

Science Unit 1 Test Study Guide

Vocabulary-

Scientific Method- 1) Question/problem 2) observation 3) hypothesis 4) research 5) observation 6) data 7) results/graph 8) conclusion 9) communicate

Hypothesis- a tentative explanation, an investigative question, a statement that may lead to a prediction, may guide an investigation, used to decide what data to pay attention to and seek, and developed from imagination and creativity

Control- a variable that is not changed, Also called constants, Allows for a "fair test", Allows for a controlled experiment

Manipulated variable- something that is purposefully changed by the investigator, what is tested, what is manipulated

Independent variable- the manipulated variable (see above)

Responding variable- something that might be affected by the change in the independent variable, what is observed, what is measured, the data collected during the investigation

Dependent variable- the responding variable (see above)

Observation- Use one or more of the 5 senses to gather information and note and record facts

Inference- logical interpretations based upon prior knowledge

Quantitative observation- uses numbers to describe what is observed

Qualitative observation- uses words to describe what is observed

Things I have to know or be able to do:

I use my senses to observe and make inferences from observations

I read and interpret information given on various types of graphs

I can identify testable hypotheses when conducting an experiment

I determine independent and dependent variables and constants in investigations

I construct tables and graphs to communicate findings

In my investigations, I understand the need for repeated trials to ensure validity and accuracy

I communicate valid conclusions based on data

I can predict trends based on data

I use critical thinking, scientific reasoning, and problem solving to make informed decisions

I analyze scientific explanations using experimental evidence, not opinions

I explain how scientists in the past contribute to what we know today

** Make Study Guide*

<p>BIG GOAL</p> <p>I can use scientific inquiry methods and use safe lab practices to investigate and solve problems.</p>	<p>Academic Vocabulary</p>	<p>Things I have to know or be able to do</p>	<p>Learning Target #</p>	<p>Observation / inference PPT</p>	<p>Skittles Lab</p>	<p>Peanuts Comic Strip</p>	<p>"Doing Science" debate</p>	<p>Hypothesis discussion</p>	<p>Identifying variables PPT and practice</p>	<p>Chapter 1.1 Reading</p>	<p>Chapter 1.2 Reading and case study</p>	<p>Learning Check # 1</p>	<p>Graphing Activity</p>	<p></p>	<p>Mastery</p>
	<p>Scientific Method</p> <p>Hypothesis</p> <p>Control</p> <p>Manipulated Variable</p> <p>Independent Variable</p> <p>Responding Variable</p> <p>Dependent Variable</p> <p>Observation</p> <p>Inference</p> <p>Quantitative Observation</p> <p>Qualitative Observation</p>	<p>I can use scientific inquiry while conducting laboratory and field investigations</p> <p>I use my senses to observe & make inferences from observations</p> <p>I read and interpret information given on various types of graphs</p> <p>I can identify a testable hypotheses when conducting an experiment</p> <p>I determine independent and dependent variables and constants in investigations</p> <p>I construct tables and graphs to communicate findings</p> <p>In my investigations, I understand the need for repeated trials to ensure validity and accuracy</p> <p>I communicate valid conclusions based on data</p> <p>I can predict trends based on data (2E)</p> <p>I use critical thinking, scientific reasoning, and problem solving to make informed decisions</p> <p>I analyze scientific explanations using experimental evidence, not opinion (3A)</p> <p>I explain how scientists in the past contribute to what we know today (3D)</p>	<p>1</p>	<p>2</p>	<p>3</p>	<p>4</p>	<p>5</p>	<p>6</p>	<p>7</p>	<p>8</p>	<p>9</p>	<p>10</p>	<p>11</p>		

Pre-Learning Key: 1=I think I've heard of it; 2=I can explain/demo with some help; 3=Confident and independent;

Identifying Variables

There are 3 types of
Variables

1. Independent (aka manipulated)
2. Dependent (aka responding)
3. Controlled (constants)

3 Kinds of Variables

- **Independent Variable**
- **Manipulated Variable**
 - **something that is purposefully changed by the investigator**
 - **What is tested**
 - **What is manipulated**

3 Kinds of Variables

- **Dependent Variable**
- **Responding Variables**
 - **something that might be affected by the change in the independent variable**
 - **What is observed**
 - **What is measured**
 - **The data collected during the investigation**

3 Kinds of Variables

- **Controlled Variable – a variable that is not changed**
 - Also called constants
 - Allows for a “fair test”
 - Allows for a controlled experiment

Variables and the Hypothesis Statement

- Use an: If, & Then statement.

