

9 Science (10FI)

Learning Opportunities

April 20 - 24, 2020

### Static Electricity

There are two kinds of electric charge: positive and negative. Both positively charged and negatively charged objects will attract neutral (uncharged) objects.

### Creating Static Charge

When electrons are transferred from one object to another, both objects become electrically charged. Objects become electrically charged:

- By friction
- By conduction (contact)

Friction – when two objects are rubbed together, the positively charged nuclei of one of the objects attract the electrons from the other object. The object gaining the electrons becomes negative and the object losing the electrons becomes positive. The greater the difference in the pull each material has on electrons, the stronger the static charge that is created.

Conduction (contact) - In charging by contact, one object is already charged and the other may or may not be. For example, after you walk on a carpet your body may be negatively charged. The doorknob is usually uncharged. Your body transfers the electric charge with the doorknob. Your hand does not even get to touch the doorknob before the charge begins to transfer in the form of a spark.

### Discharging electrically charged objects

If an object has all the excess electric charges removed, it is said to be discharged or neutralized. If an object is charged, negatively or positively, it wants to lose the charge to return to a neutral state.

Grounding is one way to discharge an object. By connecting an object to a conductor wire and then connecting that wire to the ground, we can send the extra charges into the ground. The charge is shared with the entire Earth. This is how lightning rods work.

Exposure to humid air, some kinds of light, and radioactivity can also discharge objects.

### **Think about it:**

**A spark produced by a static charge can cause dangerous fires and explosions in some situations. What are some situations where it is important to avoid static sparks? How could creating the static be avoided or how could the static be discharged before it can cause a dangerous situation?**

### Comparing Static and Moving Electric Charges

Static electricity is electric charges that remain in a fixed position on an insulator or distributes itself evenly on the surface of a conductor. Current electricity is electric charge that moves from a source of electrical energy in a controlled path through an electric circuit. These circuit have voltage, current and resistance.

Voltage (V) - the amount of energy that the energy source gives to each electron. This energy is measured in volts (V). Different types of energy sources can give different amounts of voltage. For example, a household battery can give electrons between 1.5V and 9V, a car battery gives about 12V, and wall outlets are 120V.

Current (I) - the rate that electric charges move past a given point in the circuit. Current is measured in amperes (A).

Resistance (R) – the property of a substance that makes it difficult for electric charges to flow. Resistance is measured in Ohms ( $\Omega$ ).

Ohm's Law uses the equation  $V = I \times R$

This can be rearranged to  $I = V \div R$  and  $R = V \div I$

For sample problems and practice problems, go to the documents section of my teacher page. These documents will also be posted on the Science 9-10FI page on Microsoft Teams. <https://secure1.nbed.nb.ca/sites/ASD-W/harveyhighschool/Teachers/pages/docs.aspx?FilterField1=Blog%5Fx0020%5FCategory&FilterValue1=Mrs.+Arseault>