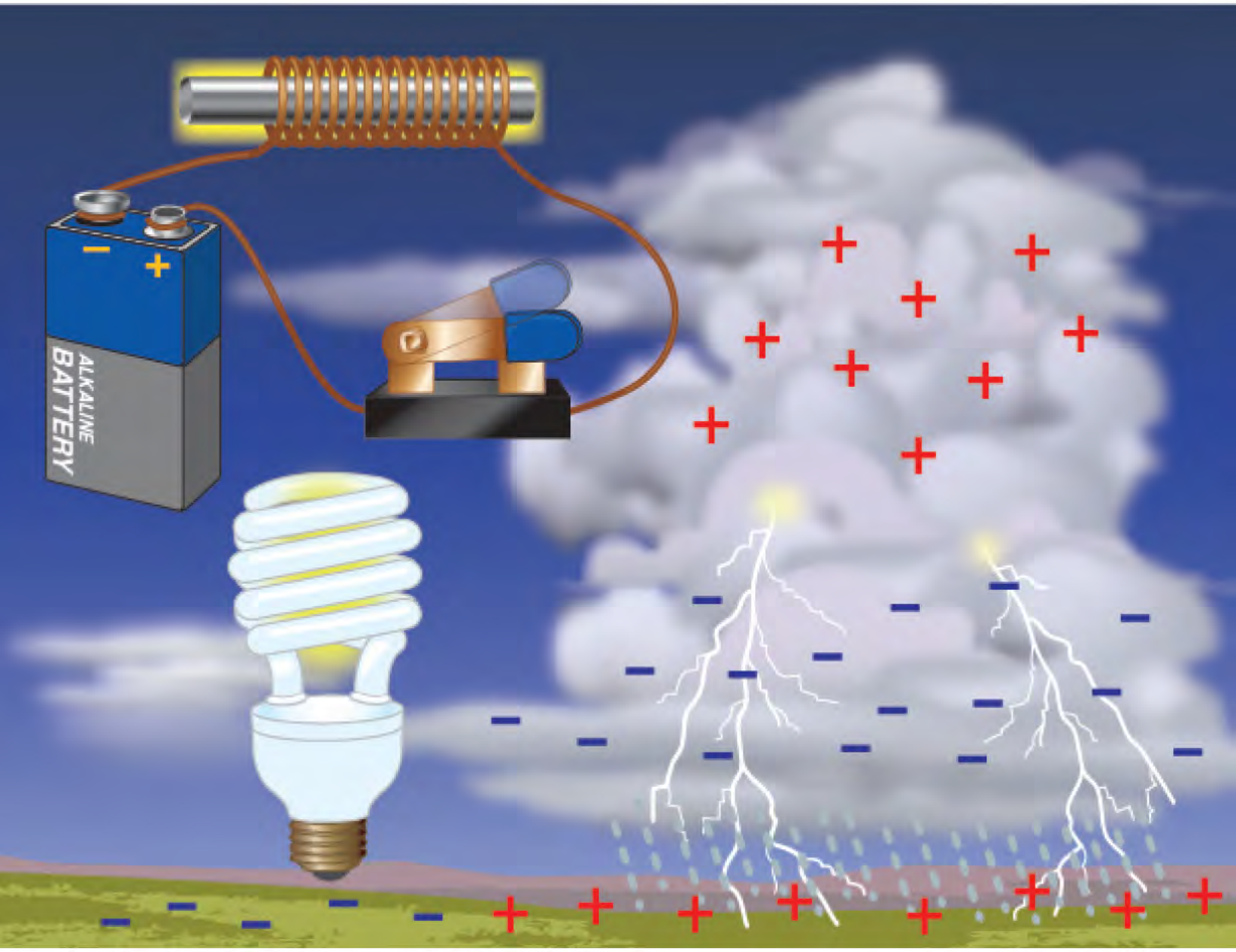
Electricity & Magnetism
Learning Guide



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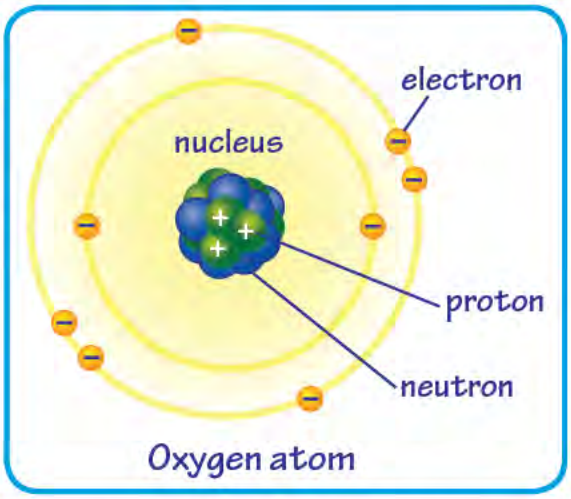
LESSON 1

INTRODUCTION TO ELECTRICITY

Atoms and Electric Charges

Atoms are made up of **protons**, **neutrons** and **electrons**. Both protons and electrons have an electric charge. Protons are **positively charged** and electrons are **negatively charged**. Neutrons are **not charged** particles.

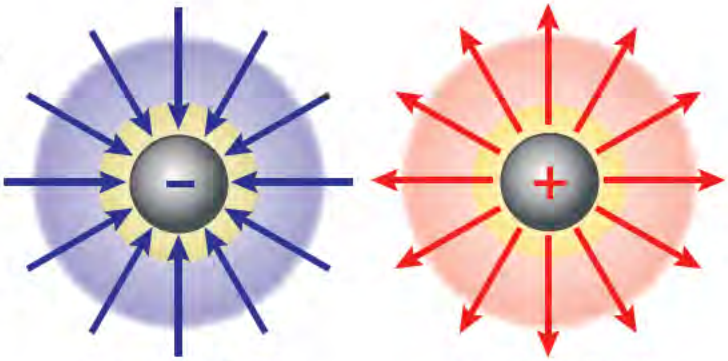


Interaction of Charged Particles

The interaction of electric charges is called **electricity**. If particles have **opposite electric charges**, they **attract** each other. If particles have **similar charges**, they **repel** each other. These interactions explain why an atom is held together. The positively charged protons in the nucleus exert a strong attraction for the negatively charged electrons that surround the nucleus.