If the *independent variable* **changes**, then the *dependent variable* will **change**.

DRY*MIX

- D – Dependent Variable**
- R – Responding Variable**
- Y – Y-axis of a graph**

- M – Manipulated Variable**
- I – Independent Variable**
- X – X-axis of a graph**

For Example:

□ Students of different ages were given the same jigsaw puzzle to put together. They were timed to see how long it took to finish the puzzle.

- Independent Variable:**
- Dependent Variable:**
- Control:**

□ Students of different ages were given the same jigsaw puzzle to put together. They were timed to see how long it took to finish the puzzle.

- Independent Variable: Students**
- Dependent Variable: Time for puzzle construction**
- Control: Puzzle**

□ A study was done to see if different composition of skateboard wheels affected the performance of the board. The same board, the same rider and the same course were used. Only the wheels were different.

- **Independent Variable:**
- **Dependent Variable:**
- **Control**

□ A study was done to see if different composition of skateboard wheels affected the performance of the board. The same board, the same rider and the same course were used. Only the wheels were different.

- **Dependent Variable: Skateboard Performance**
- **Independent Variable: Wheels**
- **Control: Skateboard, Rider, Course**

-
- **Groups of students were given different types of paper to construct paper airplanes. They all use the same pattern for their planes. The planes were tested to see which ones would fly the greatest distance.**
 - **Manipulated Variable:**
 - **Responding Variable:**
 - **Control:**

-
- **Groups of students were given different types of paper to construct paper airplanes. They all use the same pattern for their planes. The planes were tested to see which ones would fly the greatest distance.**
 - **Independent Variable: Paper**
 - **Dependent Variable: Distance plane flies**
 - **Control: Airplane pattern**

An experiment was done to see which colored sand would heat up the most when placed in the sun. The sand samples were white, red, green and black. All samples were the same amount, placed in identical containers, left in the sun the same amount of time and the temperature was measured with the same thermometer.

Independent Variable:

Dependent Variable:

Control:

An experiment was done to see which colored sand would heat up the most when placed in the sun. The sand samples were white, red, green and black. All samples were the same amount, placed in identical containers, left in the sun the same amount of time and the temperature was measured with the same thermometer.

Independent Variable: Sand Color

Dependent Variable: Sand Temperature

Control: Sand amount, container & thermometer

Activity

Science

9/3/14

Observation & Inference

Read the Peanut's gang cartoon. Marci is the character in the first scene. Peppermint Patti is the new character who is added in the third scene. Read each statement below and determine if it is an observation or an inference. Fill in the blanks with the appropriate answer.

- observation 1. Marci is wearing glasses.
- inference 2. Marci is talking to the clerk in the store
- observation 3. Marci needs 6 pencils for school.
- inference 4. Marci has a bag which is full of school supplies
- inference 5. Marci and Peppermint Patti have the same teacher.
- observation 6. Peppermint Patti has freckles.
- inference 7. Marci gladly gives Peppermint Patti her bag.
- observation 8. Peppermint Patti wears sandals.
- inference 9. Marci & Peppermint Patti are friends.
- inference 10. Peppermint Patti is always borrowing school supplies from Marci.
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Qualitative & Quantitative Observations

Qualitative observations use words to describe what is observed.

Quantitative observations use numbers to describe what is observed.

