

**SCIENTIFIC METHOD
STUDY GUIDE**

MILLER

Name ANSWER KEY
Class Period _____ 7th Grade Science

Carefully read each of the following definitions. Match each definition to the correct term below.

- A. an experiment where only one variable is tested at a time
- B. all of the information gathered during an experiment
- C. a tool that scientists use to solve problems
- D. the scientific attitude that encourages scientists to be comfortable with accepting new ideas
- E. the variable in an experiment that you want to test; it is the cause of the change in your results
- F. a specific set of steps to follow
- G. the group in an experiment that is not exposed to the independent variable; it is used for comparison
- H. the factors in an experiment that are kept the same
- I. the type of observation that uses descriptions without numbers or amounts
- J. the variable in an experiment that you measure; it is the result of changes in the independent variable
- K. an educated guess based upon research
- L. the group in an experiment that is used to test the independent variable; it is the tested group

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|----------------------------------|-------------------------------------|-----------------------------------|
| <u>E</u> 1. independent variable | <u>J</u> 2. dependent variable | <u>A</u> 3. controlled experiment |
| <u>G</u> 4. control group | <u>L</u> 5. experimental group | <u>H</u> 6. constants |
| <u>C</u> 7. Scientific Method | <u>I</u> 8. qualitative observation | <u>B</u> 9. data |
| <u>K</u> 10. hypothesis | <u>F</u> 11. procedure | <u>D</u> 12. open-mindedness |

Read the following study. State the problem in the form of a specific question. Then, identify the independent variable (IV), dependent variable (DV), control group (CG) and experimental group (EG).

A group of college students were given a short course in speed-reading. The instructor was curious if a monetary incentive (money) would influence performance on a reading test taken at the end of the course. Half of the students were offered \$50 for obtaining a certain level of performance on the test while the other half of the students were not offered any money.

13. State the Problem (question): <u>Does the offer of money influence a person's reading test performance?</u>	
14. Independent Variable: <u>monetary incentive (the offer of money)</u>	15. Dependent Variable: <u>performance on reading test</u>
16. Experimental Group: <u>students offered money</u>	17. Control Group: <u>students NOT offered money</u>

Read the following questions. In each answer, restate the question and use complete sentences.

18. What are **three** safety rules that scientists should follow before, during, or after working in the lab?

- BEFORE - Read & re-read procedures, locate safety equipment
DURING - stay organized, wear appropriate safety gear, report accidents
AFTER - clean up carefully, dispose of wastes properly

19. What are **two** reasons why scientists repeat their experiments?

- ⇒ increase the amount of data used for comparison
⇒ to eliminate mistakes
⇒ to increase ACCURACY and RELIABILITY!

Read about Corey's experiment. Explain why his question is not scientific and write a new one for him.

Corey loves popcorn and he decides to investigate popcorn for his experiment in science class. He remembers his mother telling him that the more expensive brands of popcorn pop better than the cheaper brands. He wonders if his mother is correct. Before designing his experiment, he writes the following research question: Do more expensive brands of popcorn pop better than the cheaper brands?

20. Explain why Corey's question is not a good scientific question:

"better" is NOT measurable

*Be SPECIFIC!

21. Write a new scientific question that he could use for this experiment:

Do more expensive brands of popcorn produce more popped kernels than the cheaper brands of popcorn?

Read the research question below. Identify the IV and DV. What needs to be controlled?

Will Product X prevent sneezing in people allergic to grass?

22. IV:

the use of Product X

23. DV:

of sneezes

24. What other variables need to be constant for a controlled experiment?

same # of people in EG and CG, equal exposure to grass, # of trials, similar allergy histories, length of trial, amount of medicine to EG subjects.

Read each research question and hypothesis below. In the hypothesis, underline the IV and circle the DV.

Research Question: Which type of music quiets a baby faster: jazz, classical, or rock?

25. Hypothesis: If the type of music played is classical, then the baby will quiet faster.

Research Question: Is the water temperature of Lake Erie affected by the depth of the water?

26. Hypothesis: If the depth of the water increases, then the water temperature of Lake Erie decreases.

Read the following experiment descriptions. Identify at least one weakness in the investigation AND suggest how the experiment could be improved.

Jessica wants to find out if the size of the ball will affect how high it bounces. She chooses a ping-pong ball, a softball, and a bowling ball. She drops each type of ball from a height of 2 meters. Her friend holds a meterstick and records the bounce of each ball.

27. What was wrong with this experiment? The balls in the experiment are different sizes but they also have significant differences in weight. That is more than one variable.

28. How could this experiment be improved? Jessica needs to find balls that are different sizes but weigh the same.

Courtney and Sara want to know which flavor of hard candy lasts the longest. Together, they choose 4 flavors of candy. Courtney puts 2 flavors in her mouth and, at the same time, Sara puts the other 2 flavors in her mouth. They time to see which candy flavor lasts the longest.

29. What was wrong with this experiment? The girls are trying 2 candies at the same time AND their mouths are not exactly the same.

30. How could this experiment be improved? one of the girls should hold each candy in her mouth individually and be careful to hold the candy in the exact same way.