## Old Acc Physics Unit 02 - Constant Acceleration

| Content Area: | Science |
| :--- | :--- |
| Course(s): | Accelerated Physics |
| Time Period: | Marking Period 1 |
| Length: | $\mathbf{2}$ 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

In this unit students will examine the concept of constant acceleration through use of picture representations (dot diagrams), data tables, graphs, equations, and word descriptions.

## Enduring Understandings

- Acceleration is the rate of change of velocity.
- Differentiate between position, distance, and displacement \& between speed and velocity.
- Analyze situations to determine an object's speed, velocity, position, distance traveled, and displacement.
- Draw and interpret motion maps, position-time graphs, velocity-time graphs and acceleration-time graphs to accurately model the motion of an object moving with constant acceleration.
- Solve problems involving average acceleration.
- Analyze situations and use appropriate problem solving techniques to solve problems involving objects traveling at a constant acceleration.


## Essential Questions

- What can be explained and predicted about things that move with constant acceleration?
- How can we use verbal, graphical, and mathematical models to describe motion?
- How can we apply the constant acceleration particle model to real-world situations?
- What advantages are gained from the use of vectors, as opposed to scalars?


## New Jersey Student Learning Standards (No CCS)

SCI.HS-PS2-1
Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

## Amistad Integration

N/A

Holocaust/Genocide Education
N/A

## Interdisciplinary Connections

Build a function that models a relationship between two quantities
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.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.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.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.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.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.A-REI.B. 4 | Solve quadratic equations in one variable. |
| 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). |
| MA.A-SSE.A.1a | Interpret parts of an expression, such as terms, factors, and coefficients. |

## Technology Standards

TECH.8.1.12.A. 4

TECH.8.1.12.A. 5

TECH.8.1.12.A.CS1
TECH.8.1.12.A.CS2
TECH.8.1.12.B.CS1
TECH.8.1.12.B.CS2
TECH.8.1.12.C.CS1

TECH.8.1.12.C.CS2

TECH.8.1.12.C.CS4
TECH.8.1.12.D.CS1
TECH.8.1.12.D.CS2
TECH.8.1.12.E.CS1
TECH.8.1.12.E.CS3

Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.

Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.

Understand and use technology systems.
Select and use applications effectively and productively.
Apply existing knowledge to generate new ideas, products, or processes.
Create original works as a means of personal or group expression.
Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.

Communicate information and ideas to multiple audiences using a variety of media and formats.

Contribute to project teams to produce original works or solve problems.
Advocate and practice safe, legal, and responsible use of information and technology.
Demonstrate personal responsibility for lifelong learning.
Plan strategies to guide inquiry.
Evaluate and select information sources and digital tools based on the appropriateness for
specific tasks.

TECH.8.1.12.E.CS4
TECH.8.1.12.F.CS1
TECH.8.1.12.F.CS2

Process data and report results.
Identify and define authentic problems and significant questions for investigation.
Plan and manage activities to develop a solution or complete a project.

## 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

- 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.
- 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

- Midterm


## Alternate Assessments

- Modified homework
- Modified quizzes
- Modified tests


## 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-Dictionaires
- 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

