

Learning goals: *Students will be able to*

- Use the concepts of static electricity to describe why electrostatic phenomena occur between conductors and insulators.
- Determine if an object is charged or if it simply becomes polarized when a charged object is brought near.
- Calculate the electrostatic force between point charges.
- Calculate the electric field caused by point charges
- Determine the direction of the electrostatic force or the electric field vectors in the above type problems.
- Calculate the electric potential energy of a point charge.
- Calculate the electrostatic potential caused by point charges.
- Solve problems relating to parallel plate capacitors including finding the capacitance, the electric field between the plates, the potential difference or the charge on a plate.

- Determine the equivalent resistance of a circuit consisting of any number of resistors and one battery.
- Determine the voltage, current and power dissipated by each resistor in a single battery circuit.
- Determine the resistance of a light bulb that has only been rated based on its power output in a US household fixture.

- Predict the direction of the magnet field for different locations around a bar magnet and an electromagnet.
- Relate magnetic field strength to distance qualitatively
- If and how charge (moving or stationary) and magnetic fields interact.
- Predict the direction of the magnetic field created by moving charges and the force between two magnetic fields.
- Compare and contrast bar magnets and electromagnets
- Identify the characteristics of electromagnets that are variable and what effects each variable has on the magnetic field's strength and direction.
- Use the right hand rule to determine the direction of the force on a moving charge placed in an external magnetic field.
- Explain what causes magnetic fields and describe different ways that a magnet can be created.