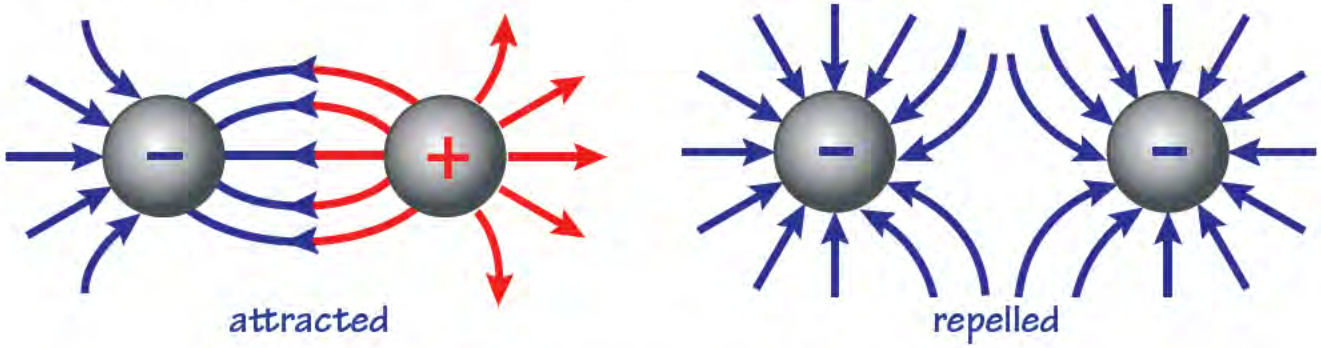
Electric Fields

The attraction or repulsion that exists between charged particles is known as **electric force**. The area around a charged particle, where an electric force is exerted, is called an **electric field**. For a negatively charged particle, electric force lines are drawn pointing **inward** toward the particle. For a positively charged particle, the lines are drawn **outward**. The lines on the diagram are close together right next to the particle, where the field is the strongest.



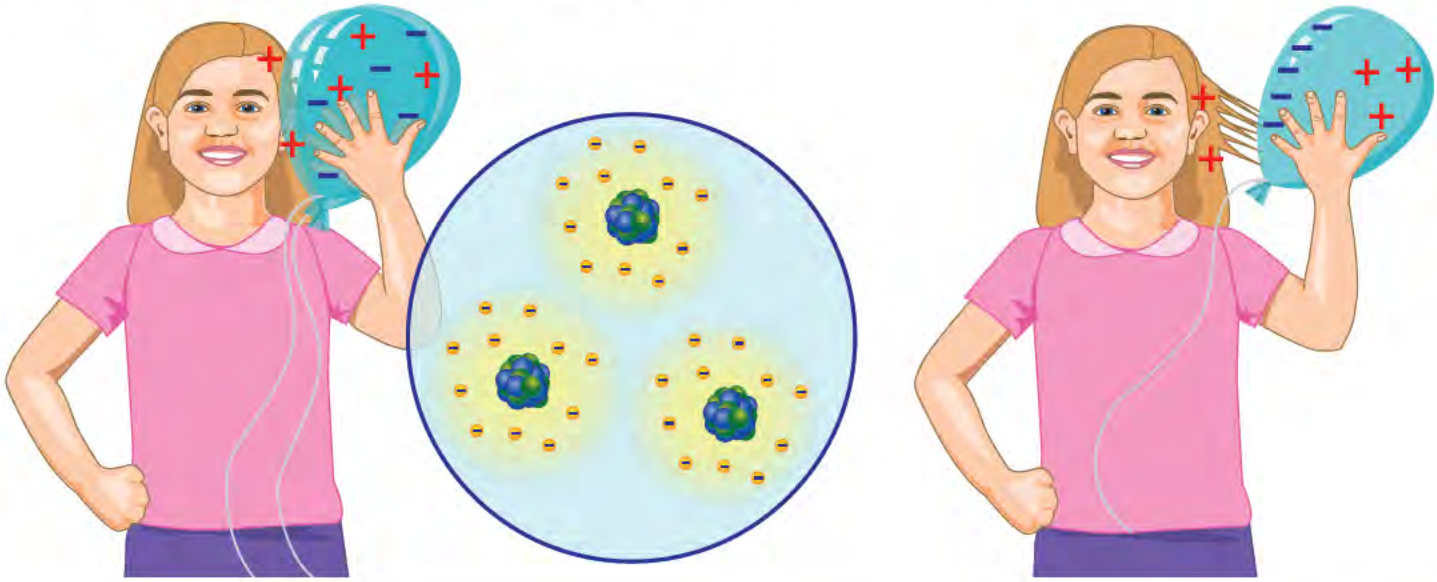
Multiple Charged Particles

When two charged particles come close together, their electric fields are combined. The diagram on the left represents the electric fields of particles that are **attracted**. The diagram on the right shows the electric fields of particles that are **repelled**.



The Movement of Electric Charges

Objects do not normally have a positive or negative charge. However, within the atoms of some materials, the electrons are able to leave and move to other atoms. When an object gains or loses electrons, the object can **become charged**.



Some materials, like copper and aluminum, are called **conductors** because their electrons can easily move.

Other materials, like plastic, are known as **insulators**, because their electrons will not easily move.