Scientific Method Notes

1. **The Scientific Method** – a series of steps that helps us find answers to questions in an organized way.

**The Steps:**

1. **Ask a question** – choose only one question to investigate at a time.

Ex: Do fruit flies come from the air or from inside the fruit itself?

1. **Form an hypothesis** – form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as to what you think the

answer will be based on your research of the problem. It is easy to make it an \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ex:

1. **Design a controlled experiment to test the hypothesis**

Controlled experiments contain only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The experimental group is the part of the experiment that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ex:

1. The control group is exactly the same as the experimental group except \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ex:

* The control group allows us to make a comparison to see how the variable affects the experiment.
1. Controls – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Everything in the experiment except the variable.)

Ex:

1. The manipulated variable – what you change/ manipulate in the experiment.

Ex:

1. The responding variable or dependent variable – the variable that changes in response to the experiment (= the data that you are recording).

Ex:

1. **Collect/record data** - obtain quantitative ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ) results.
2. **Analyze data** – use math/statistics to show patterns or relationships in the data.
3. **Make a conclusion** based on your results. The conclusions will either support or not support your hypothesis. Either way you have learned something. But…\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. **Repeat the experiment** -experiments need to be repeated to check for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or to improve results.
5. **Publish results** (if possible)!

**II. What is a Theory?**

A hypothesis that has been tested over and over again so that it has an enormous amount of data to support it can become a theory (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

Theories can be revised over time if new information is discovered – they are not absolute truths!

III. Example of an Experiment

You perform an experiment to find out if bean plants grow taller with natural sunlight or using a UV light bulb.

The Experimental group =

The Control group =

* Comparing the experimental with the control results will tell us \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The controls =

The manipulated variable =

The responding or dependent variable =