

Topic: Scientific Observation Terms	
Questions/Main Ideas:	Name _____ Date _____ Notes/Details:
What is a qualitative observation?	Observation that uses only words to describe something. <ul style="list-style-type: none"> The puppy is soft and brown.
What is a quantitative observation?	Observation that uses numbers as well as words to describe how much of something there is. <ul style="list-style-type: none"> The puppy is <u>32</u> cm tall and weighs <u>15</u> kg.


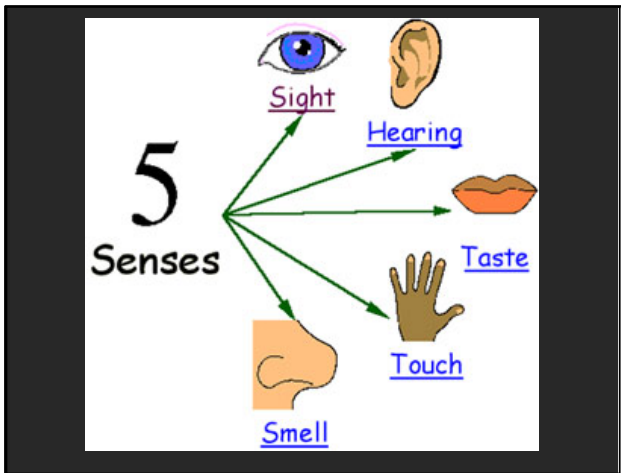
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What is a quantitative observation?	Observation that uses numbers as well as words to describe how much of something there is. <ul style="list-style-type: none"> The puppy is <u>32</u> cm tall and weighs <u>15</u> kg.
What is an inference?	An attempt to explain or interpret observations or to identify the cause of what was observed. <ul style="list-style-type: none"> Assumption The flower is bright yellow and smells good; therefore, bugs are attracted to it.

Start a NEW Warm Up Page- RIGHT side

September 7th-10th
Make Observations about each picture.

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- 
- 


How do you make observations?

What is a qualitative observation?

Observation that uses only words to describe something.

- The puppy is soft and brown.



What is a quantitative observation?



Observation that uses numbers as well as words to describe how much of something there is.

- The puppy is 32 cm tall and weighs 15 kg.

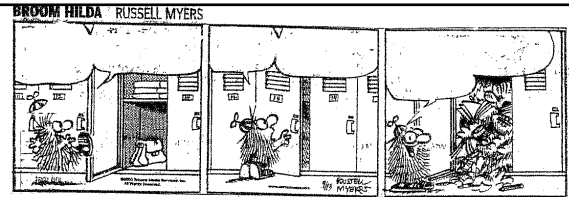
What is an inference?



An attempt to explain or interpret observations or to identify the cause of what was observed.

- Assumption
- The flower is bright yellow and smells good; therefore, bugs are attracted to it.

Is the observation qualitative or quantitative?



Use the cartoon to make observations.

A. Quantitative Observations

- 1.
- 2.
- 3.

B. Qualitative Observations

- 1.
- 2.
- 3.

C. Inference

Check out this photograph



Based on the photograph, make the following observations:

1. Make 5 qualitative observations about the scene.

- A.
- B.
- C.
- D.
- E.

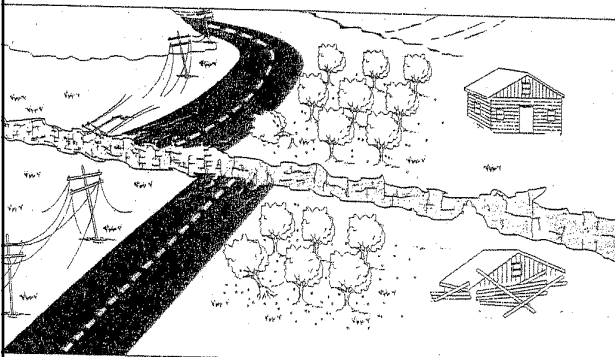
2. Make 3 quantitative observations about the scene.

- A.
- B.
- C.

