

Physics
Electrostatics

This unit will allow each student to:

- a. gain a better understanding of interactions of charged particles and electric fields
- b. continue making proper scientific measurements and calculations
- c. define and properly use all vocabulary
- d. properly apply all terms and concepts in describing/explaining real world examples
- e. continue making and interpreting scientific graphs
- f. teach someone else the concepts discussed
- g. practice proper laboratory safety

This will be accomplished by each student that is able to:

- recognize and relate SI and USCS units of charge, electrical potential energy, electric potential (voltage)
- recognize charge, electrical potential energy, electric potential (voltage) by the units only
- 1. describe the effects of static electricity on matter
- 2. describe charging by friction, conduction, and induction/charge polarization
- 3. use an electroscope to detect the presence of charge; explain how the electroscope detects charge
- 4. explain the process of grounding
- 5. describe the two main purposes of a lightning rod (primary) preventing lightning and (secondary) redirecting lightning
- 6. apply the principle of conservation of charge to an object being charged
- 7. state Coulomb's law
- 8. compare and contrast gravitational forces to electrical forces
- 9. describe the behavior of electrons in conductors v. insulators
- 10. describe and sketch electric fields surrounding single charged particles as well as multiple charged particles
- 11. explain why the interior of a conducting sphere has zero electric field
- 12. describe how a charged particle can possess electrical potential energy
- 13. explain the relationship between electrical potential energy, charge, and electric potential
- 14. describe the purpose and operation of a capacitor
- 15. use a Van de Graaff generator to demonstrate the effects of an electric field
- 16. perform calculations using proper problem solving techniques to determine:
 - (a) electrical force
 - (b) electric potential (aka: voltage)

Textbook Reference – Physics (HMH)

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| Chapters/Sections | 16 | 17.1 |
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Key Terms – *definitions are available at theteterszone.net*

charge, electrical force, **electrically polarized**, **electrostatics**, **grounding**, **conduction**, **conductor**, **electric field**, electroscope, induction, **insulator**, static electricity, Coulomb's law, capacitor, **electric potential**, **electrical potential energy**, voltage

Physics
Electric Current and Circuits

This unit will allow each student to:

- h. gain a better understanding of electric current and circuits
- i. continue making proper scientific measurements and calculations
- j. define and properly use all vocabulary
- k. properly apply all terms and concepts in describing/explaining real world examples
- l. continue making and interpreting scientific graphs
- m. teach someone else the concepts discussed
- n. practice proper laboratory safety

This will be accomplished by each student that is able to:

- recognize and relate SI and USCS units of current, resistance, voltage, and power
- recognize current, resistance, voltage, and power by the units only
- relate the flow of electric charge to potential difference and electric resistance
- identify the source of electric charge in a current carrying wire
- 17.describe the flow of electric charge and electrons through a circuit
- 18.explain the role of a voltage source in producing electric current
- 19.distinguish between dry and wet cells and briefly explain how each produces a potential difference
- 20.compare and contrast the flow of electric charge through a conducting wire to the flow of water through a pipe
- 21.describe how the potential energy of electric charge changes as it flows through a simple circuit
- 22.conceptually relate potential difference, resistance, and current using Ohm's law
- 23. perform calculations using proper problem solving techniques using Ohm's Law and electrical power
- 24.differentiate between series and parallel circuits and list their applications
- 25.identify characteristics of series and parallel circuits
- 26.construct simple electric circuits
- 27.sketch schematic (circuit) diagrams of electric circuits using proper circuit symbols
- 28.determine the equivalent resistance of several resistors wired in series and parallel
- 29.determine the voltage across resistors in series and parallel
- 30.determine the current at various locations in a series and in a parallel circuit
- 31.describe electrical power and energy usage
- 32.distinguish between AC and DC electricity

Textbook Reference – Physics (HMH)

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| Chapters/Sections | 17.3 | 17.4 | 18 |
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Key Terms – *write the definitions of the boldface terms on your own paper, definitions are available at theteterszone.net*

electrical resistance, electric current, voltage, Ohm's law, electrical power, resistor, cell (wet/dry), battery, circuit, parallel circuit, series circuit, alternating current, direct current, schematic (circuit) diagram, voltmeter, ammeter