

## Designing Experiments

**Directions:** Discussing the Scientific Method is one thing; applying it and designing an experiment is much more intricate and requires complex thinking skills. Use the skills you have learned to analyze the following situation and answer the questions.

When cells grow uncontrollably and spread to the surrounding tissues, it is called cancer. Cancer can occur in any living organism, and if the growth of the cells continues, death can occur. Many cancers can be cured if detected and treated before the rapid spread into surrounding tissues occurs. Cancers are being studied extensively because of their impact on human beings. Many studies are done on mice because of the social and ethical implications of treating humans with cancer as lab subjects.

Suppose a scientist who has been studying cancer cells finds a chemical compound that might reduce the number of cancer cells. The scientist calls the compound Reduction, and plans a series of tests to see if the compound reduces the number of cancer cells in mice.

There were 10 mice in the small laboratory and all 10 mice have cancer. The 10 mice were divided into 2 groups of 5 each. Group A received injections of Reduction. Group B received injections of a sugar solution. The injections were given every 8 hours for 10 days.

Before beginning the injections, the number of cancer cells in a sample from each mouse was determined and recorded. After beginning the injections, the number of cancer cells in a sample from each mouse was determined and recorded every 2 days. If there was a reduction in the number of cancer cells, Reduction was working. If there was an increase in the number of cancer cells, Reduction was not working.

**Table with Some of the Data Collected from Some Mice**

Specimen	Number of Cancer Cells					
	Beginning	Day 2	Day 4	Day 6	Day 8	Day 10
A3	1000	1050	1050	1075	1100	1000
A5	500	600	650	725	800	825
B2	1500	1520	1530	1550	1600	1625
B3	1200	1225	1250	1260	1275	1290

1. What was the scientist's hypothesis?
2. What was the control group? the experimental group?
3. What was the independent variable? What was the dependent variable? (be specific for both)
4. Give all examples of what the controlled variables (constants or controls) should have been.
5. Did Reduction reduce the number of cancer cells in mice? Explain.
6. Was the scientist's hypothesis correct? Explain.
7. What could the scientist have done to make his results more valid?
8. Should the scientist report this on the experiment and the conclusion he made? Why or why not?