3. Examine your observations for #1 and #2. Are any of them actually inferences or explanations? If so, which one (s)?

4. Is the following an observation or inference?
"The house collapsed at the same time the road split." Explain.

Check out this scene



Based on the scene, make the following observations:

1. Make 5 qualitative observations about the scene.
A.
B.
C.
D.
E.
2. Make 3 quantitative observations about the scene.
A.
B.
C.
3. Examine your observations for #1 and #2. Are any of them actually inferences or explanations? If so, which one (s)?
4. Is the following an observation or inference?
"The house collapsed at the same time the poles fell." Explain.

Observing and Inferring

Quantitative Observation- _____
 Qualitative Observation- _____
 Inference- _____

BOX	Sounds like it is	It could also be
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

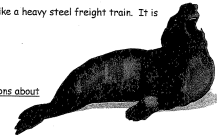
1. Did you make more qualitative or quantitative observations? Why?
2. Which of the five senses did you utilize in this activity? Which one is the most important?
3. Which of the boxes is the most difficult to infer what is in it?
4. Which box is the easiest to infer what is in it?

Quiz on observations and inferences

In the following story, underline 5 qualitative observations and observations. In addition, make one inference about the story. circle 5 quantitative

As the orange sun rises on the horizon, a herd of seals is resting on the icy cold glaciers of the Antarctic Ocean. The dominant bull is easily 2,500 kg and 15 feet long with a 7 inch elephant-like nose. Many of the dark grey females are accompanied by calves ready for swimming lessons in the clear blue ocean waters. The pups may only weigh about 33 kg, but they are big enough to swim. About twenty-five cows and calves make their way down the beach and towards the water. They are unaware of what lurks twenty feet below the ocean's surface.

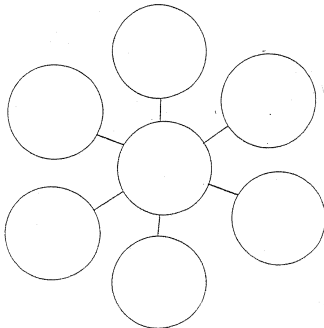
The cows enter the frigid water with little hesitation, but the silvery pups are not as quick to rush in. In the blink of an eye, a great white shark measuring 26 feet in length propels itself through the water like a heavy steel freight train. It is heading right for the swimming herd.....



Make an inference based on your observations about the above story:

Scientific method should be written in the center circle with the 6 steps starting at the top and moving clockwise.

- Write the name of the step in the circle.
- Write the number of the step in the circle.
- Draw a small picture in each circle that will help you remember the step.

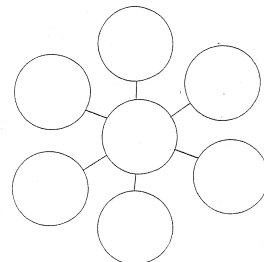


The Steps of Scientific Inquiry/Method

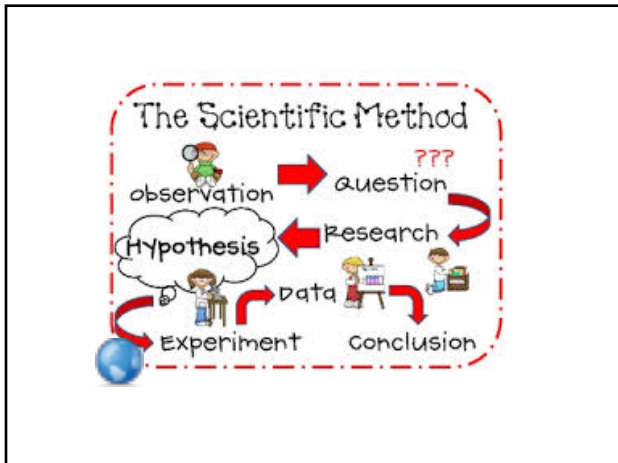
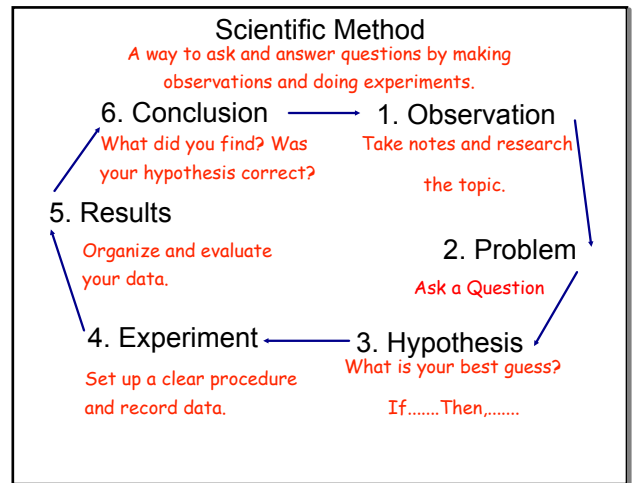
Using your notes and science book (pages 6-10) on the 6 steps of the scientific method, complete the bubble map below.

