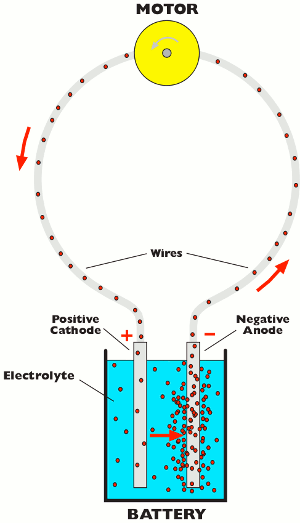
**8.1 Electric Potential Energy**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the ability to do work.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is energy a

moving object has because of its motion.

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the

energy stored in an object.

* Electric Potential Energy
* Electric energy can do work.
* Electric energy that is stored is potential energy; when

it is moving it is kinetic energy.

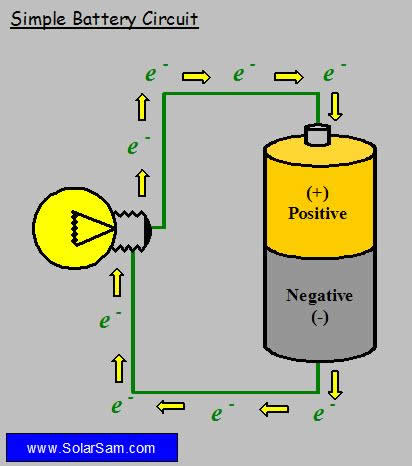
* Electrochemical cells convert \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

into\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Connecting cells together

forms \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* The ends of batteries are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Extra electrons accumulate on one terminal, making it

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* The other terminal has lost these electrons, making it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Connecting a device (ex. lightbulb) to the terminals can allow electrons to \_\_\_\_\_\_\_\_\_\_\_\_, and converts electric energy into different forms (ex. heat, light).
* The amount of electric potential energy per one coulomb

of charge is called the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

or **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

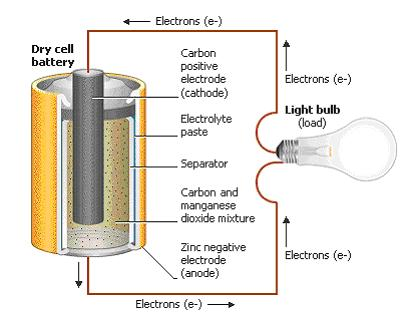
* This can be measured with a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Comparing Potential Energy and Potential Difference.**

* The potential energy in a battery depends on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the amount of

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

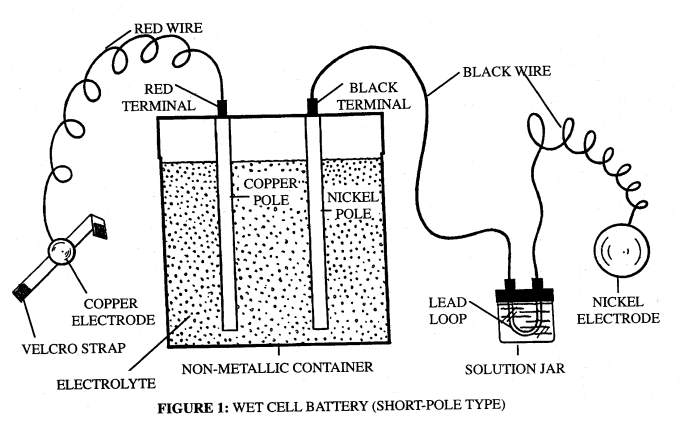
**Producing Voltage.**

* We can classify batteries into two groups.:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are batteries in devices

like flashlights, portable CD players, and watches.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are commonly used

