

THE SCIENTIFIC METHOD

The scientific method is a step by step process of answering questions about our world. It began to be formulated when attempting to study the theory of Spontaneous Generation. This theory was believed over many centuries until scientists performed experiments to disprove the idea of living things just spontaneously appearing. We still use the scientific method today to ask questions, test those questions and conclude our answers based on the actual results. The steps to the scientific method is listed below.

Observe our world

Any questions will begin with observation of something in our world. We tend to question things that we are introduced to which will lead us to research.

Research the topic

We use research to find out a little more about the topic that interest us. This can lead us to test some things about our topic.

What is a Hypothesis?

A hypothesis is more than just a guess. It's a testable idea based on observation. People often describe hypotheses as "educated guesses." You might make an uneducated guess that chocolate milk comes from chocolate cows. This guess would not be based on observation.

After observing cows or the milk industry for a while, though, you might hypothesize—make an educated guess—that chocolate milk is made of regular milk mixed with chocolate powder or syrup. Then, you'd have to test the hypothesis!

Why Do Experiments?

All experiments are carried out according to the scientific method. That's the process by which new ideas are tested through experimentation. In order to follow the scientific method, all experiments have to be repeatable—that is, anyone should be able to run the same experiment and reach the same or similar conclusions.

The scientific method is the best way that humans have devised to measure the world around us. Experiments tell us whether or not certain observations are backed up by the facts.

Variables

A **control** (or "controlled variable") is/are the parts of the experiment that could change but DOES NOT CHANGE.

For example, let's say you wanted to run an experiment to see how water affects plant growth. So you obtain three identical plants. You plant them in the exact same type of soil, and expose all three to the exact same amount of sunlight every day. The only difference is that one plant is watered once a day, the second plant is watered twice a day, and the third plant is watered three times a day. At the end of the experiment, you found that the plant that was watered twice a day grew bigger and faster than the plants that were watered once a day and three times a day.

All aspects of this experiment are controlled variables with the exception of the amount of water given.

Independent and Dependent Variables

An independent variable is the variable that is changed in a scientific experiment.

A dependent variable is the variable being tested in a scientific experiment. (How big the plant will get). The thing you are measuring.

The dependent variable is 'dependent' on the independent variable. As the experimenter changes the independent variable, the change in the dependent variable is observed and recorded.

For example, a scientist wants to see if the brightness of light has any effect on a moth being attracted to the light. How bright the light is changed by the scientist. This would be the independent variable. How the moth reacts to the different light levels would be the dependent variable.

Conclusion

The experiment will give you data. The data should be analyzed and a conclusion should be formulated based on your hypothesis. In the scientific world, a report is usually generated to report the findings. Integrity must be maintained in any report findings or your reputation as a scientist will be ruined. Also, this can set the world of science back instead of moving us forward. Science is always looking to move forward in its knowledge and experience.

Observation

Research

Hypothesis

Experiment

Conclusion

Theory

Law

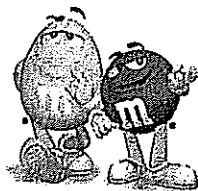
Name: _____

Date: _____

Life Science

Period: _____

Scientific Method: *M&M Lab*



The **scientific method** is a way to think about problems and a way to solve them. Scientists do not always follow the steps of the scientific method in order. However, after a problem is solved, a scientist can use the scientific method to explain how the solution was reached.

The **scientific method** can be broken down into the following parts:

1. State the problem.
2. Gather information on the topic.
3. Form a hypothesis.
4. Experiment!
5. Record and analyze data.
6. State a conclusion.

INTRODUCTION

In this activity, you will follow the steps of the **scientific method** to discover how many candies of each color are in one bag of M&Ms. It will show you how scientists record **data** on charts, make graphs, and draw **conclusions**. Do not eat any of the candies until you are permitted, because it will affect your results. Do not open the bag until you are instructed to do so.

OBJECTIVES

1. Name and describe the steps of the scientific method.
2. Follow the steps of the scientific method to solve a problem.
3. Record data in a table or chart.
4. Construct a graph that shows the results of the investigation.

MATERIALS

- 1 ' 3" bag of M&Ms
- Colored pencils to match M&M colors
- Pencil

DIRECTIONS

1. State the **problem**: (*Hint – What are you trying to find out?*)

Color	Frequency (how many)	Percentage
Total:		100%

- Title: _____

[illegible]

On the lines below, form a **paragraph** that answers the problem you looked to solve in the M&M lab. Your paragraph should include:

- [illegible]