Name_____   Date_____

Period _____   Number _____

<u>Unit 1 Vocabulary List</u>

1. Science:_____

   _____

2. Physical Science: _____

3. Chemistry: _____

   _____

4. Physics: _____

   _____

5. Scientific method: _____

6. Hypothesis: _____

   _____

7. Observation: _____

8. Interpretation: _____

9. Control group: _____

   _____

10.   Experimental group: _____

   _____

11.   Control factors: _____

   _____

12.   Variable factors: _____

   _____

13.   Independent variable: _____

14.   Dependent variable: _____

Name_____   Date_____
Period _____   Number _____

The Scientific Method Notes

I. **Observations**
   a. An ***observation*** is a _____ of an object or event by using one of the _____.

   b. It is 100% true statement; a ***fact.***

   c. **For example**: _____.

II. **Inferences**
   a. In science, making an **inference** is when a _____ based on information that may not be complete.

   b. You infer something based on factual data.

   c. **Examples of Inferences**:
      1. The grass is wet (factual information) because it rained (inference).
      2. The grass is wet (factual information) because the sprinkler was on (inference).

III. **Hypothesis**
   a. A ***hypothesis*** is an _____ that can be tested to prove or disprove the hypothesis.

   b. A hypothesis is a suggested answer to a problem WITHOUT the support of data.

   c. A hypothesis is made _____ the experiment is performed.

   d. A hypothesis is always written as: **"IF..., THEN..., BECAUSE..."**

   e. For example: **IF** it rained outside, **THEN** the grass will still be wet, **BECAUSE** the sun didn't dry off the water.

IV. **Putting it All Together**
   a. **Observation:** The grass is wet.

   b. **Inference**: The grass is wet because it rained outside.

   c. **Hypothesis**: _____ it rained outside, _____ the grass will still be wet _____ the sun didn't dry off the water.

V. **What is a Theory?**

    a. A ***theory*** is an explanation made with the support of data from an experiment.

    b. A theory is based on complete information but is <u>NOT</u> a fact.

    c. Examples:

        1. Big Bang Theory

        2. Global Warming Theory

        3. Pangaea Theory

VI. **Scientific Method**

    a. The ***scientific methods*** are the ways in which scientists

_____.

    b. There are _____ steps to the scientific method.

