

CHAPTER OVERVIEW

2: Comparing Model and Experiment

Learning Objectives

- Be able to estimate orders of magnitude.
- Understand units.
- Understand the process of building a model and performing an experiment.
- Understand uncertainties in experiments.

In this chapter, we will learn about the process of doing science and lay the foundations for developing skills that will be of use throughout your scientific careers. In particular, we will start to learn how to test a model with an experiment, as well as learn to estimate whether a given result or model makes sense.

Prelude

Newton's Universal Theory of Gravity predicts that objects near the surface of the Earth will fall with an acceleration of 9.8 m/s^2 . Your friend reports that they have measured the acceleration of a falling ball and found that it was $(9.0 \pm 0.5) \text{ m/s}^2$. Does their result invalidate the prediction from Newton's Theory?

- A. Yes, since the range $(9.0 \pm 0.5) \text{ m/s}^2$ does not include 9.8 m/s^2 .
- B. Not necessarily, as it depends on whether your friend correctly determined the uncertainty in their measurement.
- C. Definitely not, since Newton's Universal Theory of Gravity has been confirmed by many experiments.

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