

Unit 1: Scientific Method

Identifying Controls and Variables 2

Read the following passage. Answer the associated questions based on your understandings.

A group of students decided to test the effects of high sugar foods on the behavior of a mouse. Two identical mice are housed side by side in the classroom. The number of daylight hours, temperature, and the amount of water the mice receive does not vary between mice. Mouse 1 is fed oats and seeds. Mouse 2 is fed Oreo cookies and Reese cups.

1. What is the *experimental group*?

2. What is the *control group*?

3. What are the *controls* in this experiment?

4. What *problem* do you think the students are testing?

5. What is the *independent variable*?

6. What do you think the *dependent variable* is?

7. What behaviors might the students expect to see in the mouse fed candy?

8. How can the students measure the results? Make a suggestion.

A large field at the base of a mountain frequently floods. Each time the flooding occurs, more soil washes away (erosion). The owners of the land want to perform an experiment to see how different types of plants could help to reduce the soil erosion. They choose 5 areas of flat ground that are the same size, have the same kind of soil, and receive the same amount of sunlight. A different type of plant is planted in 4 of the areas, and one area is left alone. Measurements of soil erosion are made each time the land floods.

9. What is the *experimental group*?

10. What is the *control group*?

11. What are the *controls* in this experiment?

12. What *problem* do you think the students are testing?

13. What is the *independent variable*?

14. What do you think the *dependent variable* is?

15. What is the purpose of the land that does not receive any plants?

A scientist planted 4 identical tomato seedlings in flowerpots and labeled them “1”, “2”, “3”, and “4”. Each pot contained the same amount and type of soil. The 4 seedlings were placed on the same windowsill to ensure they were kept at the same temperature, and received the same amount of sunlight. Each time the plants were watered, pot “1” received 50mL of water, pot “2” received 100 mL, pot “3” received 150 mL, and pot “4” received 200 mL. At the end of each week, the heights of the plants were measured and recorded.

Plant	Amount of Water Received (mL)	Amount of growth at the end of week 1 (cm)	Amount of growth at the end of week 2 (cm)	Amount of growth at the end of week 3 (cm)	Total height grown (cm)
1	50	1.5	1.2	1.7	
2	100	2.0	2.2	2.1	
3	150	2.3	2.5	2.4	
4	200	1.2	1.2	0.5	

16. What are the *controls* in this experiment?

17. What *problem* do you think the scientists are testing?

18. What is the *independent variable*?

19. What is the *dependent variable*?

20. What is the total height grown for plant 1? Plant 2? Plant 3? Plant 4? You can complete the chart above.

21. Looking at the data, what is the relationship between the amount of water a plant receives and the plant's growth?

In 1887, a strange nerve disease attacked the people of the Dutch East Indies. The disease was beriberi. Symptoms of the disease included weakness and loss of appetite, and heart failure. Scientists thought the disease might have been caused by a bacteria. They injected chickens with bacteria from the blood of patients with beriberi. The injected chickens became sick. However, so did a group of chickens that were not injected with the bacteria. One of the scientists noticed something. Before the experiment, all of the chickens had eaten whole-grain rice. During the experiment, the chickens were fed polished rice. The scientist found that polished rice lacked thiamine, a vitamin necessary for good health.

22. What *problem* do you think the scientists are testing?

23. What is the *independent variable*?

24. What is the *dependent variable*?

25. What was the original *hypothesis*?

26. Did the results support this hypothesis? Explain.

In 1928, Sir Alexander Fleming was studying *Staphylococcus* bacteria growing in culture dishes. he noticed that a mold called *Penicillium* was also growing in some of the dishes. A clear area existed around the mold because all the bacteria that had grown in this area had died. In the culture dishes without the mold, no clear areas were present. Fleming hypothesize that the mold must be producing a chemical that killed that bacteria. he decided to isolate this substance and test it to see if it would kill bacteria. Fleming transferred the mold to a nutrient broth solution. This solution contained all the materials the mold needed to grow. After the mold grew, he removed it from the nutrient broth. Fleming then added the nutrient broth in which the mold had grown to a culture of bacteria. He observed that the bacteria died.

27. What *problem* do you think Fleming was testing?

28. What is the *independent variable*?

29. What is the *dependent variable*?

30. What was Fleming's *hypothesis*?

31. Should the hypothesis be supported or rejected based on the results of this experiment? Explain.