SNOW

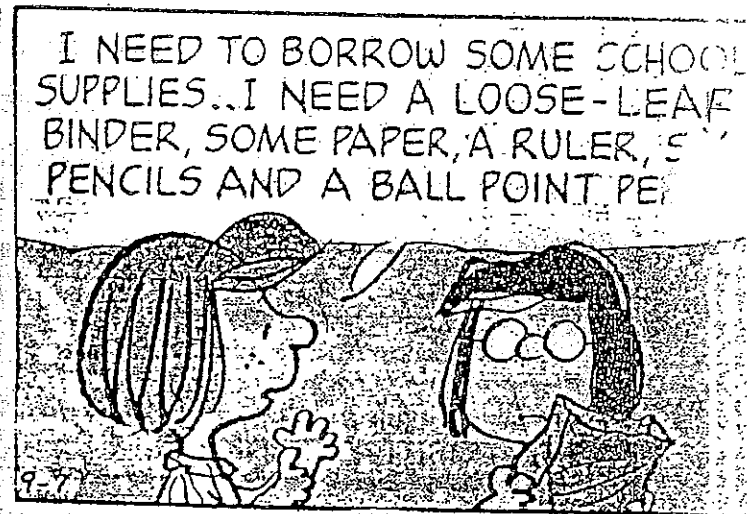
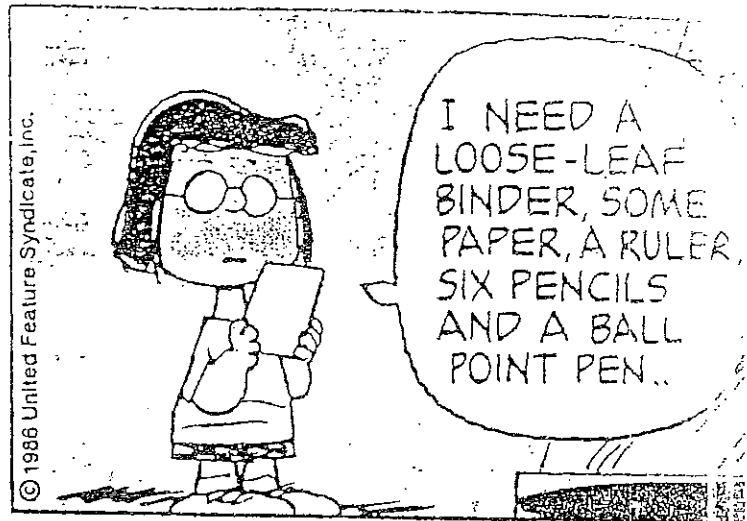
"Snow – it's cold, white, fluffy, and slippery. If you examine it closely, you may be able to see single snowflakes, each one with six points. Each flake may be only 4 mm across, but billions of them can form a snowdrift. If the temperature goes above 0 degrees, the flakes melt. You could be left with a puddle."

Write three quantitative observations about snow.

1. 4mm across
2. billions can form a snowdrift
3. each snowflake has 6 points

Write three qualitative observations about snow.

1. cold
2. white
3. fluffy



OBSERVATIONS AND INFERENCES

OBSERVATIONS:

Use one or more of the 5 senses to gather information

Note and record Facts

INFERENCES

Logical interpretation based upon prior knowledge

Based upon observations

When conducting experiments, record observations not inferences.

Inferences may be used when you are analyzing and interpreting your results.

Observation or Inference?

- O 1. The container is filled to the 350 mL mark with water.
- O 2. The Sun rose at 6:54 this morning.
- I 3. The caterpillar did not eat the moth because it is not a carnivore.
- O 4. Sound traveled faster through the desk than through the air.
- I 5. The plant on the left is growing more because it has been receiving more water.
- I 6. When the Sun came out, it made the rain stop.
- I 7. I can jump high in tennis shoes because they have rubber on the bottom.
- O 8. When the power is turned on, the game lights up and plays a song.
- I 9. Dinosaurs died out when they could not adapt to the changing climate.
- O 10. Water can fall as precipitation, which may include rain, snow, or hail.

Test your observation skills!

1. Are there cars parked on the sides of the road?

yes

3. Any minivans around?

yes

5. What's the speed limit?

35

2. What color is the pickup truck driving in the road?

light blue

4. What does the blue sign say?

Yard Sale

6. Are there any pedestrians on the road?

no

Next test:

1. How many cars were in the intersection?

2. Across the street, are there any parked cars on the side?

3. Can you describe at least one of the cars driving through the intersection?

4. Are there any other potential witnesses?

5. If your answer is yes, what was this witness doing?

6. What was the speed limit?

7. Was there anyone parked in the first parking spot?

Different types of observations:

Qualitative observations use your senses to observe the results. (Sight, smell, touch, taste and hear.)

Quantitative observations are made with instruments such as rulers, balances, graduated cylinders,

beakers, and thermometers. These results are measurable.

Qualitative (1) or Quantitative (2)?

1 1. It is light green in color.

1 2. It taste sour.

2 3. One leaf is 9 cm long.

1 4. It makes a loud pop sound.

