NAME_____PERIOD____

GOOD EXPERIMENT or BAD EXPERIMENT
Scientific Method skills Practice

What are the criteria that all good experiments meet?

- Has only one variable being tested at a time. All other conditions remain the same.
- Has a control group maintaining "normal" conditions as a basis for comparison
- Includes a sufficient number of test cases
- Uses accurate and standard measurements
- Collects relevant and pertinent data (quantitative and qualitative)

Read the experiment scenarios below. Each scenario needs to be analyzed for all of the criteria listed above.
In scenarios 1 and 2, identify and describe why it is either a good or bad experiment based on the criteria.
In scenario 3, identify the problem, hypothesis, and variables. Then, provide any improvements for the experiment.

Experiment #1

A research scientist wondered whether caffeine had an effect on the reflexes of lab rats. To test this, she gathered 30 white lab rats of the same age and size. She gave 10 of the rats 20 mL of pure water to drink each day and the other 20 rats 10mL of caffeinated water to drink each day. The two groups of rats were kept in separate cages. For 90 days, the researcher collected data concerning the number of offspring, quality and speed of movements, condition of fur, tails, eyes, and teeth.

Is this a good experiment or bad experiment? Explain.

Improvements:

Experiment #2

A biology student wondered whether plants will grow better under a green light or under normal white light. To test this, he gathered some plants in a box and put a green light over them. After two weeks, the student measured the plant heights (he found that the plants had an average growth of 6 inches) and then changed the green light bulb to a white light bulb. After two more weeks he measured the plants again and found that they had only grown 4 more inches since they were measured last. He then concluded that green light causes plants to grow better than white light.

Is this a good experiment or bad experiment? Explain.

Improvements:

Experiment #3

According to Science World Magazine, earthworms are able to learn simple things. To test this, an experimenter set up a maze for earthworms. He places an earthworm at the start of a maze. If the earthworm crawls to the right, it finds itself on uncomfortable sandpaper. If the earthworm crawls to the left, it finds itself in soothing moist soil. He repeats this experiment 10 times with each of the 20 earthworms he has for the experiment. In a data table, the experimenter records how many times each earthworm crawls to the left or to the right.

1. Write a clear purpose (problem) for this experiment.

2. Write a hypothesis in correct format that corresponds to this experiment.

3. Identify the control group for this experiment.

4. Identify the experimental group for this experiment.

5. What is the independent variable for this experiment?

6. What is the dependent variable for this experiment?

7. What are some of the variable being controlled in this experiment?

8. Are there any improvements that could be made to make it fit the criteria for a good experiment?