



## **Scientific Method: Notes**

### **In this lesson...**

- Science
- Scientific Method

### **Science:**

- The **study of the physical and natural world through observations and experiments**
- Includes **biology** (studies of organisms: all life on Earth), **chemistry** (studies of the properties of substances: chemicals, air), and **physics** (studies of the physical world and how it works: motion, magnetism)

### **Scientific Method:**

1. Ask a question
  - a. **Find a problem regarding the science field**
  - b. e.g.- What is the effect of acids on mold growth?
  - c. Always write a question about the effect of something on another
2. Do background research
  - a. For accurate scientific information, **look for scholarly and peer review sources for your information.**
  - b. Your school may pay for a service that gives you access to peer reviewed papers, such as jstor. You can also look at google scholar, but getting access to scientific journals is best.
3. Come up with your hypothesis
  - a. Your hypothesis is your prediction of what the results will be
  - b. **If blank happens, then blank will happen.**
    - i. **Or**
  - c. **If blank happens, then blank will happen, because blank**
  - d. **If...Then...Because**
4. Test your hypothesis with an experiment
  - a. **You will have to design and then carry out your experiment**
  - b. It is up to you to figure out how to test your hypothesis
5. Analyze data
  - a. **You will have to analyze the data with graphs and charts**
  - b. You should also identify any errors you may have made in your study that may have affected your results



6. Report your data (was your hypothesis right or wrong?)
  - a. **Figure out if your results proved or rejected your hypothesis. If neither happened, your results are inconclusive.**
  - b. You should also think about future studies you can do to improve upon your results.

#### Independent Variables: (Manipulated Variable)

- **The variable that is changed by the experimenter and causes other variables to change.**
  - Example: If you were testing the effect of different acids on the growth of plants, you would use x amount of acids to see the effects of each one of them.
    - Each of the different acids you use is an independent variable

#### Dependent Variables: (Responding Variable)

- **The variable that changes as a result of the independent variable changing.**
  - Example: If you were testing the effect of different acids on the growth of plants, you would use x amount of plants to see the effects of each acid on each plant.
    - The plants growth, which changes as a result of the change in type of acid, would be the dependent variable

#### Control Variable

- **The variable that is used as a reference to the changes in the independent and dependent variable.**
  - Example: If you were testing the effect of different acids on the growth of plants, you would need to test one batch of plants with water.
    - You would use water as a control variable because the acids will cause the plants to grow many different sizes and since you want to see the effect of them, you need to compare the growth to the growth of a regularly watered plant

#### Constants:

- **Parts of the experiment that stay the same**
  - Example: If you were testing the effect of different acids on the growth of plants, variables such as sunlight, amount of acid, and type of plant would be the same.
    - These would be the same because you want your results to be as real, true, and credible as possible.
    - If you didn't give each plant the same amount of sunlight, you don't know that the plant didn't grow because of the acid and not the lack of sunlight.