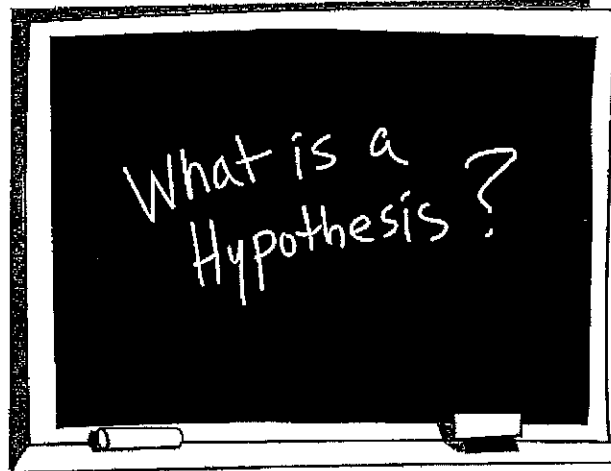
2 5. The mass of the computer is 1 1/2 kg.

Correct answers

What Is a Hypothesis?

Hypotheses are used widely in science. Put an X next to the statements that describe a hypothesis.

- A** A tentative explanation
- B** A statement that can be tested
- C** An educated guess
- D** An investigative question
- E** A prediction about the outcome of an investigation
- F** A question asked at the beginning of an investigation
- G** A statement that may lead to a prediction
- H** Included as a part of all scientific investigations
- I** Used to prove whether something is true
- J** Eventually becomes a theory, then a law
- K** May guide an investigation
- L** Used to decide what data to pay attention to and seek
- M** Developed from imagination and creativity
- N** Must be in the form of "if...then..."



Describe what a hypothesis is in science. Include your own definition of the word *hypothesis* and explain how you learned what it is.

8/27/14

Heading:

Safety Precaution Questions

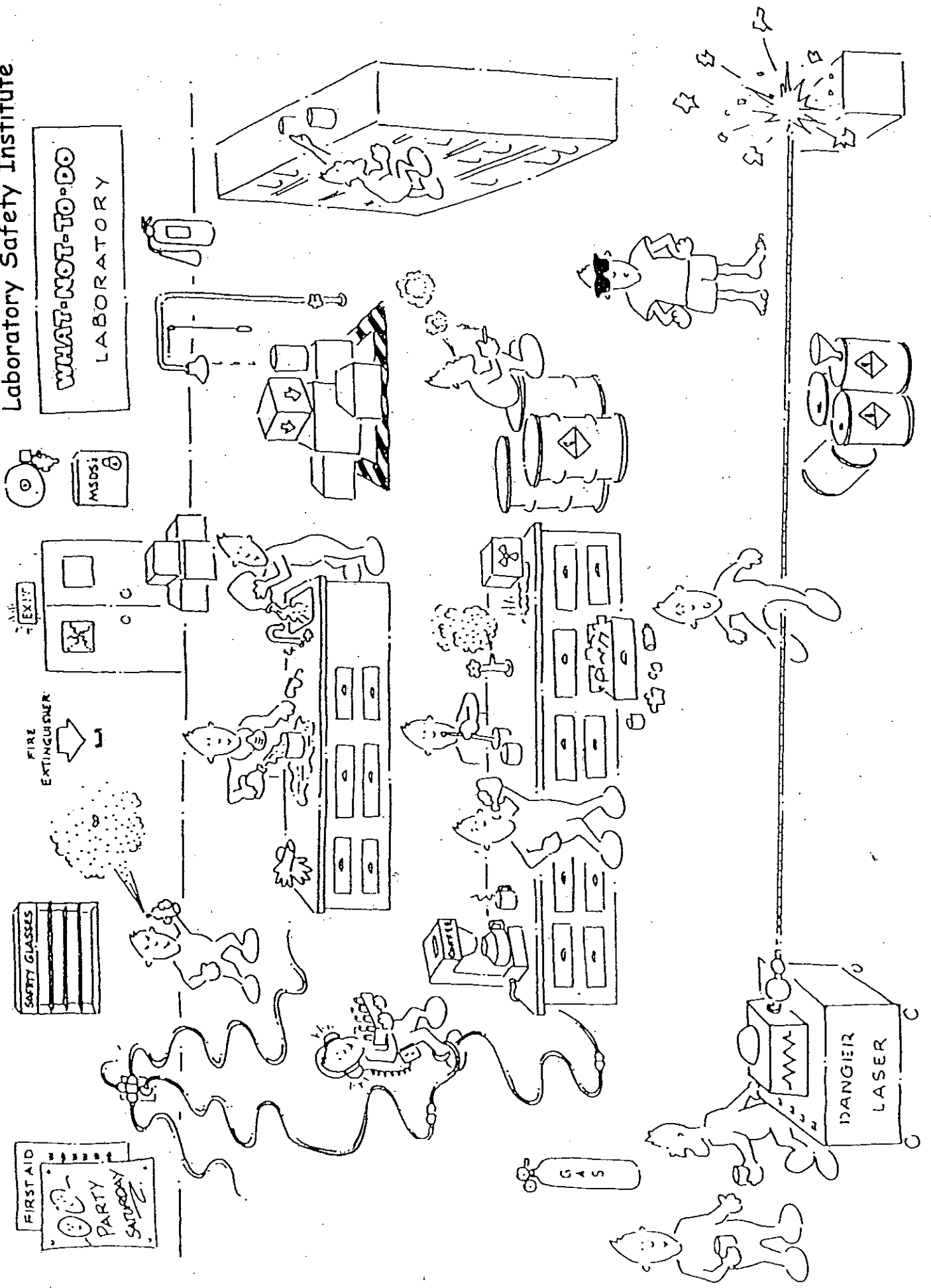
Answer TRUE or FALSE below in the space by the number:

