# Assignment Summary

For this assignment, you will follow experimental design principles to design your own investigation. You will develop a scientific question, formulate a hypothesis, write a null hypothesis if applicable, and identify the evidence and reasoning used to formulate the hypothesis. You will then describe the details of your investigation, including the set-up, materials, variables, procedure, and data collection.

Background Information

When scientists conduct an investigation, they follow the scientific method, which is a set of steps used in scientific inquiry to address a problem or answer a question. The scientific method is a framework for investigation, and there are variations in the method, depending on the nature of the investigation. The steps of the framework are as follows: make observations, ask a question, formulate a hypothesis, conduct an experiment, analyze the results, and draw conclusions. When scientists make observations, they use inductive reasoning, a process in whichmany individual observations are used to make a generalization. When they ask a scientific question, the question must be one that can be answered by using data gathered from the investigation. A hypothesis is a possible answer to the scientific question that has been developed and can be disproved or supported, but it cannot be proven. A null hypothesis is sometimes developed, and it states that there is no relationship between the variables. When scientists design an experiment, they must identify factors that could affect the outcome of the experiment. A variable is any factor that can have more than one value. In a scientific experiment, there are two important variables – the independent variable and the dependent variable. The independent variable is the factor that is tested. Its value is purposely changed by the investigator to find out how it affects the dependent variable. The dependent variable is the factor that is observed or measured during the experiment. Data are information that is collected in an investigation. Data may be quantitative or qualitative. Quantitative data are data that includes numbers, and quantitative data is descriptive in nature. When conducting an experiment, data that are collected must distinguish a difference in the dependent variable that is caused by a change in the independent variable. In many scientific investigations, it is essential that only one condition, the independent variable, changes, while all other conditions are kept constant. There are some exceptions, including field investigations in which organisms are studied in their natural environment or straightforward research investigations in which existing evidence is gathered through literature research. Many experiments have a control group, which is used to help interpret the results of the experiment. In contrast to the experimental group, the control group does not receive the variable being tested, the independent variable. Not all experiments can have a control group for baseline comparisons

# Assignment Instructions

For this project, you are expected to submit a complete Scientific Inquiry Guide with the following components:

1. An investigative question.
2. A hypothesis, including a null hypothesis if applicable.
3. A description of the experimental set-up. Draw, label, and describe the set-up.
4. A list of materials needed.
5. A description of the independent variable that is detailed and identifies logical levels and increments of the independent variable to be tested.
6. A description of the dependent variable that is quantitative and has a unit of measure associated with it.
7. A description of the constants, and how they will be controlled.
8. A summary of the procedure.
9. A description of the data collection method and a justification for the method.

**Step 1: Prepare for the project.**

1. Read through the guide before you begin so you know the expectations for this project.
2. If there is anything that is not clear to you, be sure to ask your teacher.

**Step 2: Design an investigation of your choice using the experimental design principles that you have learned about.**

**Step 3: Evaluate your project using this checklist.**

If you can check off each box below, you are ready to submit your project.

* Did you write an investigative question that can be tested?
* Did you write a description of the experimental set-up.
* Did you make a list of the materials needed?
* Did you write a description of the independent and dependent variables?
* Did you write a description of the constants?
* Did you write a summary of the procedure?
* Did you write a description of the data collection method and a justification for the method?
* Did you complete all parts of the Scientific Inquiry Guide?

**Step 4: Revise and submit your project.**

1. If you were unable to check off all of the requirements in the checklist, go back and make sure that your project is complete. Be sure to save your project before submitting it.
2. Turn in your completed Scientific Inquiry Guide to your teacher. Make sure that your name is on it.
3. Submit your completed Scientific Inquiry Guide through the virtual classroom.
4. Congratulations! You have completed your project.