

Tick one box per statement: ☐ not yet ☐ nearly ☐ confident.

8. Electric Charges, Fields, and Gauss's Law

8.1 Electric Charge and Electric Force

- ☐☐☐ Describe the electric force that results from the interactions between charged objects or systems.
- ☐☐☐ Describe the electric and gravitational forces that result from interactions between charged objects with mass.
- ☐☐☐ Describe the electric permittivity of a material or medium.

8.2 Electric Charge and the Process of Charging

- ☐☐☐☐ Describe the behavior of a system using conservation of charge.

8.3 Electric Fields

- Describe the electric field produced by a charged object or configuration of point charges.
- Describe the electric field generated by charged conductors or insulators.

8.4 Electric Fields of Charge Distributions

- Describe the electric field resulting from a given charge distribution.

8.5 Electric Flux

- Describe the electric flux through an arbitrary area or geometric shape.

8.6 Gauss's Law

- ☐☐☐ Describe the properties of a charge distribution by applying Gauss's law.

9. Electric Potential

9.1 Electric Potential Energy

- ☐☐☐ Describe the electric potential energy of a system.

9.2 Electric Potential

- ☐☐☐ Describe the electric potential due to a configuration of charged objects.
- ☐☐☐ Describe the relationship between electric potential and electric field.

9.3 Conservation of Electric Energy

- Describe changes in a system due to a difference in electric potential between two locations.

10. Conductors and Capacitors

10.1 Electrostatics with Conductors

- ☐☐☐ Describe the charge distribution within a conductor.

10.2 Redistribution of Charge Between Conductors

- ☐☐☐ Describe the movement of charge and the resulting interactions when conductors physically contact each other.

10.3 Capacitors

- Describe the physical properties of a parallel-plate capacitor.

10.4 Dielectrics

- Describe how a dielectric inserted between the plates of a capacitor changes the properties of the capacitor.

11. Electric Circuits

11.1 Electric Current

- ☐☐☐ Describe the movement of electric charges through a medium.

11.2 Electric Circuits

- ☐☐☐ Describe the behavior of a circuit.

11.3 Resistance, Resistivity, and Ohm's Law

- ☐☐☐ Describe the resistance of an object using physical properties of that object.
- ☐☐☐ Describe the electrical characteristics of elements of a circuit.

11.4 Electric Power

- Describe the transfer of energy into, out of, or within an electric circuit, in terms of power.

11.5 Compound Direct Current Circuits

- ☐☐☐ Describe the equivalent resistance of multiple resistors connected in a circuit.
- ☐☐☐ Describe a circuit with resistive wires and a battery with internal resistance.
- ☐☐☐ Describe the measurement of current and potential difference in a circuit.

11.6 Kirchhoff's Loop Rule

- Describe a circuit or elements of a circuit by applying Kirchhoff's loop rule.

11.7 Kirchhoff's Junction Rule

- ☐☐☐ Describe a circuit or elements of a circuit by applying Kirchhoff's junction rule.

11.8 Resistor-Capacitor (RC) Circuits - (RC)

- ☐☐☐ Describe the equivalent capacitance of multiple capacitors.

☐☐☐ Describe the behavior of a circuit containing combinations of resistors and capacitors.

12. Magnetic Fields and Electromagnetism

12.1 Magnetic Fields

- ☐☐☐ Describe the properties of a magnetic field.
- ☐☐☐ Describe the magnetic behavior of a material as a result of the configuration of magnetic dipoles in the material.
- ☐☐☐ Describe the magnetic permeability of a material.

12.2 Magnetism and Moving Charges

- ☐☐☐ Describe the magnetic field produced by moving charged objects.
- ☐☐☐ Describe the force exerted on moving charged objects by a magnetic field.

12.3 Magnetic Fields of Current-Carrying Wires and the Biot-Savart Law

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- ☐☐☐ Describe the magnetic field produced by a current-carrying wire.
- ☐☐☐ Describe the force exerted on current-carrying wires by a magnetic field.

12.4 Ampère's Law

- ☐☐☐ Use Ampère's law to describe the magnetic field created by a moving charge carrier.

13. Electromagnetic Induction

13.1 Magnetic Flux

- ☐☐☐ Describe the magnetic flux through an arbitrary area or geometric shape.

13.2 Electromagnetic Induction

- ☐☐☐ Describe the induced electric potential difference resulting from a change in magnetic flux.

13.3 Induced Currents and Magnetic Forces

- ☐☐☐ Describe the force exerted on a conductor due to the interaction between an external magnetic field and an induced current within that conductor.

13.4 Inductance

- ☐☐☐ Describe the physical and electrical properties of an inductor.

13.5 Circuits with Resistors and Inductors (LR Circuits) (LR)

- ☐☐☐ Describe the physical and electrical properties of a circuit containing a combination of resistors and a single inductor.

13.6 Circuits with Capacitors and Inductors (LC Circuits) (LC)

- ☐☐☐ Describe the physical and electrical properties of a circuit containing a combination of capacitors and a single inductor.