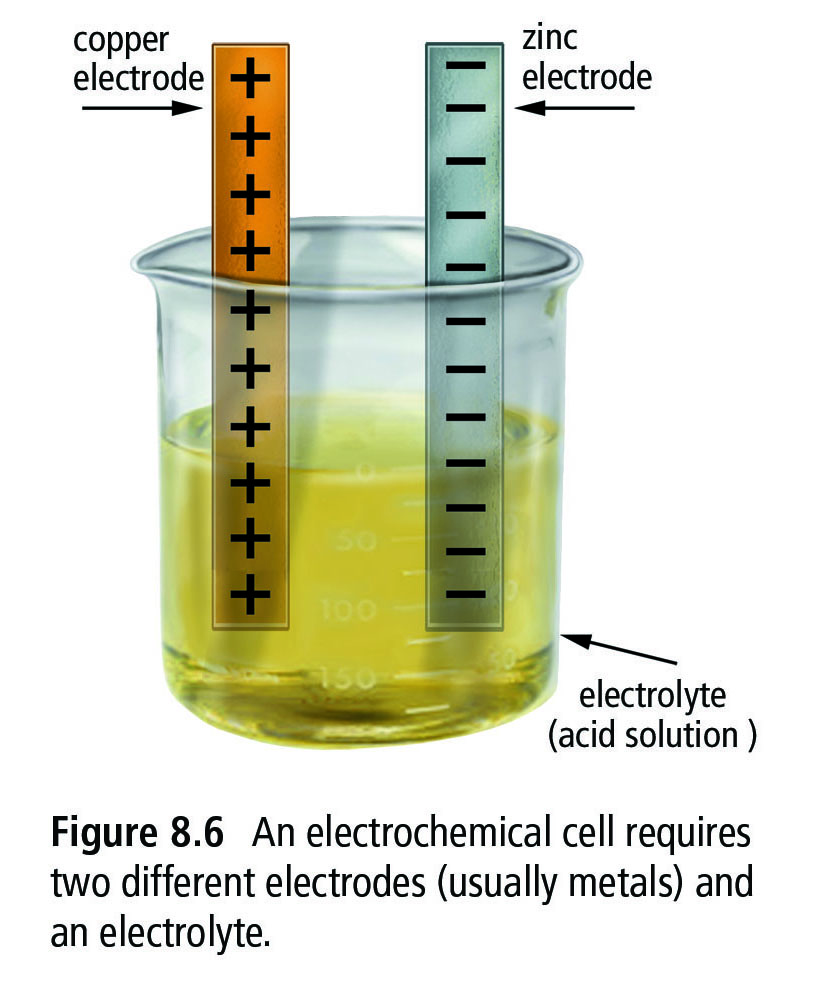
in cars, motorcycles and electric golf carts.

* A battery has two terminals called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The electrodes are made up of two different metals.
* The electrodes are in an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

which is a substance that conducts electricity.

* In a dry cell the electrolyte is a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

and it is a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** in wet cells.

* In this electrochemical cell, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

are transferred from the copper electrode (which becomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) to the zinc electrode

(which becomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

* The separation of charge results in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the two electrodes.

**Many Sources of Electrical Energy.**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* rubbing two materials together can separate charges

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* When certain types of crystals, like quartz, are squeezed, there is a separation of positive and negative charges on the crystal. Striking the crystal generates a burst of thousands of volts of electricity.

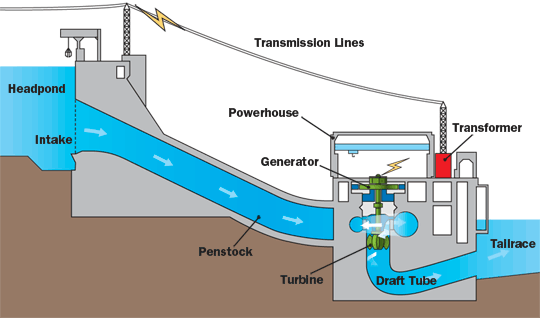
1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* solar panels and many calculators use photo-electrochemical cells as a source of power
* they are made of semi-conducting material such as silicon
* when light hits the cell electrons are broken off the surface of the material

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* A thermocouple device is used to transform heat energy into electrical energy.
* Two wires of different metals are joined at both ends. When heated or cooled, charge is separated and voltage is created. Thermocouples can only create a small amount of electric energy.
* They are used in ovens and furnaces to control the temperature.

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* Generators work on the principle that when a wire moves close to a magnet, a voltage is created across the wire.
* In British Columbia the energy from water is used to generate most of our electric energy.

