

Purpose/Objectives:

You have been given a sealed box that contains three objects. You have also been given an identical but empty box and a tray with an assortment of objects that may have been used to fill the mystery box. Using these objects and the scientific method, you will work with your lab partners to try to determine the contents of your mystery box without opening it.

By the end of this exercise, you should be able to:

- Explain the scientific investigation method and apply it to examples.
- Identify and describe questions that can be answered scientifically.
- Explain what distinguishes a good scientific hypothesis.
- Define, give examples of, and identify dependent and independent variables.

Background:

Whether you realize it or not, you use the process or method of scientific investigation to learn about yourself and the world around you. Scientists use this method of investigation to construct new knowledge as well. Usually the scientific process begins with a problem or question about an **observation**. Only questions that can be answered by making observations and gathering evidence can be solved using scientific investigation.

Once a question is identified, a testable explanation or **hypothesis** must be proposed. The scientific process requires that we test our hypotheses either experimentally or by further observation. Since a broad generalization is very difficult to test, one way to test a hypothesis is to make a specific **prediction** based on the general hypothesis.

Testing a hypothesis with scientific investigation allows us to gather evidence, or **data**, that will either support or contradict the hypothesis. To ensure that the test is reliable, a good scientific experiment has several important elements, including: one **independent** (manipulated) variable, one **dependent** (responding) variable, standardized variables, **controls**, and **replication**.