CP Physics Unit 10 - Circuits

Content Area: **Science**
Course(s): **CP Physics, Accelerated Physics**
Time Period: **Marking Period 4**
Length: **3.5 Weeks**
Status: **Published**

Unit Overview

The ability and nature of charge to move from one location to another is the basis of Electricity. In this unit, we'll explore how this happens, and how we quantify Electricity.

Enduring Understandings

- The internal structure of a system determines many properties of the system.
- Electric charge is a property of an object or system that affects its interactions with other objects or systems containing charge.
- Materials have many macroscopic properties that result from the arrangement and interactions of the atoms and molecules that make up the material.
- A field associates a value of some physical quantity with every point in space. Field models are useful for describing interactions that occur at a distance (long- range forces) as well as a variety of other physical phenomena.
- At the macroscopic level, forces can be categorized as either long-range (action-at-a- distance) forces or contact forces.
- Certain quantities are conserved, in the sense that the changes of those quantities in a given system are always equal to the transfer of that quantity to or from the system by all possible interactions with other systems.
- The electric charge of a system is conserved.
- Physicists often construct a map of isolines connecting points of equal value for some quantity related to a field and use these maps to help visualize the field.

Essential Questions

- What does an electric field describe?
- What is electric charge?
- How do phenomena on the microscopic level affect macroscopic motion?

New Jersey Student Learning Standards (No CCS)

SCI.HS-PS2-4	Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
SCI.HS-PS2-5	Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

Amistad Integration

N/A

Holocaust/Genocide Education

N/A

Interdisciplinary Connections

MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MA.S-ID.B.6a	Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data.
MA.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MA.S-ID.B.6c	Fit a linear function for a scatter plot that suggests a linear association.
MA.S-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
MA.F-BF.A	Build a function that models a relationship between two quantities
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MA.F-LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
MA.F-LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.
MA.A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions

	plotted in the coordinate plane, often forming a curve (which could be a line).

Technology Standards

TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.F.CS1	Identify and define authentic problems and significant questions for investigation.

21st Century Themes/Careers

List specific standards that are relevant
No general statements

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Financial Literacy Integration

N/A

Instructional Strategies & Learning Activities

- Scotch Tape Lab
- Electroscope Lab
- Vann deGraff Generator Demo
- Packet on Electrostatics
- Phet Simulation - Determine how to make a circuit
- Series Circuit Investigation
- Parallel Circuit Investigation
- Complex Circuit Investigation
- Circuit Calculations

Formative Assessments

- Homework (Canvas and/or Written Work)
- Warm-Ups
- Exit Tickets

Summative Assessment

- Quiz on Electrostatics
- Electrostatic and Circuits Test

Benchmark Assessments

- Final Exam

Alternate Assessments

- Modified homework
- Modified quizzes
- Modified tests
- Modified projects

Resources & Technology

- Google docs, spreadsheets, slides
- TI graphing calculator
- document camera
- chromebooks
- Promethean board
- websites: desmos, geogebra, EdPuzzle

- Canvas

BOE Approved Texts

Etkina et al., College Physics: Explore and Apply AP Edition, 2nd Edition ©2019 with Mastering Physics with Pearson eText