Scientific method should be written in the center circle with the 6 steps starting at the top and moving clockwise.

- Write the name of the step in the circle.
- Write the number of the step in the circle.
- Draw a small picture in each circle that will help you remember the step.



Topic: Scientific method terms	Name _____ Date _____
Question/Main Idea	Notes/Details
What is the <u>scientific method</u> ?	Organized steps to solve a problem <ul style="list-style-type: none"> • Problem solving method • 6 steps • Scientific inquiry process
What is a <u>hypothesis</u> ?	<ul style="list-style-type: none"> • An educated guess • Possible answer to your problem • Possible explanation for a set of observations
Define <u>experiment</u> .	Series of steps followed that tests a hypothesis under controlled conditions <ul style="list-style-type: none"> • Procedure • Test
What is <u>data</u> ?	Information collected during the experiment <ul style="list-style-type: none"> • Facts • Figures • Evidence



Describe <u>technology</u> .	Use of science for improving life
What is the <u>experimental group</u> ?	Group being tested that contains the "manipulated variable"
What is the <u>control group</u> ?	Group that does not contain the "manipulated variable" <ul style="list-style-type: none"> • Standard for comparison
What is the <u>independent variable</u> ?	Variable that is purposefully changed by the experimenter to test a hypothesis <ul style="list-style-type: none"> • Manipulated variable • IV
What is the <u>dependent variable</u> ?	Variable that is measured or responds to a change in the manipulated variable in an experiment <ul style="list-style-type: none"> • Responding variable • DV
What are <u>constants</u> ?	All other factors in an experiment that are kept the <u>same</u> in the experimental and control groups <ul style="list-style-type: none"> • Remain the same

How do you show your test results?	<ul style="list-style-type: none"> • Charts • Data tables • Graphs
What is included in your <u>conclusion</u> ?	<ul style="list-style-type: none"> • Restate your hypothesis • Decide whether your hypothesis was correct or incorrect
How do you communicate your findings/results?	<ul style="list-style-type: none"> • Scientific meetings • Scientific journals • Internet

The Scientific Method

The scientific method is used by scientists to solve problems through research and experimentation. We will examine the six steps they use.

Step 1 Identify the problem. Be sure to state the problem in question format as specifically as possible.
For example: Which detergent works best in the cold wash cycle?

Step 2 Research your problem. Find out as much information about the topic using various resources:
> interview, phone, write people
> library books, magazines, newspapers
> internet
> television, videos, dvds, radio
Hint >> Research can usually be done on the nouns in the problem statement.

Step 3 Form a hypothesis. A hypothesis is a possible answer to your question based on observations. If you have made no observations, then your hypothesis is an educated guess.
State your hypothesis as an "if...., then" or "I predict that... because..." statement.
For example: If I use Tide detergent during the cold wash cycle, then the clothes will be cleaner.

Step 4 Conduct an experiment/procedure. Procedures are written with the verb stated first. This tells others who conduct the experiment that each step must be completed in the order stated to possibly be accurate. You are conducting tests to see if your hypothesis is correct or incorrect.

A procedure should include precise measurements of all materials. The methods of observation(s) and their frequency should be easily and clearly stated. You are collecting data.

