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# Vocabulary List

## Unit 5: Electricity and Magnetism

### 5A: Introduction to Electricity

**current electricity -** the flow of electric charge through a circuit.

**electrostatic force ($F_E$) -** one of the four fundamental forces of the universe; the attraction and repulsion of particles based on their electrical charges; is equal to Coulomb's constant times the magnitude of two charges divided by the distance between the charges, squared.

**static electricity -** the accumulation of electric charge on the surface of or within a material.

### 5B: Static Electricity

**conduction -** the transfer of charge by direct contact.

**conductor -** a material electrons can easily travel across.

**charging by friction -** the transfer of electrons by two objects being rubbed together.

**electrostatic force ($F_E$) -** one of the four fundamental forces of the universe; the attraction and repulsion of particles based on their electrical charges; is equal to Coulomb's constant times the magnitude of two charges divided by the distance between the charges, squared.

**induction -** charging a neutral object by bringing a charged object close to, but not touching, the object.

**insulator -** material that resists the movement of charge.

**law of conservation of charge -** electric charge cannot be created or destroyed, but can be transferred from one object to another.

**static electricity -** the accumulation of electric charge on the surface of or within a material.

**triboelectric series -** a list of materials that ranks materials by how easily they give up or receive electrons.

**polarization -** the process of separating opposite charges within an object.

### 5C: Coulomb's Law

**Coulomb's Law -** law devised by Charles Coulomb that explains the factors that affect contribute to the electrostatic force; is equal to Coulomb's constant times the magnitude of two charges divided by the distance between the charges, squared.

**electric field (E) -** a region around a charged particle or charged object within which a force is exerted on other charged particles or charged objects.

**electrostatic force ($F_E$) -** one of the four fundamental forces of the universe; the attraction and repulsion of particles based on their electrical charges; is equal to Coulomb's constant times the magnitude of two charges divided by the distance between the charges, squared.

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### 5D: Electric Potential Energy and Electric Potential

**electric field (E)** - a region around a charged particle or charged object within which a force is exerted on other charged particles or charged objects.

**electric potential (V)** - also known as voltage, the electric potential energy per unit charge; the SI unit is the volt (V).

**electric potential energy ($PE_E$)** - energy stored by electric charges; the energy that a charge in an electric field possesses, which gives it the ability to do work; the SI unit is the joule (J).

**kinetic energy (KE)** - the energy of motion; equal to one half times mass times the square of the velocity of an object.

### 5E: Current Electricity

**current (I)** - the flow of electric charge per unit time; SI unit is the ampere, (A).

**current electricity** - the flow of electric charge.

**electric potential(V)** - also known as voltage, the energy capacity of a unit of charge; the SI unit is the volt (V).

**resistance (R)** - the opposition of a material to the flow of electric current; the SI unit is the ohm (Ω).

**static electricity** - the accumulation of electric charge on the surface of or within a material.

### 5F: Ohm's Law

**circuit** - a closed loop through which electrical charges can continuously flow.

**current (I)** - the flow of electric charge per unit time; SI unit is the ampere, (A).

**electric potential (V)** - also known as voltage, the energy capacity of a unit of charge; the SI unit is the volt (V).

**Ohm's Law** - law formulated by Georg Ohm that relates current, voltage, and resistance within a circuit; voltage is equal to current times resistance.

**resistance (R)** - the opposition of a material to the flow of electric current; the SI unit is the ohm (Ω).

### 5G: Series Circuits

**closed circuit** - a circuit with no breaks, in which current can flow continuously.

**equivalent resistance ($R_{eq}$)** - the total resistance of a collection of resistors; for a series circuit, is equal to the sum of the resistances of the individual resistors. For a parallel circuit, the reciprocal of the equivalent resistance is equal to the reciprocal of each of the resistances of the individual resistors.

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## Unit 5: Electricity and Magnetism

### 5G: Series Circuits (continued)

**Ohm's Law** - law formulated by Georg Ohm that relates current, voltage, and resistance within a circuit; voltage is equal to current times resistance.

**open circuit** - a circuit with a break, either a switch or malfunction in which current cannot flow.

**series circuit** - a closed loop in which the current follows a single path.

**voltage drop** - loss of voltage due to resistance.

### 5H: Parallel Circuits

**complex circuit** - a circuit that consists of series and parallel circuit components.

**electric potential (V)** - also known as voltage, the energy capacity of a unit of charge; the SI unit is the volt (V).

**equivalent resistance ($R_{eq}$)** - the total resistance of a collection of resistors; for a series circuit, is equal to the sum of the resistances of the individual resistors. For a parallel circuit, the reciprocal of the equivalent resistance is equal to the reciprocal of each of the resistances of the individual resistors.

**Ohm's Law** - law formulated by Georg Ohm that relates current, voltage, and resistance within a circuit; voltage is equal to current times resistance.

**parallel circuit** - a closed circuit in which the current divides into two or more paths before recombining to complete the circuit.

### 5I: Electrical Power

**efficiency** - ratio of the total energy output divided by the energy input into a device.

**electric power (P)** - the electrical work done per unit time; SI unit is the watt (W).

**electrical work (W)** - the work done on a charged particle by an electric field.

### 5J: Magnetism

**electromagnetism** - the interaction of electric currents or fields with magnetic fields.

**magnetism** - an effect produced by the motion of electric charge, resulting in attractive and repulsive forces between objects.

**magnetic field (B)** - a region around a magnetic material or a moving electric charge within which the force of magnetism acts.

**magnetic force ($F_B$)** - a push or a pull exerted on a moving charge that is equal to the magnitude of that charge multiplied by the velocity of the charge multiplied by the strength of the magnetic field where the charge is located.

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## Unit 5: Electricity and Magnetism

### 5K: Generators and Motors

**alternating current** - current that reverses direction multiple times per second.

**commutation** - the electromechanical process by which direct current is turned into alternating current.

**direct current** - current that runs in only one direction.

**electromagnetic induction** - a phenomenon that creates a current in a circuit when there is relative motion between the wire and the magnetic field.

**Faraday's Law** - a law that predicts how a magnetic field will interact with an electric circuit to produce an electromotive force.

**generators** - devices that convert mechanical energy into electrical energy.

**motors** - devices that convert electrical energy into mechanical energy.

**rotor** - a moving component of an electromagnetic system in an electric motor or generator. Its rotation is due to the interaction between the windings and magnetic fields which produces a torque around the rotor's axis.

**stator** - the stationary component of an electric motor or generator.