

1. Nuclei of human cheek cells can be more readily observed under a compound microscope if the cells are first stained with
(1) bromthymol blue (2) Benedict's solution (3) Fehling's solution **(4) iodine solution**
2. 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 (3) support the original hypothesis
(2) be repeated to verify the reliability of the data (4) be conducted by a scientist
3. A study was conducted using two groups of 10 plants of the same species. During the study, the plants were placed in identical environmental conditions. The plants in one group were given a growth solution every 3 days. The heights of the plants in both groups were recorded at the beginning of the study and at the end of a 3-week period. The data showed that the plants given the growth solution grew faster than those not given the solution.
- When other researchers conduct this study to test the accuracy of the results, they should
(1) give growth solution to both groups
(2) make sure the conditions are identical to those in the first study
(3) give an increased amount of light to both groups of plants
(4) double the amount of growth solution given to the first group
4. Based on experimental results, a biologist in a laboratory reports a new discovery. If the experimental results are valid, biologists in other laboratories should be able to perform
(1) an experiment with a different variable and obtain the same results
(2) the same experiment and obtain different results
(3) the same experiment and obtain the same results
(4) an experiment under different conditions and obtain the same results
5. Antibiotic X has a unique characteristic in that it fluoresces (glows) when exposed to ultraviolet light. An investigator added antibiotic X to a dish containing a culture of cells. She exposed the cells to ultraviolet light and found that antibiotic X was highly concentrated within mitochondria. Which assumption could the investigator make regarding the results of this experiment?
(1) Antibiotic X could be used to identify mitochondria in living cells.
(2) Antibiotic X could be used to stain nuclei of living cells.
(3) All fluorescent materials will be absorbed by mitochondria.
(4) All antibiotics will be absorbed by mitochondria.
6. A biologist in a laboratory reports a new discovery based on experimental results. If the experimental results are valid, biologists in other laboratories should be able to
(1) repeat the same experiment with a different variable and obtain the same results
(2) perform the same experiment and obtain different results
(3) repeat the same experiment and obtain the same results
(4) perform the same experiment under different experimental conditions and obtain the same results
7. Which procedure must be followed for the results of an experiment to be considered valid?
(1) The experiment must be repeated a number of times and yield similar results.
(2) After one trial, the results of the experiment must be published.
(3) The results must be expressed in the form of a table or graph.
(4) The data must include metric measurements.

8. Substance X has a unique characteristic in that it fluoresces (glows) when exposed to ultraviolet light. An investigator added substance X to a dish containing a culture of cells. The investigator exposed the cells to ultraviolet light and found that substance X was highly concentrated only within mitochondria (cell organelles). Which assumption could the investigator make regarding the results of this experiment?

- (1) Substance X could be used to identify mitochondria in living cells.
- (2) Substance X could be used to stain nuclei of living cells.
- (3) All fluorescent substances will be absorbed by mitochondria.
- (4) All mitochondria synthesize fluorescent substances.

9. A scientist tested a hypothesis that white-tailed deer would prefer apples over corn as a primary food source. The findings of the test, in which the scientist claimed that the deer preferred apples, were published. Which research technique, if used by the scientist, might result in this claim being questioned?

- (1) The scientist observed four deer in different locations at various times of the day.
- (2) The scientist observed a total of 500 deer in 20 different locations at various times of the day.
- (3) The scientist observed 200 deer in various natural settings, but none in captivity.
- (4) The scientist observed 300 deer in various locations in captivity, but none in natural settings.

10. The diagram below shows two setups that were used to study bacterial growth. Each setup initially contained an equal number of the bacterium *E. coli* in different carbohydrate solutions. After one hour, a 1-milliliter sample was drawn from each tube and analyzed. The number of bacteria found in the sample from test tube 1 was higher than the number in test tube 2.



Which conclusion regarding this investigation is not valid?

- (1) All bacteria grow best in a solution of glucose.
- (2) *E. coli* grows better in a 10% solution of glucose than in a 10% solution of sucrose.
- (3) The type of sugar solution will make a difference in the rate of growth of *E. coli*.
- (4) The rate of growth of *E. coli* depends on the type of carbohydrate present.

11. To test the effect of hormones on plant growth, six potted plant seedlings of the same species were measured and then sprayed with auxin (a growth hormone). After four weeks of growth under ideal conditions, the plants were measured again. To set up a proper control for this experiment, the investigator should

- (1) spray the same plants with different amounts of auxin
- (2) spray auxin on six plant seedlings of the same species and grow them in the dark for four weeks
- (3) wash the auxin off three of the plants after two weeks
- (4) grow another six plant seedlings of the same species under the same conditions, spraying them with distilled water only

12. The current knowledge concerning cells is the result of the investigations and observations of many scientists. The work of these scientists forms a well-accepted body of knowledge about cells. This body of knowledge is an example of a

- (1) hypothesis
- (2) controlled experiment
- (3) theory
- (4) research plan