**Review.**

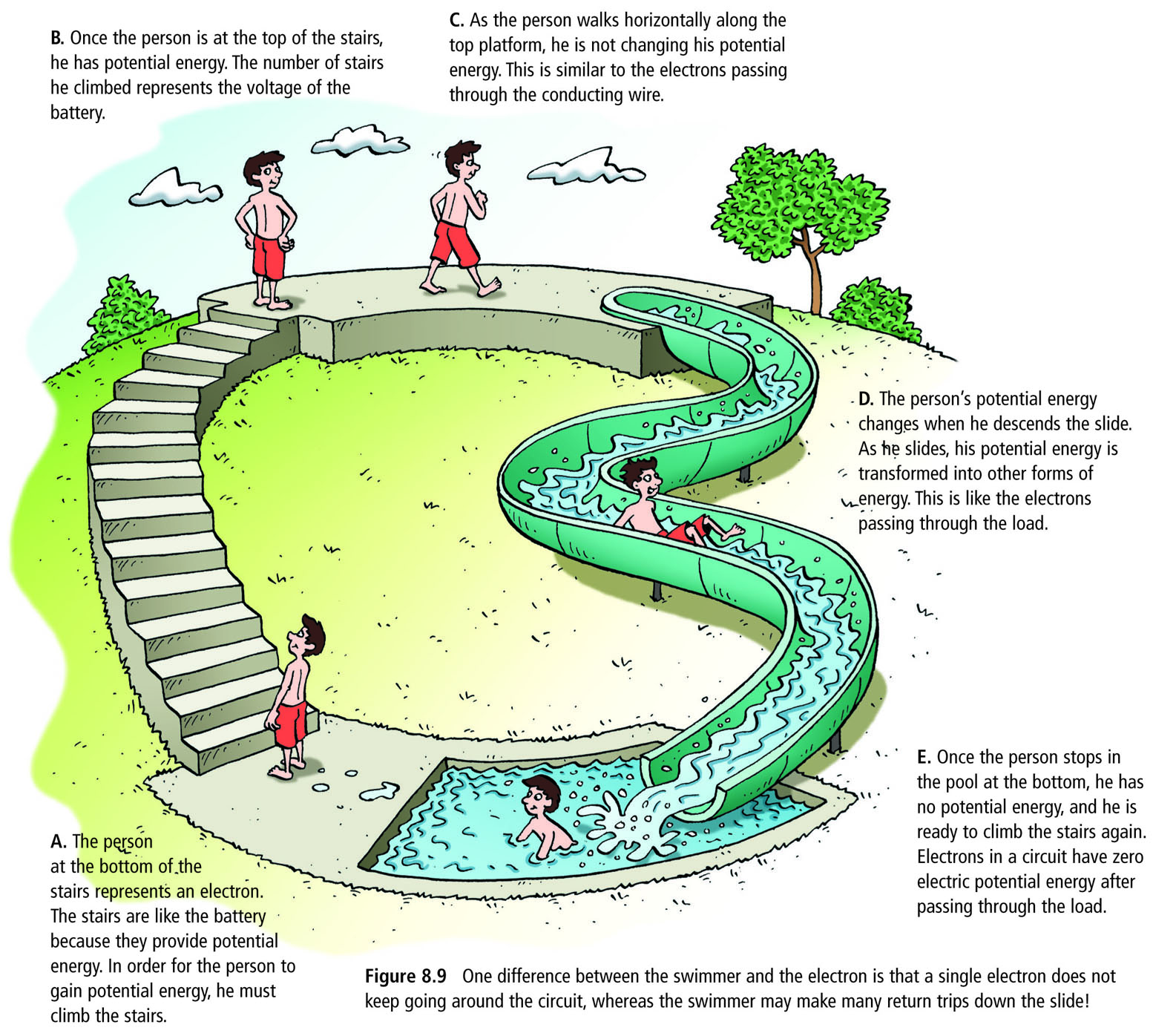
What do sources of electrical energy do these pictures represent?







**8.2 Electric Current.**

* Current electricity is the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** in a complete circuit. The unit of measuring electric current is the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, which is defined as one coulomb of charge passing a given point per second.
* An **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is a device used to measure **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**Energy Around a Circuit.**

* Any device that transforms electrical

energy into other forms of energy is called an

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

* Some examples of a load are a

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, a

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

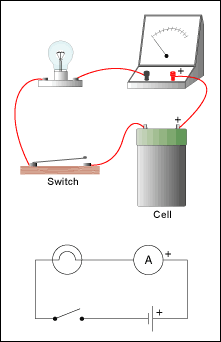
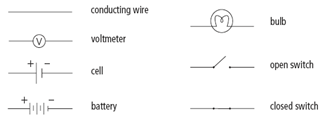
and a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

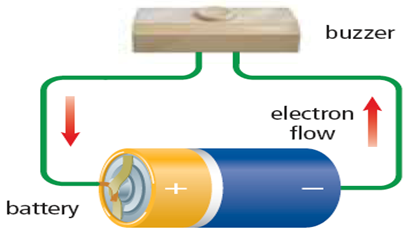
that allows electrons to flow is called an

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**Circuits Components and Diagrams.**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – the source of electric current
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – the wire carrying the electric current
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – a device that transforms electrical energy into other forms of energy
* \_\_\_\_\_\_\_\_\_\_\_–a device used to turn the circuit on and off by opening or closing the circuit.



**Electrons Are So Pushy.**

* So far you have learned that a source like a battery

supplies the energy to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Electrons are pushed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

of the battery, along conducting wires through the

load (light bulb), to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Electrons apply an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

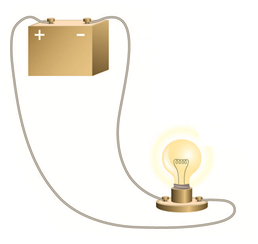
**Current Electricity and Static Electricity.**

* Unlike \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ where the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, in a battery the charge will flow the second the circuit is connected.
* Once the battery is connected to complete the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ continuously through the circuit.
* This continuous flow of charge is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Conventional Current.**

* The flow of electricity is from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (the flow of electrons).
* In the early days of electricity research, scientists \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ believed electricity flowed from positive to negative.
* Descriptions of this flow from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ still exists today, and is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**8.3 Resistance and the Flow of Electrons.**

* Resistance is the property of any material that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

the flow of electrons and transforms electrical energy into other forms of energy.

