Introduction: Laboratory & Mathematics

Unit: Laboratory & Mathematics

Note that the topics of laboratory experiments, experimental design, uncertainty, solving word problems, vector math, and trigonometry are covered in the Physics 1 notes, and are not repeated here.

Topics covered in this chapter:

The purpose of this chapter is to teach prerequisite skills that will be used later in the course.

- *The AP® Physics Science Practices* lists & describes the scientific practices that are required by the College Board for AP® Physics 2.

- *Vectors*, *Vectors vs. Scalars in Physics*, and *Vector Multiplication* describe properties of vectors and how mathematics with vectors works.

- *Logarithms* is a review of the base 10 and natural logarithm functions.

Calculating uncertainty (instead of relying on significant figures) is a new and challenging skill that will be used in lab write-ups throughout the year.

Standards addressed in this chapter:

NGSS Standards/MA Curriculum Frameworks (2016):

This chapter addresses the following MA science and engineering practices:

Practice 1: Asking Questions and Defining Problems

Practice 2: Developing and Using Models

Practice 3: Planning and Carrying Out Investigations

Practice 4: Analyzing and Interpreting Data

Practice 6: Constructing Explanations and Designing Solutions

Practice 7: Engaging in Argument from Evidence

Practice 8: Obtaining, Evaluating, and Communicating Information

AP®

AP® Physics 2 Science Practices (2024):

This chapter addresses the following AP Physics 1 science practices:

SP 4.1 The student can justify the selection of the kind of data needed to answer a particular scientific question.

SP 4.2 The student can design a plan for collecting data to answer a particular scientific question.

SP 4.3 The student can collect data to answer a particular scientific question.

SP 4.4 The student can evaluate sources of data to answer a particular scientific question.

SP 5.1 The student can analyze data to identify patterns or relationships.

SP 5.2 The student can refine observations and measurements based on data analysis.

SP 5.3 The student can evaluate the evidence provided by data sets in relation to a particular scientific question.

Skills learned & applied in this chapter:

- Working with exponential and logarithmic functions.

Prerequisite Skills:

These are the mathematical understandings that are necessary for Physics 1 that are taught in the MA Curriculum Frameworks for Mathematics.

- Construct and use tables and graphs to interpret data sets.
- Solve simple algebraic expressions.
- Perform basic statistical procedures to analyze the center and spread of data.
- Measure with accuracy and precision (*e.g.,* length, volume, mass, temperature, time)
- Convert within a unit (*e.g.,* centimeters to meters).
- Use common prefixes such as milli-, centi-, and kilo-.
- Use scientific notation, where appropriate.
- Use ratio and proportion to solve problems.

Fluency in all of these understandings is a prerequisite for this course. Students who lack this fluency may have difficulty passing the class.