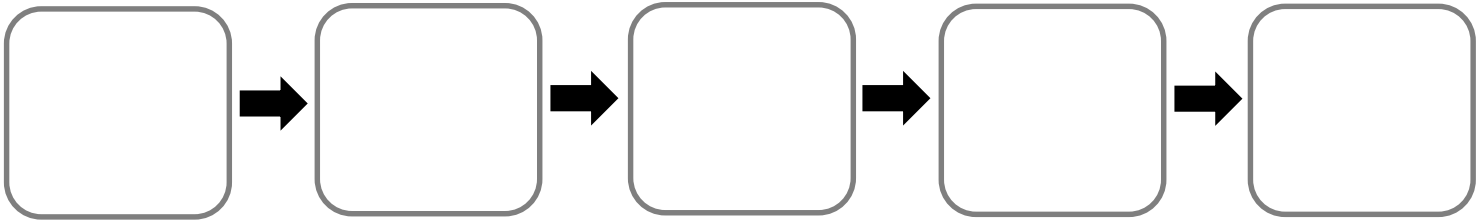Name _____ Date _____ Period _____

Scientific Investigation Notes Organizer

What is the purpose of the scientific method?

Generally speaking, outline the sequence of scientific investigation.

Scientific Method Vocabulary – Fill in this chart as you take notes or Use Ch 1, Section 3 in your book.

VOCABULARY TERM	DEFINITION	EXAMPLE
Observation		
Inference		
Quantitative Data		
Qualitative Data		
Independent Variable		
Dependent Variable		
Control Group		
Experimental Group		

A *hypothesis* is often times written in what format? Why form a hypothesis prior to experimentation?

Explain what it means to say that a good experimental procedure is one that is controlled **and** reproducible**.**

    a. **Controlled** –

    b. **Reproducible** –

An experimental procedure should test <u>one variable</u> at a time. *Defend this statement with an explanation.*

Imagine you are conducting an experiment designed to test the effects of fertilizer on plant growth. Identify the variables in your experiment.

Independent Variable	Dependent Variable	Constant Variables

Summarize the experimental setup
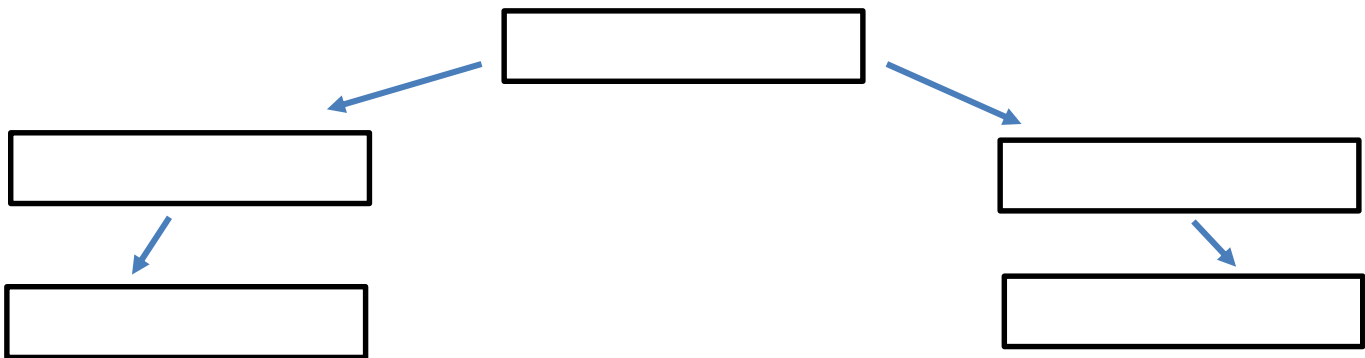
In your opinion, which type of data would you consider <u>"stronger"</u> - and why?

How are the following measured using the metric system?

Mass	Volume	Distance	Temperature

Complete the following: *A good quality conclusion….*

A hypothesis is never proven, it is _____ or _____.

Explain the importance of an experiment being reviews and repeated by other scientists around the world.

Scientific Investigation Identification Practice

Observation vs. Inference – *Identify the following parts as either an observation or an inference.*

1. Kids are walking towards their buses. ____*Observation*____   School must be over. _____*Inference*_____

2. Snakes are laying on the rocks. _____   Snakes need sunlight for warmth _____

3. Susie is cold. _____   Susie is shivering. _____

4. The plant needs water. _____   The leaves are brown on the edges. _____

5. The fish must have died. _____   There are no fish in the aquarium. _____

6. Now you come up with your own…

   Observation: **Inference:**

Quantitative Data vs. Qualitative Data – *See if you can give examples of qualitative and quantitative data.*

7. *Quantitative* **Data**: The room is 16°C.

   Qualitative **Data**: _____*The room is cold!*_____

8. *Qualitative* **Data**: Brandon's heart is beating really fast.

   Quantitative **Data**: _____

9. *Quantitative* **Data**: The plant placed under a yellow light grew 3 cm in one week.

   Qualitative **Data**: _____

10. Now come up with your own…

    Quantitative Data: _____

    Qualitative Data: _____

Identifying Scientific Variables, Graphing Data and Drawing Conclusions

11. Experimental Scenario #1: For her 7th grade science fair experiment, Mrs. Koester asked the question "Are birds more attracted to a certain color of birdseed?" Her experiment involved placing a bird feeder with 5kg of birdseed in the same location each Sunday, leaving it for one week, and then measuring the remaining food. Each week she tested a different color bird seed – natural/not dyed, red, blue and green. Identify the following variables in 7th grade Mrs. Koester's experiment (this is a true story, by the way).

   a. Independent Variable: d. Experimental Group:

   b. Dependent Variable: e. Control (Comparison) Group:

   c. Constant Variables:

12. **Experimental Scenario 2:** A student investigated whether ants dig more tunnels in the light or in the dark. She thought that ants used the filtered light that penetrated the upper layers of earth and would dig more tunnels during the daytime. Ten ant colonies were set up in commercial ant farms with the same number and type of ants per ant farm. The same amount of food was given to each colony, and the colonies were in the same temperature. Five of the colonies were exposed to normal room light and five were covered with black construction paper so they did not receive light. Every other day for three weeks the length of the tunnels was measured in millimeter using a string and a ruler. Averages for the light and dark groups for each measured were then computed. The averages are listed in the following chart.

Length of Tunnels (mm) Constructed by Ants

Day	Light	Dark
1	5	7
3	10	15
5	20	25
7	26	32
9	32	47
11	50	62
13	61	93

Now draw a conclusion regarding how ants build tunnels, using the data chart information.

Remember, a good quality conclusion summarizes the results, answers the question, states if hypothesis is supported or rejected, identifies sources of error, and provides suggestions for future investigations.

13. **Given the following data…**

   a. Calculate the average heart rate (BPM = Beats Per Minute) for each temperature.
   b. Graph the data in a LINE GRAPH (**Include the axis labels, title, and key**). *Hint: you should have four lines, try making each one a different color!*

Temperature (°C)	Trial 1HR (BPM)	Trial 2 (BPM)	Trial 3 (BPM)	Average HR (BPM)
-5	35	41	39	
0	46	45	52	
5	55	55	58	
10	78	68	77	