Scientific Method Practice:
Analyzing Experiments

Directions: Read each scenario and answer the questions that follow.

(A) A scientist noticed that cattails grew only in swampy parts of his backyard. He decided to try to find out why. He researched on the internet and found that cattails are not found in deserts, usually grow in swamps, and sometimes grow along rivers and streams. After a while, he thought, "I think cattails need water to grow." He then went into his yard and dug up 100 cattails. He divided them into four groups. Each group contained 25 cattails. All of the groups were grown in the same type of soil, they all received the same amount of light, and they were all kept at the same temperature. There was only one difference between the groups. Group 1 received 4 quarts of water a day. Group 2 received 3 quarts of water a day. Group 3 received 2 quarts of water a day. Group 4 received 1 quart of water each day. Every day he went out and measured the plants. After 30 days he observed that the plants in group 1 had grown an average of 8 inches. The plants in group 2 had grown an average of 4 inches. The plants in group 3 had grown an average of 2 inches. The plants in group 4 had grown an average of only 1 inch. He then decided that the amount of water that a cattail receives effects its growth. Plants that receive more water grow more. The scientist then repeated his experiment using another 100 cattails.

Fill in the data chart using the results in the paragraph.

Group #	Amount of Water	Growth

1. State the problem. _____

2. What was his hypothesis? _____

3. What was his hypothesis based on? _____

4. What was his conclusion? _____

5. Name 3 constants. _____

6. What was the independent variable? _____

7. What was the dependent variable? _____

8. Why did he repeat the experiment with another 100 cattails?

_____

B A teacher wanted to know if her students would do better on a quiz if they listened to Metallica before taking the quiz. She read several studies about the effect of music on young people. Most of the studies said that when students listen to rock and roll before taking tests, they do better on the tests. She then guessed that the longer a student listened to Metallica before a quiz, the better they would do on the quiz. She asked 90 of her students to participate. She broke the 90 students into 3 groups. All of the students were the same age, from the same background, they all took the same quiz, and they were all above average students. There was the same amount of boys and girls in each group. Group #1 did not listen to any music before taking the quiz. Group #2 listened to one hour of Metallica before taking the quiz. Group #3 listened to two hours of Metallica before taking the quiz. She then wrote down the following in his notebook: Group #1 had an average of 96% on the quiz. Group #2 had an average of 85% on the quiz. Group #3 had an average of 71% on the quiz.

Fill in the data chart using the results in the paragraph.

Group #	Hours of Music	Average Score

9. State the problem. _____

10. What was her hypothesis? _____

11. What was her hypothesis based on? _____

12. What was the conclusion? _____

13. Name 4 constants. _____

14. What was the independent variable? _____

15. What was the dependent variable? _____

16. Which group was the control? _____

C Mr. Toowise was having a difficult time getting his students to get good grades on quizzes. He was trying to think of a way that he could positively reward his students. He read an article that said that lab rats that were rewarded with sunflower seeds ran though a maze faster than rats that were not rewarded with sunflower seeds. Mr. Toowise stated, "I think that the more sunflower seeds I promise my students, the better they will do on a quiz." He divided the class into three groups. Group one was promised zero sunflower seeds if they did well on the next quiz. Group two was promised 25 sunflower seeds if they did well on the next quiz. Group three was promised 50 sunflower seeds if they did well on the next quiz. Group one received an average of 70% on the quiz. Group two received an average of 73% on the quiz. Group three received an average of 71% on the quiz.

17. State the problem. _____

18. State the hypothesis. _____

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19. What was his hypothesis based on? _____

20. Fill in the data table from the results.

Group #	Number of Seeds	Average Score

21. State the conclusion. _____

22. Did the conclusion agree or disagree with the hypothesis? _____

23. Which group was the control? _____

24. Name the independent variable. _____

25. Name the dependent variable. _____

26. Name 2 constants. (think!)_____

Mr. Notsure wanted to know whether or not his students would do better on a quiz if he promised them candy. He went to the library and read several studies about the effect of giving food to lab animals. He found out that if animals were given food as a reward for doing something, they usually did better the more reward they were given. He guessed that the more candy that his students were promised, the better they would do on the quiz. He had all of his classes participate in the experiment. There were four groups in all. Each group had the same amount of boys and girls, they were all given the same quiz, they were all the same age, the same ability, and they were all from the same background. The first group was not promised any candy if they did well on the quiz. The second group was promised 1 candy bar if they did well on the quiz. The third group was promised 2 candy bars if they did well on the quiz. The fourth group was promised 3 candy bars if they did well on the quiz. Group #1 got an average of 70% on the quiz. Group #2 got an average of 80% on the quiz. Group #3 got an average of 90% on the quiz. Group #4 got an average of 95% on the quiz. He then repeated the experiment with different students.

