

# Types of Investigations

for more information see page 932 in the textbook

Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." Science is more than facts that you find in textbooks. It is a way of observing, a way of thinking, and a way of knowing about the world. Science is a process. The goal of science is to provide explanations for events that happen in nature. Scientists use those explanations to understand patterns in nature and make production about future events. Scientists use three types of investigations to research and develop explanations.

Much of science is conducted with investigations using observations that result in descriptive findings. This type of study is called **descriptive investigations**. Astronomers, meteorologists, and geologists often conduct descriptive investigations. Classification of leaves is an example of a descriptive investigation. Observing animal behavior in nature is another example. Descriptive investigations use careful observations and measurements to develop findings. Science journals, science logs, and field notebooks are some of the tools scientists use to gather information for descriptive investigations.

**Comparative investigations** involve collecting data on different organisms, objects, features, or collecting data under different conditions (e.g., times of year, temperatures, locations) to make comparisons. Identifying the boiling points of three different liquids, or using a hand lens to observe the external anatomy of 2 different insects are examples of comparative investigations.

**Experimental investigations** are investigations that scientists use to change a variable to determine the effect on other variables. The classic example is "What is the affect of light color on plant growth?" In this experiment, the variable color of light is changed by the student. The student may compare red light to green light. The thing the scientist modifies is identified as the **independent variable**. Another classic example is "What is the affect of refrigeration on popcorn popping?" In this experiment, student's pop popcorn that has been refrigerated compared to popcorn that has been left out in a warm dry place for a number of days.

In these investigations it is important to keep all other variables constant. In the examples above, it would not be a fair test if the plants under the green light received a different amount of water or if the popcorn in the refrigerator was a different brand. The things in an experiment that are kept the same are identified at the **controls**.

In investigation the things that change, amount of plant growth or number of kernels that pop are identified as the **dependent variable**.

This year in Biology, you will use all three types of investigation to study and explore the living world!

Unit 1 Notes: Nature of Science

Title: Types of Scientific Investigation

Date:

Essential Question: What are the 3 types of scientific investigation?

1.

2.

3.

## Types of Scientific Investigation & Examples

<b>Descriptive</b>	<b>Comparative</b>	<b>Experimental</b>

Classifying various food items as carbohydrates, proteins or lipids	Using a microscope to observe and draw an onion cell
Using a microscope to identify similarities and differences between onion and cheek cells	Counting the number of stomata on 2 different types of leaves
Placing 3 different size pieces of potato into hydrogen peroxide to determine which size produces more bubbles	Measuring the transpiration rate of three plants with different amounts of leaves to determine how surface area affects the amount of water lost.

Descriptive Investigation	Descriptive Investigation
Comparative Investigation	Comparative Investigation
Experimental Investigation	Experimental Investigation