

One of the key elements in science is the ability to make and test quantitative predictions. Often, the initial prediction is no better than an intuitive guess. As one makes measurements based on the predictions, these measurements are used to refine the initial prediction, and hopefully, the results eventually produce a robust model that has powerful predictive power. Sometimes, the initial guess is a well-formed hypothesis that is based on previous experiments or experience.

In this assignment, you will use a relatively simple system to practice the elements of a scientific experiment by studying the period of a pendulum. In this case, your pendulum will consist of a relatively small object on the end of a string (or other means of swinging the object). The period of a pendulum is defined as the time it takes to swing from one side to the other and back again. This is an activity that you should be able to accomplish using materials found around the house.

The question that will be tested is: How does the period of the pendulum depend on the mass of the object that is swinging? (Once you finish this study, I encourage you to explore other aspects of the pendulum, such as the dependence on the length or amplitude of the swing. If you do, please report these in your journal.)

The assignment involves the following parts:

- 1** On the Pendulum Forum, make a prediction and explain your reasoning. Ideally, your prediction should contain a quantitative element, such as, if I double the mass, the period will double. However, depending on your experiences and reasoning, you may only be able to make a qualitative prediction, such as if I decrease the mass the period increases. Once you have made a prediction, you will be able to view the predictions of the other students.
- 2** For full credit on this assignment, you must test your prediction by carrying out the experiment. Keep in mind issues of accuracy and precision as you develop a quantitative test of your prediction. You will have a Journal associated with this assignment. In your journal, you must keep a detailed record of your experiments. A key criterion for the grading of the journal will be whether or not another student could use it to reproduce your results.
- 3** You will also present your results on the Pendulum Forum. This will represent an open discussion of the results and will hopefully model the process of discussion of results within the scientific community. As the results for each person are presented, comment on possible reasons for the results that are obtained.