Unit 01: Introduction to Physics and methods of science

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **1-2 Weeks**
Status: **Published**

Summary

This unit introduces physics as a branch of science and explores tools and methods of scientific inquiry. The roles of scientific measurement, units, and error are discussed and applied. Students will learn mathematical techniques of data analysis, with particular emphasis placed on graphical methods.

Revised July 2022

Standards

9.4.12.CI	Creativity and Innovation
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
9.4.12.DC.7	Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a).
8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.

Essential Questions/Enduring Understandings

Essential Questions

- What are the methods of science?

- What are some of the tools of data analysis?

- What is physics?

Enduring Understanding

- Physics is an experimental science that tries to describe the physical world in the language of mathematics

- Data analysis is critical in helping scientists interpret the results of experiments

Objectives

- Students will know the experimental method

- Students will know the areas of physics

- Students will know the SI system of units

- Students will be skilled at estimating the error in measurements

- Students will be skilled at using the scientific method to test hypotheses

- Students will be skilled at converting for English to SI units

- Students will be skilled at collecting data

- Students will be skilled at graphical methods for analyzing data

- Students will be skilled at making lines of best fit to data

- Students will be skilled at finding the slope of a line

Learning Plan

- Discussion: What is science and what are the methods of science

- Video clip: "The Cosmos: Eratosthenes"

- Demonstrations: Areas of Physics

- Teacher presentation: What are measurements, systems of units, and experimental errors?

- Lab Activity: Making measurements in the lab and estimating error

- Video: "The Mechanical Universe: Introduction"

- Lab: The temperature of ice water: Collecting and graphing data

- Teacher presentation: graphical methods and analysis

- Cooperative problem solving: unit conversions and graphs

Assessment

Formative:

Do Now Questions

Exit Ticket Questions

Whole Class Discussion Participation

Small Group Discussion Participation

Individual Student Questions/Responses

Independent Tasks (*Unit conversions, graphing tasks*)

Lab Experiments (*Making measurements in the lab and estimating error*)

Quizzes

Summative:

Lab Report (*The temperature of ice water: Collecting and graphing data)*

Unit Test

Benchmark:

Honors Physics Midterm Exam

Alternative Assessments:

Guided Formal Lab Report

Unit Study Guide

Materials

Textbook PHYSICS: PRINCIPLES WITH APPLICATIONS 6th Edition GIANCOLI, PEARSON

Mechanical Universe Video Series

Equipment for Demos

Lab Equipment: Rulers, Balance, Stopwatch, Thermometers, Beakers, Ice

Computer / Smart board

¼ inch graph paper

Phet Simulations

Integrated Accommodation and Modifications

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

https://docs.google.com/spreadsheets/d/1XVU7bji7iOgH8W9w9PLxDox44Da1R1oCxiSeoIztRGQ/edit?usp=sharing