

Old Acc Physics Unit 11 - Electricity

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

Course Pacing Guide

| Unit | MP/Trimester | Weeks |
|---|--------------|-------|
| Unit 00 - Mathematical Toolkit and Graphing | 1 | 1 |
| Unit 01 - Constant Velocity | 1 | 2 |
| Unit 02 - Constant Acceleration | 1 | 2.5 |
| Unit 03 - 2D Motion | 1 | 3 |
| Unit 04 - Balanced and Unbalanced Forces | 2 | 4 |
| Unit 05 - Circular Motion | 2 | 2 |
| Unit 06 - Work, Power and Energy | 2 | 3.5 |
| Unit 07 - Impulse and Momentum | 3 | 3 |
| Unit 08 - Rotational Inertia | 3 | 3 |
| Unit 09 - Simple Harmonic Motion | 3 | 2 |
| Unit 10 - Waves and Sound | 3 | 3 |
| Unit 11 - Electrostatics | 4 | 4 |
| Unit 12 - Magnetism | 4 | 3 |

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. |
|---------------|--|

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|----------------|--|
| 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

- Use graphing calculator to explore tables.
- Spend time with modeling problems
- Use problems and activities from book involving modeling problems
- Provide access to online book
- Provide access to book pages and problems through Canvas
- Provide access to review keys
- Use Pearson Quizzes to review and reinforce.
- Provide access to Pearson Review.
- Examview Quizzes to assess HW.

Differentiated Instruction

- Curriculum Map
- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Tiered Learning Targets
- Meaningful Student Voice & Choice
- LMS use
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Goal-Setting & Learning Contracts
- Grouping
- Rubrics
- Learning Through Workstations
- Concept Attainment
- Mentoring

- Assessment Design & Backwards Planning
- Student Interest & Inventory Data

Formative Assessments

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

Summative Assessment

- Quiz
- Unit Test
- Lab(s)

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

Closure

Such as:

- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Have students dramatize a real-life application of a skill.
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Have students fill out a checklist with the objectives for the day.
- Have students complete an exit ticket without putting their name on it. Hand back exit tickets the next day in class and have students correct as a warm up.
- Ask students to write what they learned, and any lingering questions on an "exit ticket". Before they leave class, have them put their exit tickets in a folder or bin labeled either "Got It," "More Practice, Please," or "I Need Some Help!"
- After writing down the learning outcome, ask students to take a card, circle one of the following options, and return the card to you before they leave: "Stop (I'm totally confused. Go (I'm ready to move on.)" or "Proceed with caution (I could use some clarification on . . .)"

ELL

Such as:

- Alternate Responses
- Advance Notes
- Extended Time

- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaries
- Google Translate

*Add to or remove any of these as you see fit.

Special Education

List is not inclusive but may include examples such as:

- Shorten assignments to focus on mastery of key concepts.
- Shorten spelling tests to focus on mastering the most functional words.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student's needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Use a study carrel. (Provide extras so that the student is not singled out.)
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.
- Allow the student to complete an independent project as an alternative test.
- Give progress reports instead of grades.
- Grade spelling separately from content.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for a better grade.
- Average grades out when assignments are reworked, or grade on corrected work.

- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

*Add to or remove any of these as you see fit.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

*Add to or remove any of these as you see fit.

At Risk

Examples may include:

- Use of mnemonics
- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Use of a study carrel
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback

- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart
- Chart progress and maintain data

*Add to or remove any of these as you see fit.

Gifted and Talented

Focus on effort and practice

Offer the Most Difficult First

Offer choice

Speak to Student Interests

Allow G/T students to work together

Encourage risk taking