NAME _____ Date _____

SCIENTIFIC METHOD PRACTICE PROBLEMS

Many significant problems in science have been solved through the use of the scientific method. Read the following scenarios and answer the following questions.

SCENARIO I.

Mary investigated the effect of different concentrations of Miracle Grow on the growth of tomato plants. Mary hypothesized that if higher concentrations of Miracle Grow were added, the plants would exhibit poorer growth. She grew four groups of tomato plants (10 plants/group) for 30 days. She then applied Miracle Grow as follows:

Group A, 0% Miracle Grow;
Group B, 10% Miracle Grow;
Group C, 20% Miracle Grow; and
Group D, 30% Miracle Grow.

The plants received the same amount of sunlight and water each day. At the end of 30 days, Mary recorded the height of the plants (in centimeters) and the color of the leaves (green, yellow-green, yellow, or brown.)

BASIC EXPERIMENTAL TERMS: Use these terms to answer the following questions

***An <u>independent variable</u> is the variable which is purposefully changed by the experimenter.**

***A <u>dependent variable</u> is the variable which responds to the changed variable.**

***<u>Controlled variables</u> are variables that are not changed during the experiment (constants).**

***A <u>control group</u> is the group in the experiment which allows the experimenter to assess the effect of any unforeseen variable. It usually represents "normal" conditions.**

***An <u>experimental group</u> is any group in an experiment that is different than the control group and has one changed variable.**

1. **In this scenario, what is the independent variable?_____**

2. **What is the dependent variable? _____**

3. **In this scenario, what are the controlled variables? (Identify at least three.)**

_____, _____

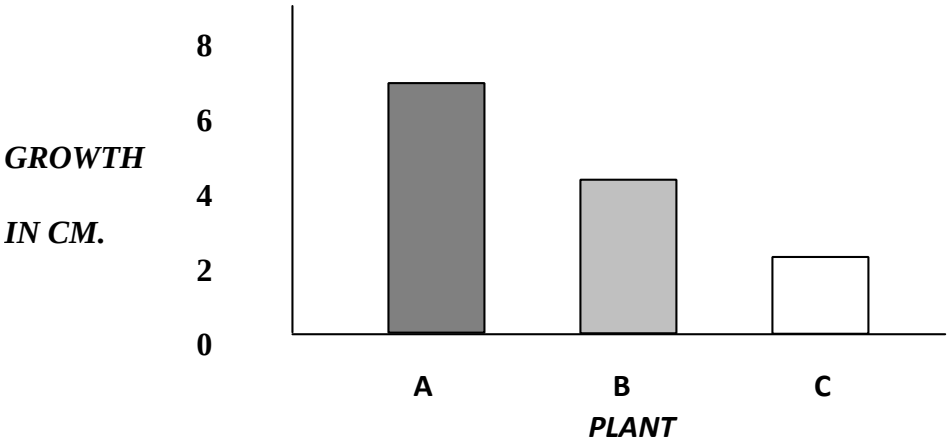
_____

4. Which group would be the control group in this experiment?_____

SCENARIO 2.

Some students grew sunflower plants in their school's biology laboratory. The following table and graph show the conditions and results of the experiment after three weeks. Use this information to answer the following questions.

	Temperature	Humidity	Water	Light	Color of Light
Plant A	**21^0 C**	**50%**	**30 mL**	**10hrs.**	**violet**
Plant B	**21^0 C**	**50%**	**30 mL**	**10hrs.**	**green**
Plant C	**21^0 C**	**50%**	**30 mL**	**10hrs.**	**White (normal)**



1. Was this a controlled experiment? *Explain your answer.*

2. State a *possible* hypothesis for this experiment.

3. Independent variable: _____

Dependent variable: _____

4. **Which plants are the experimental subjects? _____**

5. **Which plant is the control subject? _____**

6. **What are the controlled variables? (Identify at least three.)**

   _____

   _____

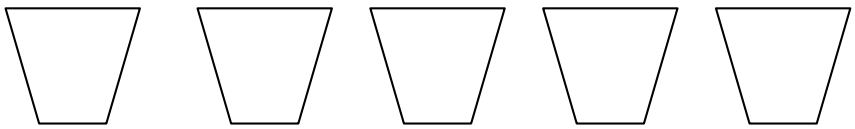
   _____

7. **Did the experiment prove that the hypothesis that you stated in #2 was correct? *Explain your answer.***

SCENARIO 3.

A scientist observed that tobacco plants flower only at certain times of the year. After careful consideration of this phenomenon, the scientist conducted an experiment. She grew five tobacco plants and exposed each to light for a specific period of time each day. Study the diagrams below which show the results of this experiment. Then complete the sentences that follow.

Flower Flower Flower Bud Bud



10 hours 12 hours 14 hours 16 hours 18 hours

HOURS OF DAYLIGHT

1. **Since only one variable was changed in this experiment, this is called a _____ experiment.**

2. **The independent variable in this experiment is _____.**

3. **The dependent variable in this experiment is _____.**

4. **List some of the controlled variables in the experiment. (Identify at least three.)**

_____

_____

_____

SCENARIO 4.

1. **Peter loves music. He believes that he does his homework better and faster when he listens to music. His parents say that music is distracting when studying.**

   a. **State the problem (question) here.**

   _____

   b. **Write a testable hypothesis in the "If……, then …." Form. Be sure it is in this form and write a complete sentence.**

   _____

   _____

   c. **Describe in 3-6 sentences an experiment Peter could do to test his hypothesis.**

   _____

   _____

   _____

   _____

   _____

   _____

   d. **What is the independent variable?** _____
   e. **What is Peter's dependent variable?** _____
   f. **What is the control?** _____
   g. **List some variable that must remain constant.**

   _____