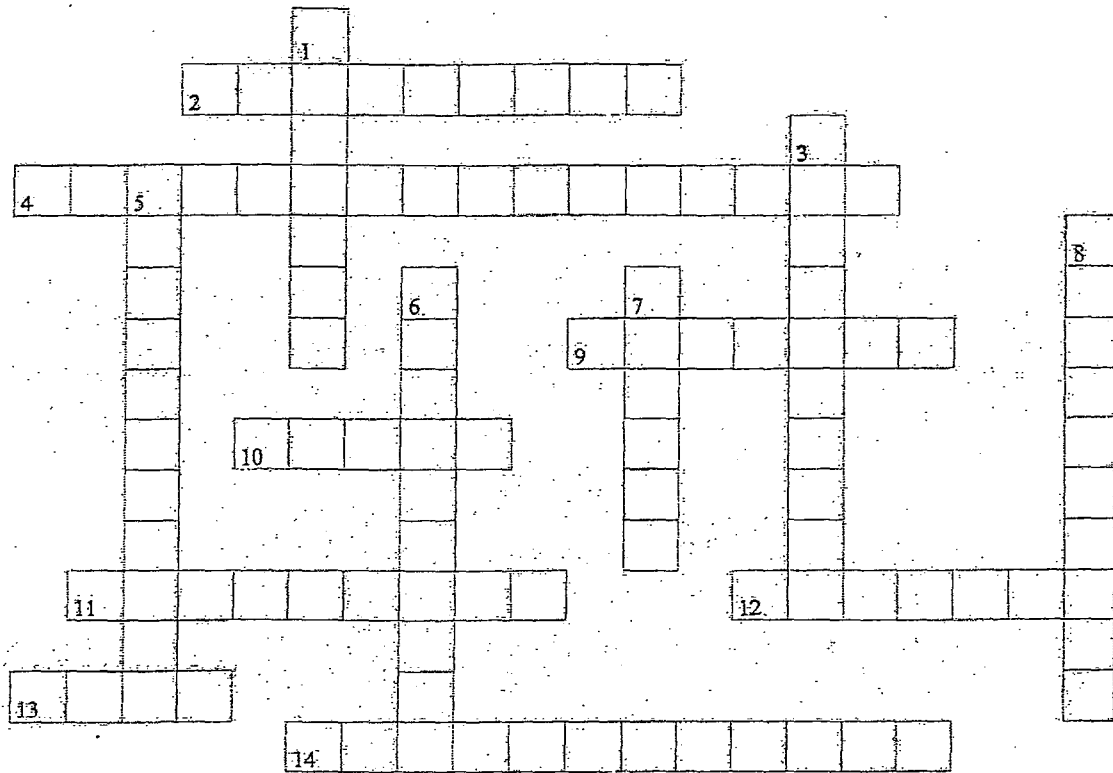27. State the problem. _____

28. State the hypothesis. _____

29. Fill in the data table, including the column headings.

30. Was his hypothesis correct? _____

31. Name 4 constants. _____

32. Which group was the control? _____

33. Name the dependent variable. _____

34. Name the independent variable. _____

35. Why did he repeat the experiment? _____

Crossword Puzzle

Clues:

1. The __?__ is the part of an experiment that is not being tested and is used for comparison.
2. The __?__ describes the steps you use during an experiment.
3. After an experiment, scientists write a __?__ which summarizes their experiment and results.
4. The __?__ __?__ is a process used by scientists to find answers to questions or solve a problem.
5. The __?__ variable is the part of the experiment that is being tested or the part that is changed by the person doing the experiment.
6. The __?__ is an educated guess.
7. Scientists use their data to make charts and __?__ to communicate the results of an experiment.
8. After the scientist makes a hypothesis, they perform an __?__ to collect data.
9. The first step of the scientific method is to define or identify the __?__.
10. Sometimes scientists make a mistake, or __?__, and need to do an experiment again.
11. The __?__ variable is the part of the experiment that is affected by the independent variable.
12. After the experiment, scientists organize and __?__ the data.
13. The information collected during an experiment is called __?__.
14. Scientists make __?__ to help them make a hypothesis or collect data during an experiment.

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