Name _____ Class _____ Date _____

Chapter 21 Magnetism

Summary

21.1 Magnets and Magnetic Fields

- **Magnetic force** is the force a magnet exerts on another magnet, on iron or a similar metal, or on moving charges.

Like magnetic poles repel one another, and opposite magnetic poles attract one another.

- All magnets have two **magnetic poles,** regions where the magnet's force is strongest.

A magnetic field, which is strongest near a magnet's poles, will either attract or repel another magnet that enters the field.

- The area surrounding Earth that is influenced by a giant magnetic field is the **magnetosphere.**

When a material is magnetized, most of its magnetic domains are aligned.

- A **magnetic domain** is a region that has a very large number of atoms with aligned magnetic fields.
- A **ferromagnetic material,** such as iron, can be magnetized because it contains magnetic domains.

21.2 Electromagnetism

- Electricity and magnetism are different aspects of a single force known as the **electromagnetic force.**
- The electric force results from charged particles. The magnetic force usually results from the movement of electrons in an atom.

Moving electric charges create a magnetic field.

- A coil of wire carrying a current produces a magnetic field. The coil acts like a bar magnet. Each end of the coil is a pole. A coil of current-carrying wire that produces a magnetic field is called a **solenoid.**

Changing the current in an electromagnet controls the strength and direction of its magnetic field.

- An **electromagnet** is a solenoid with a ferromagnetic core.

Electromagnetic devices such as galvanometers, electric motors, and loudspeakers change electrical energy into mechanical energy.

- A **galvanometer** is a device that uses a solenoid to measure small amounts of current.

- An **electric motor** is a device that uses an electromagnet to turn an axle.
- A loudspeaker reproduces sounds.

21.3 Electrical Energy Generation and Transmission

According to Faraday's law, a voltage is induced in a conductor by a changing magnetic field.

- **Electromagnetic induction** is the process of generating a current by moving an electrical conductor relative to a magnetic field.

The two types of generators are AC generators and DC generators.

- A **generator** is a device that converts mechanical energy into electrical energy by rotating a coil of wire in a magnetic field.
- AC generators produce alternating current. DC generators produce direct current.

A transformer changes voltage and current by inducing a changing magnetic field in one coil. This changing field then induces an alternating current in a nearby coil with a different number of turns.

- A **transformer** is a device that increases or decreases the voltage and current of two linked AC circuits.
- Power lines carry power from power plants to homes. The voltage is very high in the lines. The voltage must be lowered before it enters homes.

Most of the electrical energy generated in the United States is produced using coal as an energy source. Some other sources are water (hydroelectric), nuclear energy, wind, natural gas, and petroleum.

- A turbine uses the energy from one of these six sources to produce electricity.
- A **turbine** is a device with fanlike blades that turn when pushed, for example, by water or steam.