- I Maintain a focused attitude in class, especially during labs. Playing around can cause accidents.
- F Always attempt to do extra experiments that you think of on your own.
- F You only need goggles when you are working with flames or microscopes in lab. *wear goggles when you are asked to*
- F If any accidents occur, take care of them yourself and don't bother telling the teacher. *Always tell the teacher*
- F Run out of the door, screaming, if a fire occurs. *- Keep orderly*
- I Always know where the fire extinguisher, water sources, and emergency supplies are in class.
- F Be sure to always taste the chemicals if they look edible.
- I Never aim the test tube toward you or other class members when you are heating substances in them or gently stirring them.
- F When testing the odor of any chemicals, be sure to put your nose as close as possible to the liquid and take a deep breath in to get a real test of its odor. *- Can be dangerous - You waft it instead*
- I Always use your hand and waft the air to get the general odor of a substance.
- F Never clean up any spilled liquids on the floor, counter or desks. There are people hired in the class to take care of things like that. *- You are responsible for your lab station.*
- I Never throw matches or anything hot from burning into the trash.
- I Don't begin a lab until it has been explained by the teacher so you know what to do.
- F Be sure to do the labs all by yourself since others in your lab group do not know what to do and they do not do things as well as you do anyway. *Work with your group!*
- I Clean all the equipment and work areas when you are finished with your lab.
- I Tie your hair back and push sleeves, scarves, chains, or anything that might catch on fire or get in the way of the lab. This keeps you safe.
- F Throw any broken glass into the trash. *- receptacle / cardboard box*

Homework → Worksheet Lab Equipment

Laboratory Safety Institute

WHAT-NOT-TO-DO
LABORATORY



Scientific Method:

question / problem

observation

hypothesis

research

observation

experiment

observation

data

results/graph

conclusion

communicate

Scientific Inquiry

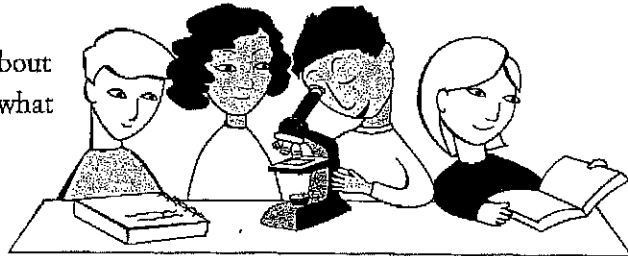
You may not always experiment.

You may observe and get results and draw a conclusion.

You may not always have a hypothesis

Doing Science

Four students were having a discussion about how scientists do their work. This is what they said:



Antoine: "I think scientists just try out different things until something works."

Tamara: "I think there is a definite set of steps all scientists follow called the scientific method."

* Marcos: "I think scientists use different methods depending on their question."

Avery: "I think scientists use different methods but they all involve doing experiments."

Which student do you most agree with? _____

Explain why you agree with that student and include why you disagree with the other students.

- Marcos is the most correct answer
- all students had something correct in their answer