Step 5 Record and Analyze data. Determine the outcome/result of your experiment based on the data collected. Data can be presented in:

- > pie, line, bar, or pictographs
- > charts, tables

Step 6 State your conclusion. After determining the outcome you write a conclusion to your question (problem). You decide whether your hypothesis is correct "true" or incorrect "false".

For example: My experimentation confirmed my hypothesis; Tide is the best detergent to clean clothes in the cold wash cycle.

OR

My experimentation did not confirm my hypothesis; Out of all the detergents tested, Wisk worked the best in cold temperatures.

Many times experiments must be done repeatedly to ensure the accuracy of the data.

Experimental Design Practice 1

Read this scenario about an experiment:

Each student in a seventh grade science class was asked to think of an experiment to do which involved planting seeds to grow some kind of plant. Laura had been taking care of her mom's house plants and decided to do an experiment to see whether the amount of fertilizer really makes a difference. She used four identical plastic pots and measured 500 cm³ of potting soil into each. She put 5 corn seeds in each pot about 2 cm into the soil. She used Super-Gro, a liquid fertilizer, and she made different concentrations of the fertilizer with which to water each pot. The pots were all put on a shelf near a window.

- Pot A was given plain water--no fertilizer.
- Pot B was given 1/2 tablespoon of fertilizer per gallon of water.
- Pot C was given 1 tablespoon of fertilizer per gallon of water, as recommended on the bottle.
- Pot D was given 2 tablespoons of fertilizer per gallon of water.

Laura watered the pots when she planted the seeds and then each time the soil started to get dry, and she was very careful to put the same amount of water in each pot. She made a chart to write data about the growth of the corn plants. For 15 days she wrote down the height, in cm, of each of the plants in each pot.

Follow the directions on the next page to analyze this experiment.

Experimental Design Practice 1

Draw a simple diagram of the setup of Laura's experiment in the box:

Find each of these components of experimental design in Laura's experiment:

1. The independent variable:
2. The dependent variable:
3. The control:
4. The constants:

Experimental Design Practice 3

Read the following scenario:

Where Maryam lived, she could hear many crickets chirping in the late summer. It seemed like the hotter the day, the more the crickets chirped. She designed an experiment to see whether her guess was true.

She built a cage for crickets of wire and wood and put some grass and leaves in the bottom. A thermometer was hung in the middle of the cage. She controlled the temperature in the cage with a pet heater she got at the pet store.

Maryam went outside and collected 10 crickets and put them in her cage. She did her tests over several days to give the crickets a "rest" between tests. She changed the temperature in the cage before each test. The tests were done at 25°C, 30°C, and 35°C. Three trials were done at each temperature. For each test, Maryam counted the chirps from the crickets for three minutes.

Use this information about Maryam's experiment to complete an experimental design diagram provided by your teacher.

Experimental Design Diagram (EDD)

Title: The Effect of _____ on _____

Hypothesis: If _____ then _____

Independent Variable (IV):

levels of the IV				
<small>Label the level which will act as the control, if there is one.</small>				
repeated trials				

Dependent Variable (DV):

Constants: (Be sure to include measurements where needed.)


Experimental Design Practice 4

Sonya is interested in studying freshwater plants. She observes that plants which normally grow in fresh water are not found in salt water. She wonders how salt water affects freshwater plants.

She decides to grow the same type of plants in both salt water and fresh water. Sonya takes 20 freshwater plants of one kind and plants each one in 1L of soil. All of the plants are about 5 cm tall. 10 of the freshwater plants are watered with the same amount of fresh water every 4 days; whereas, the other 10 freshwater plants are given the same amount of salt water every 4 days.

For 4 months, she measures the heights of the plants in cm. The data is recorded in a table.

Watered with fresh water		Watered with salt water	
Plant number	Height in cm	Plant number	Height in cm
1	15	1	5
2	14	2	6
3	15	3	7
4	17	4	7
5	13	5	5
6	14	6	5
7	16	7	8
8	16	8	6
9	15	9	6
10	14	10	8



Experimental Design
Practice 4



Title: The Effect of _____ on _____

Hypothesis:

Independent (manipulated) variable:

Dependent (responding) variable:

Constants (include specific measurements):

Based on the data table, which group represents the experimental group?
Control group?