* A **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** will slow down

the flow of electrons and convert it into **\_\_\_\_\_\_\_\_\_\_** and **\_\_\_\_\_\_\_\_\_**.

**Resistance and Current.**

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is directly **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* If a battery is connected to an electric circuit that has a large resistance, **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** will flow than if the same battery is connected to a lower resistance circuit.

**Ohm's Law.**

* Electrical resistance is the ratio of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The unit of measurement for electrical resistance is the ohm (Ω).
* Ohm’s law is written
* *Ohm’s law is more commonly written as :*

V = IR

**Example 1:**

The current through a load in a circuit is 1.5A. If the potential difference across the load is 12 V, what is the resistance of the load?

**Example 2:**

The resistance of a car headlight is 15 Ω. If there is a current of 0.80 A through the headlight, what is the voltage across the headlight?

**Example 3**:

A 60 V potential difference is measured across a load that has a resistance of 15 Ω . What is the current through this load?

Converting Prefixes:

milli (m)

mA → A (÷ 1000)

A → mA (x 1000)

kilo (k)

kΩ → Ω (x 1000)

Ω → kΩ (÷ 1000)

mega (M)

MV → V (x 1 000 000)

V → MV (÷ 1 000 000)

**Example 4:**

A 15 mA current flows through a 400 Ω lamp. What is the voltage across the lamp?

**Example 5:**

A 12 kΩ load is connected to a 90 V power supply. What is the current thought the load in milliamperes?

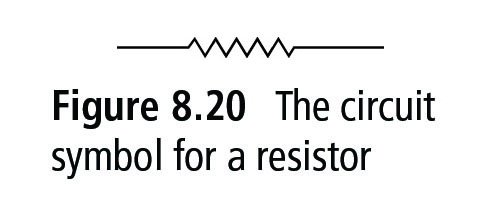
**Determining the Resistance.**

Method 1

* Use a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to measure voltage and an \_\_\_\_\_\_\_\_\_\_\_\_\_ to measure current. Using Ohm’s law you can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the load’s resistance.

Method 2

* Use a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to measure the resistance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



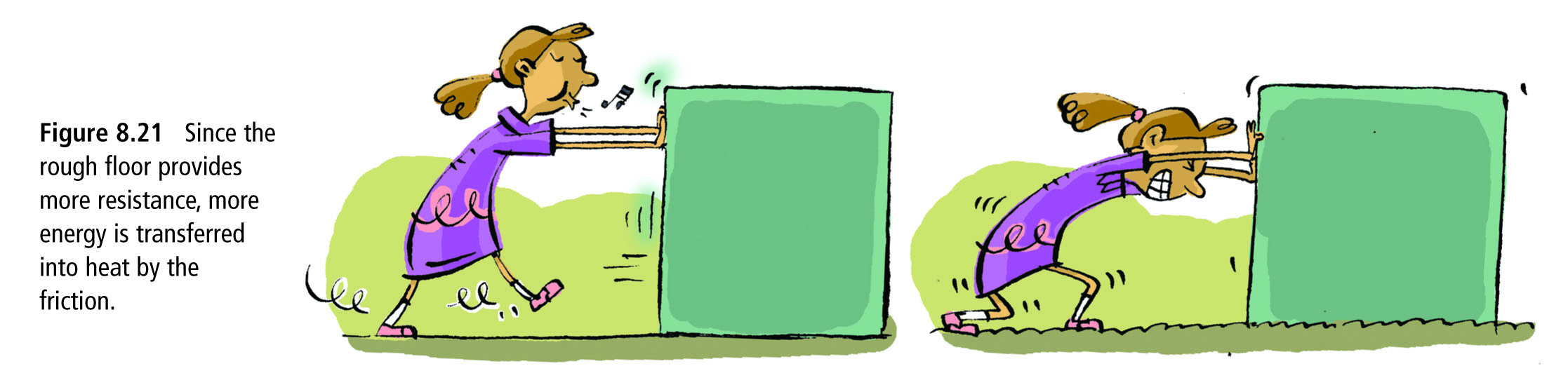
**Resistors.**

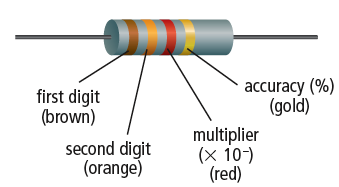
* A resistor is an electrical component that

has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Resistors can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a circuit to provide the correct voltage and current to other components of the circuit.

**Resistance.**

* ****Resistance is a big loser. When a charge encounters resistance, some of the electrical energy is converted to other forms of energy usually \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

****

**Resistors and Colour Codes.**