VII. **The 6 Steps of the Scientific Method**
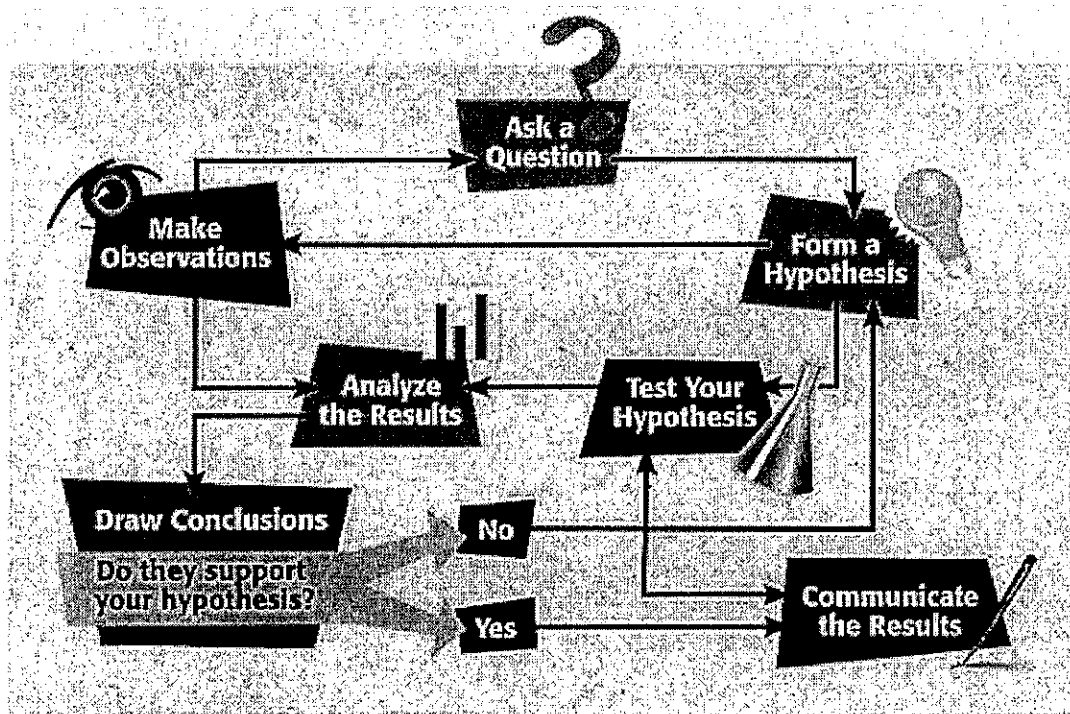
1) **Make an Observation**

    a. Use your _____!

    b. Not all senses have to be used at the same time.

    c. <u>Example</u>-Some plants are taller than others.

2) **Ask a Question**

    a. Pose/ask a question to try to figure out why you observed what you did.

    b. Scientists often ask a question after _____ _____.

    c. <u>Example</u>: Will fertilizers increase the growth rate of plants?

3) **Formulate Hypothesis**, or write or develop a possible explanation for the problem.

    a. NOT a question, always a _____

    b. A hypothesis is a prediction, or an _____

    c. Always written as: "IF..., THEN..., BECAUSE..."

    d. <u>Example</u>: **If** fertilizer is added to trees, **then** the plants will grow faster **because** the added nutrients will speed their growth.

4) **Test Hypothesis**

    a. Design a test that will support or disprove your hypothesis.

    b. The test should be _____ (you conduct the experiment more than once and get the same results every time).

    c. <u>Controlled experiment:</u> A part of your experiment that is not altered so that you can compare changes that occur in the experiment.

        i. **Example**-having 3 plants that are all the same type of plant.

    d. <u>Variables</u> are factors that _____ from group to group in an experiment.

        i. **Example**-changing the _____ _____ that each plant gets.

VIII. **Control Groups**

    a. An experiment needs to be controlled because a scientist needs to determine that the thing they are testing for actually works.

    b. A ***control*** is the standard to which everything is compared.

IX. **Experimental Groups**

    a. The experimental group is the group that _____

_____.

Experimental	Control
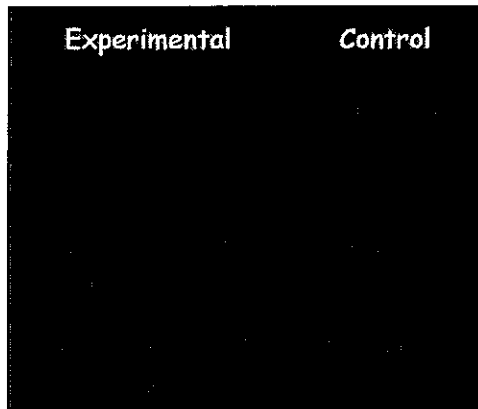
    b. <u>Two types of variables</u>:

        1. **Independent variable**-the variable you **change** in the experiment.

        2. **Dependent variable**- the variable you are measuring.

    c. **Example**: You want to measure the effect of the sun on plant growth.

        What do you change (independent variable)? **amount of sunlight**

        What do you measure (dependent variable)? **growth of plant**

    d. The effect of the **independent variable (sun) on the dependent variable (growth of plants).**

    e. **Examples:**

        1. The effect of <u>sunlight (independent variable)</u> on the <u>growth of plants (dependent variable)</u>.

        2. The effect of <u>cold medicine</u> (_____) on the <u>number of sneezes</u> (_____).

        3. The effect of <u>bleach</u> (_____) on the <u>growth of bacteria</u> (_____).

Group 1   # Group 2

- 3 trees   - 3 trees
- All have same volume of   - All have same volume of
  water and same amount   water, same amount of
  of sunlight   sunlight, and same
                               amount of fertilizer

What's DIFFERENT?

The fertilizer. The fertilizer is the **VARIABLE.**

Group 1   # Group 2

- 3 trees   - 3 trees
- All have same volume of   - All have same volume of
  water and same amount   water, same amount of
  of sunlight   sunlight, and same
                               amount of fertilizer

Which is the **CONTROL**?

A control is the basis for comparison.

GROUP 1 is the control because to find out if the fertilizer worked, you need to compare it with something that doesn't have fertilizer.

Control | Experimental

Control

- 3 trees
- All have same volume of water and same amount of sunlight

> **This is the control because it doesn't have the VARIABLE (the fertilizer).**

Experimental

- All have same volume of water, same amount of sunlight, and same amount of fertilizer

> **Fertilizer is the VARIABLE (different).**

- Fertilizer is the INDEPENDENT VARIABLE
- Growth is the DEPENDENT VARIABLE

> **This is the experimental group because it is why you are doing the experiment.**

5) Analyze/Interpret the Results

    a. After you have measured and recorded information, what do they mean?

    b. Did the trees with the fertilizer (experiment group) grow more than those in the control group (without the fertilizer)?
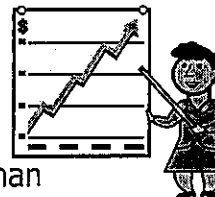
6) Draw Conclusions

    a. Look back at your hypothesis.

    b. Does your data support your hypothesis or reject it?

TURN OVER

X. **What Makes a Good Experiment?**

a. _____
  - i.   Example: 50 people in control and 50 people in the experimental
  - ii. WHY? *More or less people can alter the results of the experiment.*

b. _____
  - i.   The large sample size reduces the possibility that the results are due to chance.

c. _____
  - i.   Every scientist from around the world should be able to repeat your experiment and obtain the exact same results.

Name: _____ Date: _____ Per: _____

Observation Report

Directions: Answer the questions that follow, please be as thorough as possible.

1. Use your sense of hearing to make 4 observations.

   - _____
   - _____
   - _____
   - _____

2. Use your sense of sight to make 4 observations.

   - _____
   - _____
   - _____
   - _____

3. Use your sense of touch to make 4 observations.
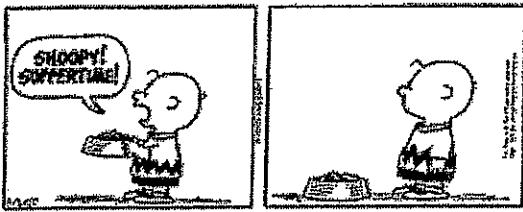
   - _____
   - _____
   - _____
   - _____

4. Use your sense of smell to make 4 observations.

   - _____
   - _____
   - _____
   - _____

5. Use your sense of taste to make 4 observations.

   - _____
   - _____
   - _____
   - _____

6. Define observation.
- _____

7. Define inference.
- _____

8. Define interpretation.
- _____

For each picture below, indicate if the statements that follow are observations, inferences, or interpretations.
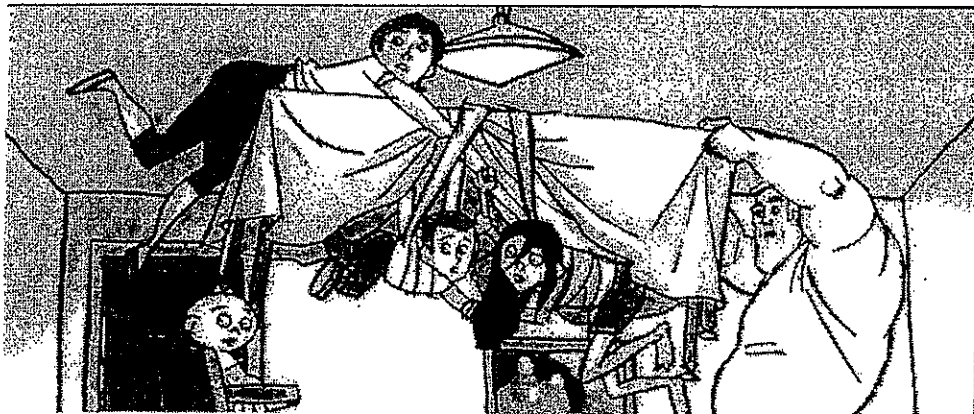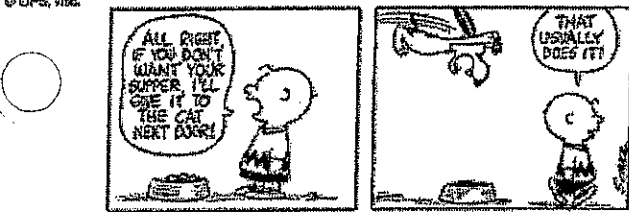

9. Charlie has a stripe on his shirt. _____
10. It is about 5 o'clock pm. _____
11. Charlie yelled for Snoopy. _____
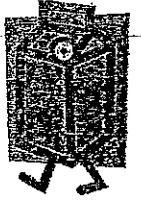12. Snoopy can fly. _____

13. They look like the family from "The Incredibles." _____
14. The father is very strong. _____
15. The baby is in a highchair. _____
16. The family was eating dinner. _____

Observation vs. Inference

Directions: Please read the following scenario and use your knowledge of science and observation and inference. After each statement, place an "O" if it is an **Observation** and an "I" if it is an **Inference**. Good Luck☺

A long time ago milk used to be delivered to peoples homes because they did not have ways to keep the milk cold within the home. One day the milkman delivered two bottles of milk to a doorstop. These bottles were left outside overnight. In the morning, the family in the house found the bottles cracked and the bottle caps were supported on frozen columns of milk.

1. It is winter. _____

2. During the night, the milk expanded and the milk broke the bottles. _____

3. In the morning the milk was solid. _____

4. the temperature dropped below freezing or 32° F. _____

5. In the morning the bottles were cracked. _____

6. Milk expands when it freezes. _____

7. In the morning, the caps were on the top of the milk. _____

8. The same thing would have happened if water was in the bottles. _____

9. The milk was liquid when delivered, but solid in the morning. _____

10. The milkman should have put the milk in the milk box where it belongs. ___

Name: _____ Date: _____ Per: _____

Inferences vs. Observations! (7th)

Sometimes you make decisions based upon your observations; these are often called inferences. Look at the diagrams below. Read the statements next to the diagrams. Based upon what you observe, decide if each statement is an observation or an inference.

1) _____ It is windy.

2) _____ The tree has branches.

3) _____ The tree has roots.

4) _____ The tree is outside.

5) _____ The tree has leaves.

6) _____ The tree has a broken branch.

7) _____ The leaves are green.

8) _____ The tree is growing in dirt.
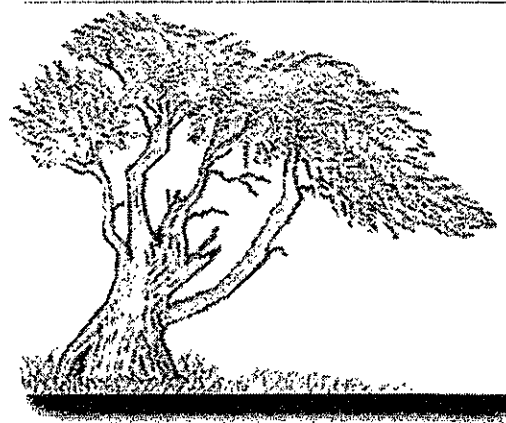
9) _____ The kids are at recess.

10) _____ The kids are outside.

11) _____ The score is tied.

12) _____ They are playing with a soccer ball.

13) _____ There are 4 people on that section of the field.

14) _____ They are having fun.

15) _____ The players are wearing cleats.

16) _____ One person is near the goal.

17) _____ There are trees/bushes in the background.

Name: _____ Period: _____ Date: _____

Observations and Inference Worksheet:

Part 1 Directions: Read the following sentences carefully. Determine if the sentence is an observation, an inference or a prediction. On the line to the left of the sentence write your choice.

_____ 1. The mineral on the table is transparent and smooth.
_____ 2. If I touch the hot pot-handle I will burn my hand.
_____ 3. The stream is not polluted.
_____ 4. It must of rained before because there are many puddles.
_____ 5. The stream velocity (speed) is 20 mph.

Part 2 Directions: Read the following sentences carefully. For each sentence underline the observation and circle the inference.

6. The people down the street must be having a barbecue because the air smells of smoke and burnt chicken.

7. There is a baseball in my driveway and my car windshield is broken. Someone playing ball must have shattered my windshield.

8. The rock has scratches and is very polished. This rock was once carved by a glacier.

Part 3 Directions: Look at the diagram below. Read the statement and determine if it is an observation or and inference. Write your answer on the line to the left.
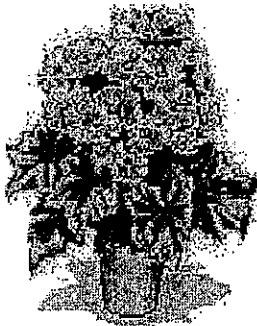
_____ 9. The plant has roots
_____ 10. The plant uses water
_____ 11. The plant has flowers
_____ 12. The plant has stems
_____ 13. The plant grew from a seed

Part 4 Directions: Take a walk around your backyard or neighborhood. Make 3 observations and 3 inferences about nature. Be prepared to share them in class. Use the chart on the back to help organize your ideas.

Name: _____ Period: _____ Date: _____

Nature

	Observations	Inferences
1		
2		
3		

Name:_____ Date:_____

Identify the Controls and Variables

Smithers thinks that a special juice will increase the productivity of workers. He creates two groups of 50 workers each and assigns each group the same task (in this case, they're supposed to staple a set of papers). Group A is given the special juice to drink while they work. Group B is not given the special juice. After an hour, Smithers counts how many stacks of papers each group has made. Group A made 1,587 stacks, Group B made 2,113 stacks.

1. What is the control group? _____
2. What is the experimental group? _____
3. What is the variable? _____
4. What are the control factors? _____
_____

Homer notices that his shower is covered in a strange green slime. His friend Barney tells him that coconut juice will get rid of the green slime. Homer decides to check this this out by spraying half of the shower with coconut juice. He sprays the other half of the shower with water. After 3 days of "treatment" there is no change in the appearance of the green slime on either side of the shower.

1. What is the control group? _____
2. What is the experimental group? _____
3. What is the variable? _____
4. What are the control factors? _____
_____

Bart believes that mice exposed to radiowaves will become extra strong (maybe he's been reading too much Radioactive Man). He decides to perform this experiment by placing 10 mice near a radio for 5 hours. He compared these 10 mice to another 10 mice that had not been exposed. His test consisted of a heavy block of wood that blocked the mouse food. he found that 8 out of 10 of the radiowaved mice were able to push the block away. 7 out of 10 of the other mice were able to do the same.

1. What is the control group? _____
2. What is the experimental group? _____
3. What is the variable? _____
4. What are the control factors? _____
_____

Krusty was told that a certain itching powder was the newest best thing on the market, it even claims to cause 50% longer lasting itches. Interested in this product, he buys the itching powder and compares it to his usual product. One test subject (A) is sprinkled with the original itching powder, and another test subject (B) was sprinkled with the Experimental itching powder. Subject A reported having itches for 30 minutes. Subject B reported to have itches for 45 minutes

1. What is the control group? _____
2. What is the experimental group? _____
3. What is the variable? _____
4. What are the control factors? _____
_____

Experimental Design Ditto

Directions: Read through each example experiment and answer the questions that follow

1. A group of science teachers at Samoset decided to see if textbooks were really necessary to teach science. Two of Mrs. Monnier's classes were given textbooks as usual, and two of her classes got no books. She did the same labs, gave the same tests, and the same lessons. At the end of the school year, the final exam results were compared.

Control Group: _____

Experimental Group:

_____

Independent Variable:

3 Control Factors:

1. _____

2. _____

3. _____

2. Swimsuit manufacturers designed a new bodysuit that they believe will cut down on water resistance, and result in faster times. On Mondays, Wednesdays, and Fridays, the swimmers wore their regular bathing suits for practice. On Tuesdays, Thursdays, and Saturdays, they wore the new bodysuits. Their times were compared. They swam their usual races, with their usual strokes, in their usually pool, at the usual time.

Control Group: _____

Experimental Group:

_____

Independent Variable:

3 Control Factors:

4. _____

5. _____

6. _____

3. Dr. Tomato developed a new brand of fertilizer that he believed would create bigger, juicier, better tasting tomatoes. He divided his land in half. On one half he used his old kind of fertilizer; on the other half he used the new fertilizer. He then planted the usual plants, and watered them equally.
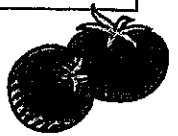
Control Group: _____

Experimental Group:

_____

Independent Variable:

3 Control Factors:

7. _____

8. _____

9. _____

4. Chef Cheesecake wants to test a new improved cheesecake. He makes his usual recipe with cream cheese, and then he makes another one with cheddar cheese. He calls in twenty (20) of his regular customers and gives them a taste test. He baked the cakes for the same amount of time and used the same type of pans that he always does.

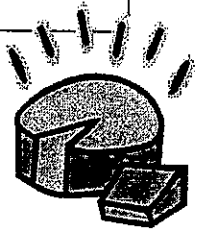Control Group: _____

Experimental Group:

_____

Independent Variable:

3 Control Factors:

10. _____

11. _____

12. _____

5. Sam Painter wanted to test a new brand of paint called "Flake No More." He used his house and painted half of the house with "Flake No More," and the other half with his usual brand called "Really Rotten No Good Paint." He observed the paint for the next three years. (There are no control factors stated in this one, but you can figure them out!)
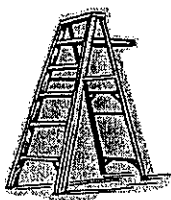
Control Group: _____

Experimental Group:

_____

Independent Variable:

3 Control Factors:

13. _____

14. _____

15. _____

Name_____ Date_____

Period ____ Number____

Unit 1-Intro to Science & Scientific Method
Review Sheet

Directions: Write out each question on an index card. Then, use your notes to find the answers and record the answers on the back of the index card.

REMEMBER TO ALSO STUDY ALL VOCAB WORDS

Section 1 Notes

1. What is the scientific method?
2. What are the steps of the scientific method?
3. What is data?
4. What is a theory?

Section 2 Notes

5. How many variables should you have in a controlled experiment?
6. What 3 things should a good experiment include?
7. Give an example of an observation.
8. Give an example of an inference.

Directions: Answer the questions below on this sheet of paper.

9. Mr. Smith's thinks that a special juice will increase the productivity of his workers. He creates two groups of 50 workers each and assigns each group the same task (in this case, they're supposed to staple a set of paper). Group A is given the special juice to drink while they work. Group B is not given the special juice. After an hour, Mr. Smith's counts how many stacks of papers each group has made. Group A made 1,587 stacks, Group B made 2,113 stacks.

