Introduction: Laboratory & Measurement

Unit: Laboratory & Measurement

Topics covered in this chapter:

The purpose of this chapter is to teach skills necessary for designing and carrying out laboratory experiments, recording data, and writing summaries of the experiment in different formats.

- *The Scientific Method* describes scientific thinking and how it applies to physics and to this course.
- *The AP® Physics Science Practices* lists & describes the scientific practices that are required by the College Board for an AP® Physics course.
- *Designing & Performing Experiments* discusses strategies for coming up with your own experiments and carrying them out.
- *Random vs. Systematic Error, Uncertainty & Error Analysis,* and *Significant Figures* discuss techniques for estimating how closely measured data can quantitatively predict an outcome.
- *Graphical Solutions (Linearization)* discusses strategies for turning a relationship into a linear equation and using the slope of a best-fit line to represent the quantity of interest.
- *Keeping a Laboratory Notebook, Internal Laboratory Reports,* and *Formal Laboratory Reports* discuss ways in which you might record and communicate (write up) your laboratory experiments.

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.

Use this space for summary and/or additional notes:

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 1 Learning Objectives/Essential Knowledge (2024):

This chapter addresses the following AP® Physics 1 science practices:

1.A Create diagrams, tables, charts, or schematics to represent physical situations.

1.B Create quantitative graphs with appropriate scales and units, including plotting data.

2.A Derive a symbolic expression from known quantities by selecting and following a logical mathematical pathway.

2.B Calculate or estimate an unknown quantity with units from known quantities, by selecting and following a logical computational pathway.

3.A Create experimental procedures that are appropriate for a given scientific question.

3.B Apply an appropriate law, definition, theoretical relationship, or model to make a claim.

3.C Justify or support a claim using evidence from experimental data, physical representations, or physical principles or laws.

Skills learned & applied in this chapter:

- Designing laboratory experiments
- Estimating uncertainty in measurements
- Propagating uncertainty through calculations
- Writing up lab experiments

Use this space for summary and/or additional notes: