



# Review Questions

6. A drug company tested a new medication before putting it on the commercial market. Pills without medication were given to 500 test subjects in group A, and pills with medication were given to 500 subjects in group B. In this experiment, the individuals in group A served as the (1) host group (2) dependent variable (3) control (4) hypothesis
7. In order to find the percentage of organic matter in soil from several different locations, a student collected the samples, weighed them immediately, roasted them for several minutes in the flame of a Bunsen burner to burn off organic matter, and weighed them again. The student concluded that the difference between the first and second weights represented the weight of the organic matter in the soil. The most serious mistake that the student made in this experiment was in (1) taking large samples (2) weighing the samples before roasting them (3) failing to dry the samples before first weighing them (4) assuming that roasting could remove the organic matter
8. In an investigation to determine the effects of environmental pH on the germination of dandelion seeds, 25 dandelion seeds were added to each of five petri dishes. Each dish contained a solution that differed from the others only in its pH, as shown below. All other environmental conditions were the same. The dishes were covered and observed for 10 days. The data table the student designed is shown below.
- Using one or more complete sentences, state the independent variable in this investigation.

The Effect of pH on Seed Germination		
Petri Dish	pH of Solution	Number of Seeds Germinated
1	9	
2	8	
3	7	
4	6	
5	5	

Base your answers to questions 9–11 on the information below.

A student placed five geranium plants of equal size in five environmental chambers. Growing conditions were the same for each plant except that each chamber was illuminated by a different color of light of the same intensity. At the end of 20 days, plant growth was measured.

9. State a possible hypothesis for this experiment.
10. What control should be used in this experiment?
11. Describe one modification you would make in the design of this experiment to make the results more reliable.
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12. A student wants to shorten the ripening time for tomatoes. He predicts that the more water the seedlings receive, the faster their tomatoes will ripen. To test this prediction, he grows 20 tomato plants in a garden in full sunlight that has dry soil and 20 in a garden in a shadier location where there is greater moisture content in the soil. He then records the time it takes for fruit to develop and ripen on the plants in each garden location. State a serious error the student made with the design of this experiment.
13. In attempting to demonstrate the effectiveness of a new vaccine, a scientist performed these experimental procedures:
- One hundred genetically similar rats were divided into two groups of 50 rats each (group A and group B).
  - Each rat in group A was given an injection of the vaccine in a glucose-and-water solution.
  - Each rat in group B was given an injection of the glucose-and-water solution containing no vaccine.
  - After several weeks, all rats in both groups were exposed to the disease for which the vaccine was developed.
- What dependent variable was studied in this experiment?
14. A new drug for the treatment of asthma is tested on 100 people. The people are evenly divided into two groups. One group is given the drug, and the other group is given a glucose pill. The group that is given the glucose pill serves as the (1) experimental group (2) limiting factor (3) control (4) indicator

15. As part of a laboratory experiment, a thin slice of peeled raw potato weighing 10 grams is placed in an oven at 80°C. After 5 hours, the potato sample is removed from the oven and weighed again. The purpose of this experiment might be to (1) test for the presence of starch in living tissues (2) isolate cells in various stages of cell division (3) determine the water content of potato tissue (4) study the rate of photosynthesis in potatoes

16. What is the function of a control group in an experiment?

17. Scientists breed mice to be as genetically alike as possible to use in experiments. What is the advantage of using such mice compared to mice that are not genetically similar? Why would cloned mice be even better?

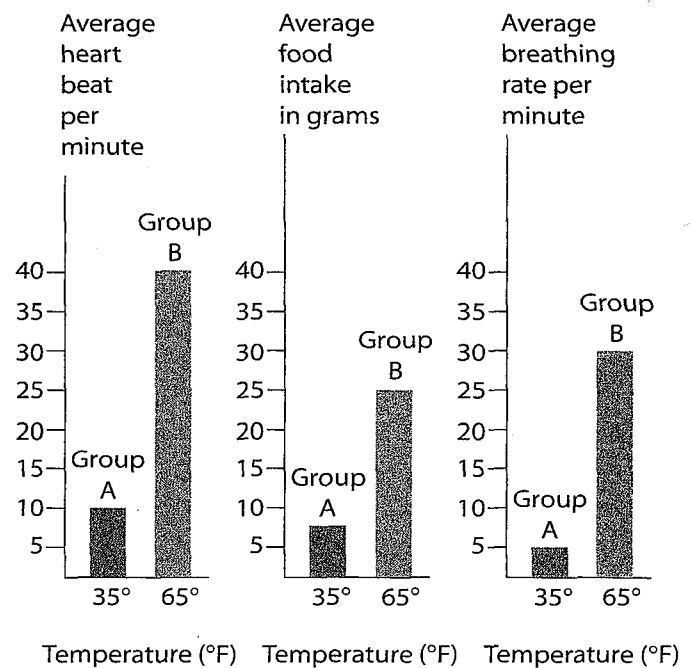
18. A student conducted an original, well-designed experiment, carefully following proper scientific procedure. In order for the conclusions to become generally accepted, the experiment must (1) contain several experimental variables (2) support the original hypothesis (3) be repeated to verify the reliability of the data (4) be conducted by a scientist

19. A student tossed a coin five times and observed results of four tails and one head. He concluded that when a coin is tossed, there is an 80% chance of getting a tail and a 20% chance of getting a head. The conclusion would be more valid if (1) only two tosses of the coin had been used (2) the weight of the coin had been taken into consideration (3) a greater number of tosses had been used (4) the surface the coin landed on had been taken into consideration

Base your answers to questions 20–22 on your knowledge of biology and the experiment described in the paragraphs and graphs below.

A group of 24 frogs was separated into two equal groups. Group A was placed in an environment in which the temperature was a constant 35°F. Group B was placed in a similar environment, except the temperature was a constant 65°F.

Equal amounts of food were given to each group at the start of the experiment and again every 24 hours. Immediately before each daily feeding, the excess food from the prior feeding was removed and measured. This allowed the scientist to determine the daily amount of food each group of frogs consumed. Each day, the heart rate and breathing rate of the frogs were checked. At the end of the experiment, the following bar graphs were prepared:



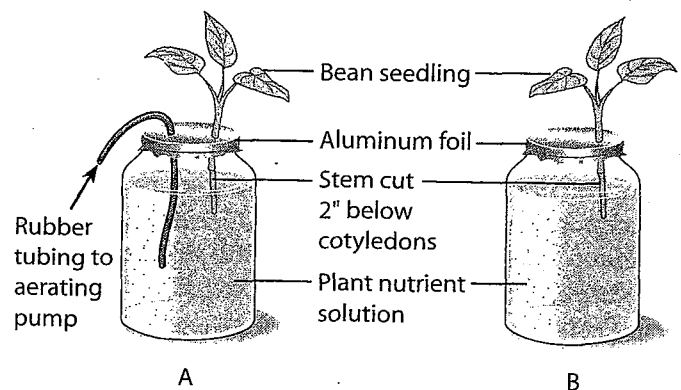
20. Using one or more complete sentences, state the hypothesis the scientist was most likely investigating in this experiment.

21. After examining the graphs, the scientist could reasonably assume that at a low temperature the frogs would (1) become more active (2) produce less carbon dioxide (3) eat more food (4) use more oxygen

22. The independent variable in this experiment was (1) heart rate (2) breathing rate (3) amount of food consumed (4) temperature of the environment

Base your answers to questions 23–25 on the experiment below and on your knowledge of biology.

After watching the behavior of earthworms in soil, a biology student suggested that the penetration of air into the soil promotes the root development of plants. The student then set up the following experiment.



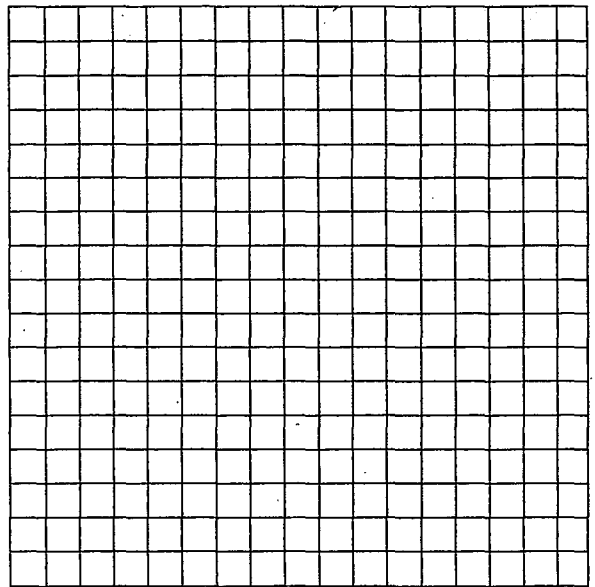
23. The important data to be recorded in this experiment will come from the observation of the increase in (1) leaf size (2) stem size (3) number of leaves (4) number of roots

- 24. State the hypothesis being tested in this experiment.
- 25. Describe what the student could do to this experiment to improve the reliability of the student's conclusions.

Base your answers to questions 26–29 on the information below and on your knowledge of biology.

A student was working on an investigation to measure the relative activity of an enzyme at various pH values. He collected the following data: pH 2, enzyme activity 10; pH 8, enzyme activity 50; pH 12, enzyme activity 10; pH 4, enzyme activity 20; pH 6, enzyme activity 40; pH 10, enzyme activity 40

- 26. What is the independent variable in this experiment?
- 27. Organize the data above by filling in the data table provided on the next page. Follow these directions when completing your data table.
  - Provide an appropriate title for the data table.
  - Fill in the first box in each column with an appropriate heading.
  - Arrange the data so that pH values are in increasing order.



- 29. According to the data, this enzyme would probably work best at what pH values? (1) 7 and 8 (2) 2 and 12 (3) 6 and 7 (4) 4 and 10

30. The drugs usually used to treat high blood pressure do not affect blood vessels in the lungs. Bosentan is a new drug being studied as a treatment for high blood pressure in the lungs. In an experiment, patients treated with Bosentan showed an improvement in the distance they could walk without fatigue within 12 weeks.

Design an experiment to test the effectiveness of Bosentan as a drug to treat high blood pressure in the lungs. In your answer be sure to:

- State the hypothesis of your experiment
- State how the control group will be treated differently from the experimental group.
- State the type of data that should be collected to determine if the hypothesis is supported.

Title:	

- 28. Construct a graph using the information in the data table, the following directions, and the grid provided in the next column.
  - Provide an appropriate title for the graph.
  - Make and label an appropriate scale on each axis.
  - Plot and connect the points. Surround each data point with a circle.