Identify the problem? (What question is Mr. Smith trying to answer?)

_____

_____

Write a hypothesis for this experiment. (Use "If..., then..., because...")

_____

_____

What is the control group? _____

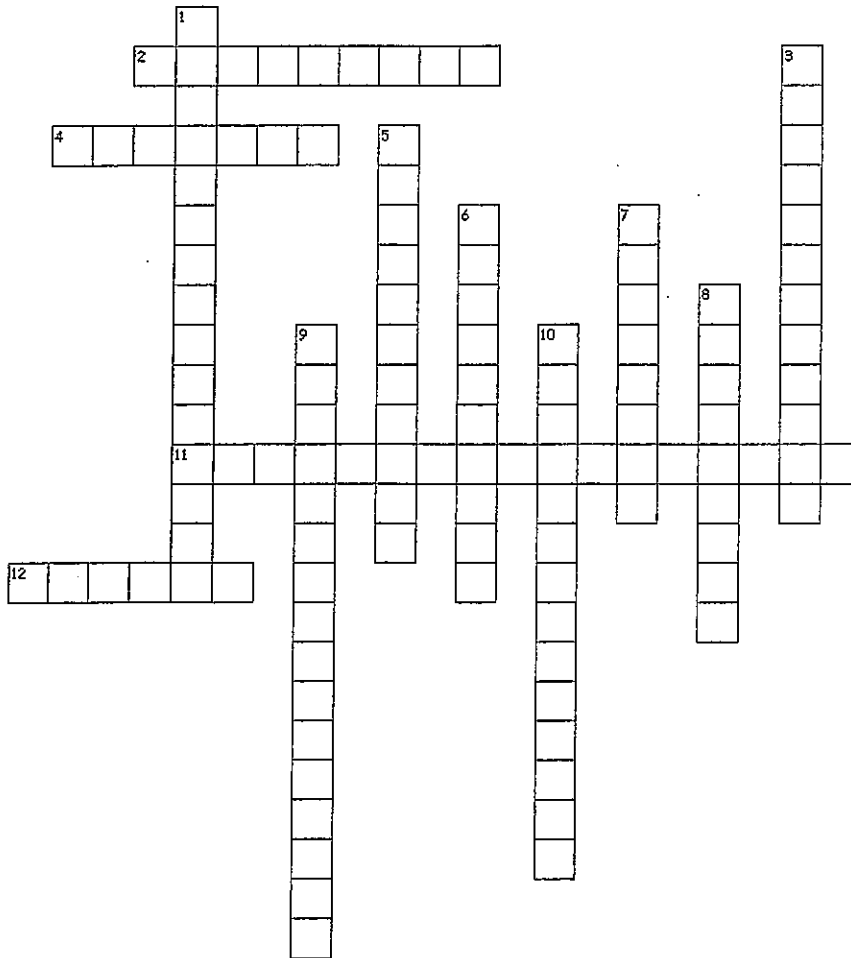Identify 2 control factors (constants).
a. _____
b. _____

What is the experimental group? _____

What is the variable of this experiment? _____

Chapter 1 Scientific Method

Across
2. the study of the forms of matter including how matter interacts with other matter
4. the study of energy and the way that energy affects matter
11. The group(s) in an experiment being tested. It DOES get the variable
12. the "stuff" that everything is made of (solid, liquid or gas)

Down
1. the study of matter and energy (physics and chemistry)
3. It is the group that is most natural in an experiment. It does NOT get the variable (the thing you are testing).
5. uses the 5 senses to describe something
6. an educated guess
7. the factor that changes from group to group in an experiment
8. a conclusion drawn from an observation.
9. a series of steps a scientist follows to solve a problem
10. these factors stay the SAME for all groups in an experiment

12 of 12 words were placed into the puzzle.

Created by Puzzlemaker at DiscoveryEducation.com

DISCOVERY EDUCATION™