Unit 1: Constant Velocity Motion

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **3 Weeks**
Status: **Published**

Summary

This unit begins with simple descriptions of what physics is, and then gets students into the business of doing science right away. Students will begin with team building, learning how to use the ISLE cycle methodology, and then describing constant velocity motion using multiple representations. The tools of scientific measurement, including significant figures, scientific notation, and units, are integrated into the unit as students learn to describe constant velocity motion. Students will review mathematical tools such as linear equations and slope, with particular emphasis placed on graphical methods. Review of necessary algebra skills will be included as needed.

Revised: July 2026

1	Make sense of problems and persevere in solving them
HS-PS	Physical Science
HS-PS1	Matter and Its Interactions
L.SS.11–12.1.A	Apply the understanding that usage is a matter of convention, can change over time, and place, and is sometimes contested.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
2	Reason abstractly and quantitatively
3	Construct viable arguments and critique the reasoning of others
L.KL.11–12.2.A	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
4	Model with mathematics
5	Use appropriate tools strategically
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
6	Attend to precision
L.VL.11–12.3.D	Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.
W.RW.11–12.7	Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes.
SL.PE.11–12.1.B	Collaborate with peers to promote civil, democratic discussions and decision-making, set clear goals and assessments (e.g., student developed rubrics), and establish individual roles as needed.
SL.PE.11–12.1.D	Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
	Analyzing and Interpreting Data
	Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more

detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

Developing and Using Models

Essential Questions/Enduring Understandings

ESSENTIAL QUESTIONS

How can mathematics be used in conjunction with language to communicate ideas in physics?

How do scientists go about the process of doing science?

ENDURING UNDERSTANDINGS

Mathematics provides a common language to communicate the ideas of Physics across national boundaries and different cultures.

Objectives

Students will be able to give examples of the processes through which physicists construct knowledge.

Students will be able to explain the difference between hypotheses (explanations) and predictions.

Students will be able to define all the vocabulary words.

Students will be able to use the particle model to represent an object. Determine in which situations the particle model is useful.

Students will be able to draw and interpret motion diagrams.

Students will be able to distinguish between displacement, distance, position, and path length.

Students will be able to distinguish between velocity and speed.

Students will be able to measure objects using SI units, and convert from one unit to another.
Students will be able to answer mathematical questions using significant figures.
Students will be able to design a testing experiment and make a prediction of its outcome based on a hypothesis.
Students will be skilled at algebraic functions.
Students will be skilled at knowing and using scientific notation, SI Units and Unit Conversions

Learning Plan

At the beginning of the year, students will be introduced to the Investigative Science Learning Environment (ISLE) cycle, which includes observational experiments, generating hypotheses, coming up with testing experiments and predicting their outcomes, making judgements about their experiments, and applying new scientific knowledge to other circumstances.

Students will practice using the ISLE cycle to answer some or all of the following questions: What makes the sound when a balloon pops? Where does the water on the outside of a cold glass come from? Why does my science teacher have 17 TVs (or tennis rackets, or cameras, or whatever) in their house?

Students will work in small groups throughout the unit to construct multiple representations of motion, including written descriptions, graphs, motion diagrams, and mathematical models (equations).

Hands-on activities include working with battery-powered cars and bean bags to measure how far a car travels each second, acting out descriptions of motion with a group, using manipulatives to add and subtract vectors, and predicting where two cars will meet based on a mathematical model of their motion (Where Will the Cars Meet? Formal Lab).

Computer based activities include use of Universe and More Motion Mapper (online) and the Moving Man simulation at PhET (online).

Assessment

Formative Assessment: Students will present work on white boards throughout the unit and will critique the problem solutions of others. Students will complete independent homework assignments that will be reviewed in class and allow for self-assessment of progress.

Summative Assessment: Students will complete a formal lab report (ex Toy Car Lab or Where Will the Cars Meet?) End of chapter test.

Benchmark Assessment: midterm exam

Alternate Assessment: Project or Presentation on Motion

Materials

Computer with PowerPoint or Google Slides and internet access

Textbook PHYSICS: PRINCIPLES AND PROBLEMS, Glencoe

Calculators, Rulers, Metersticks, colored pencils, graph paper, balloons, battery powered constant velocity cars, batteries, bean bags or sugar packets, digital scales, ice, access to water, small bins, paper bags, plastic produce bags, pins

Integrated Accommodation and Modifications

FOR SPECIAL EDUCATION STUDENTS , ELL, AT RISK AND STUDENTS GIFTED STUDENTS

https://docs.google.com/spreadsheets/d/18XhAi7Rm-E8LJwO4uMQS7ZEh0dh3NxYbTFH2IoHLH7Y/edit?usp=sharing