

# Lesson Notes:

FirstEnergy®

## Electrical conductors and insulators

Electric  
UNIVERSE

1.

Everything around us is made of tiny particles called atoms. Atoms make up all solid things, liquids and even the air.

2.

All atoms have at least ONE electron circling the nucleus.



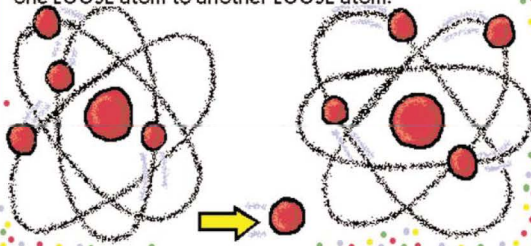
The centers, or nuclei of some atoms are heavier than other atoms.

Heavy atoms have more electrons flying around their centers than do light ones.



3.

Atoms of some materials are LOOSE. Something can cause electrons to FLY AWAY from the nucleus of one LOOSE atom to another LOOSE atom.



This bumps an electron from the SECOND LOOSE atom to the THIRD ATOM and on and on!



4.

A stream of electrons being pushed from ONE LOOSE ATOM TO THE NEXT is called an ELECTRIC CURRENT.

5.

There are several ways to push electrons and start an electrical current. One of the most common ways is with a magnet. Machines that use magnets to make electricity are called generators, alternators, or sometimes, dynamos. Another way is through a chemical reaction. Electric cells use chemical energy to make an electrical current. We sometimes call electric cells, "batteries".

6.

An electric current can pass through things made up of loose atoms. We call these **CONDUCTORS!!!**

7.

Things made of tightly held atoms, that will not let their electrons move, are called . . .

**INSULATORS!!!**

Can you think of useful things to make out of electrical insulators? How about things to make from electrical conductors?

8.

There are also other kinds of atoms.

Electrons are held so tightly to their nuclei that electrons cannot jump to the next atom.

Therefore, an electrical current CANNOT be pushed through a TIGHT ATOM!





## **Common electrical conductors** (Loosely held atoms)

**Most metals**  
**Copper**  
**Aluminum**  
**Iron and steel**  
**Silver**  
**Gold**  
**The Earth**  
**Water**  
**Your body**



## **Common electrical insulators** (Tightly held atoms)

**Rubber**  
**Plastics**  
**Glass**  
**Wood & paper**  
**Cotton**  
**Ceramics**

## SCIENCE WORDS TO DISCUSS

- **Atom** • **Electron** • **Nucleus** • **Nuclei** • **Magnet** • **Chemical** • **Electric cell**
- **Battery** • **Generator** • **Alternator** • **Dynamo** • **Tightly held** • **Loosely held** • **Conductor** • **Insulator** • **Current** •

## PRE & POST LESSON QUESTIONS

What are atoms? Can you name some of their parts?

What types of atoms allow electrons to jump from one atom to another?

What types of atoms prevent atoms from jumping from one to another?

What types of atoms are found in electrical conductors?

What types of atoms are found in electrical insulators?

Can you name some materials that are electrical conductors?

Can you name some materials that are electrical insulators?