts that perform four basic functions: **input, storage, processing, and output**.

3. Computers can be linked with other computers.

Computers can be linked together in networks. The largest computer network is the Internet, a decentralized network devised to keep going even if many links are not functioning. The World Wide Web is an international internet-based environment in which Web sites can be posted and reviewed.