

# Scientific Inquiry

## Objective

This lab is designed to demonstrate how to incorporate a systematic approach to investigate a physical problem.

## Materials

1. 1-meter stick
2. 2-meter stick
3. Paper clips
4. Pendulum bobs (box of 12)
5. Protractor
6. Stopwatch
7. String and scissors for room
8. Table clamp and rod (tall)
9. Three-hole bracket clamp
10. Triple-beam balance

## Introduction

Scientific inquiry involves using the processes of science such as observing, describing, measuring, questioning, hypothesizing, designing experiments, and gathering and interpreting data. You will use a simple pendulum to experimentally determine the factors affecting the time for one complete oscillation of the pendulum, the period of the pendulum.

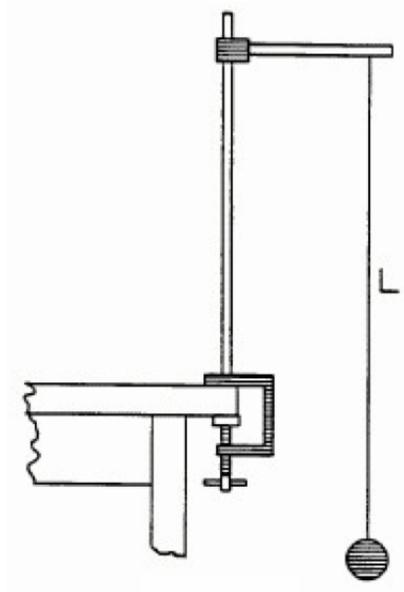
In an experiment there are factors that may vary or change within a system. These factors are called *variables*. Variables are measurable properties. Variables that are controlled by the experimenter are called *independent variables*. A variable that is allowed to respond to the independent variable is called the *dependent variable*. Only one independent variable should be tested at a time; all other dependent variables must be held constant.

A *hypothesis* is a predictive statement typically relating an independent variable to a dependent variable. A hypothesis provides direction for the collection of data. Analysis of data collected will provide the basis for rejection or non-rejection of a hypothesis. [Q1] Why should the term “prove” not be used?

## Procedure

1. [D1] List all factors that you think may affect the period of the pendulum. [Q2] What is the dependent variable in this experiment?

2. [D2] State a hypothesis for each factor listed.
3. [D3] Write the procedure you will follow for testing each hypothesis. Identify the independent variable to be tested and the variables that will be held constant.
4. Using the materials provided and your procedure, gather data needed to determine the relationship between variables. See Figure 1 for an illustration of how to set up the pendulum apparatus. When measuring the period of the pendulum, be sure that you use a wide range in your variables and create several data points for each variable (five or more).



**Figure 1:** *Apparatus*

5. Graph the data you have collected and state what relationship exists between variables as determined experimentally.
6. [D4] Make a statement about each of your hypotheses based on an analysis of your data.