Biology blizzard bag 1

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. *Scientists publish the details of important experiments so that*
   a. *their work can be repeated.*
   b. *their experimental procedures can be reviewed.*
   c. *others can try to reproduce the results.*
   d. *all of the above*

____ 2. *The ability to reproduce results is an important part of any*
   a. *hypothesis.*
   b. *theory.*
   c. *law.*
   d. *experiment.*

____ 3. *Biology is the study of*
   a. *the land, water, and air on Earth.*
   b. *all life.*
   c. *animals and plants only.*
   d. *the environment.*

____ 4. *Which of the following is NOT a characteristic of all living things?*
   a. *growth and development*
   b. *ability to move*
   c. *response to the environment*
   d. *ability to reproduce*

____ 5. *Which of the following characteristics of living things best explains why birds fly south for the winter?*
   a. *Living things respond to their environment.*
   b. *Living things maintain internal balance.*
   c. *Living things are made up of units called cells.*
   d. *Living things are based on a universal genetic code.*

____ 6. *Cell specialization in multicellular organisms allows cells to*
   a. *reproduce.*
   b. *perform different functions.*
   c. *respond to their environment.*
   d. *be less complex.*

____ 7. *The amount of light and temperature are examples of*
   a. *factors necessary for life.*
   b. *methods of energy production.*
   c. *factors to which living things respond.*
   d. *factors that affect reproduction.*

____ 8. *The process by which organisms keep their internal conditions relatively stable is called*
   a. *homeostasis.*
   b. *evolution.*
   c. *metabolism.*
   d. *photosynthesis.*

____ *10. What is the term for change over time?*
- *a. population*
- *b. Evolution*
- *c. Change*
- *d. be different*

____ *11. Unicellular organisms have offspring that are?*
- *a. 2 celled, and identical*
- *b. 1 celled, and identical*
- *c. 1 celled, and different*
- *d. 2 celled, and different*

____ *12. All living organisms must?*
- *a. reproduce and move*
- *b. be made of cells and drink water*
- *c. grow and use sunlight for energy*
- *d. contain DNA and be made of cells*

____ *13. The smallest unit of life is a?*
- *a. Organ*
- *b. Tissue*
- *c. Organelle*
- *d. cell*

____ *14. Asexual reproduction involves?*
- *a. A male and female*
- *b. Two genetically different parents*
- *c. One parent*
- *d. Two genetically alike parents*

15. Which of the following is *unethical* behavior in scientific investigations?
- a. allowing peers to review investigations
- b. following guidelines for medical experiments
- c. reporting inaccurate data
- d. basing investigations on someone else's work

16. As a characteristic of all living things, homeostasis relates most directly to which of the following biological themes?
- a. interacting systems
- b. scale and structure
- c. stability
- d. evolution

17. All living things maintain a balance within their cells and with the environment through the process of
- a. growth.
- b. development.
- c. homeostasis.
- d. evolution.

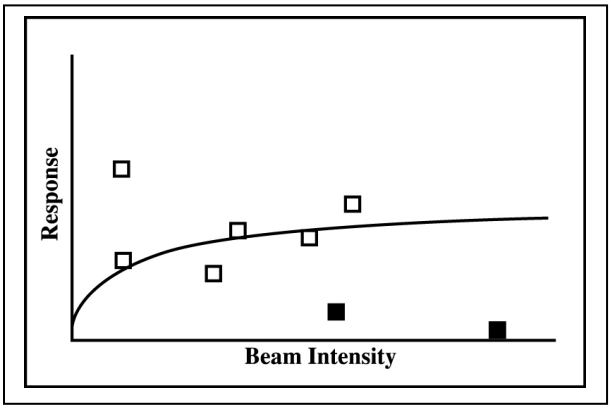
18. The energy that drives metabolism in animals comes from
- a. homeostasis.
- b. food.
- c. water.
- d. heredity.

19. Children tend to resemble their parents due to
    a. heredity.
    b. responsiveness.
    c. metabolism.
    d. homeostasis
20. A field of sunflowers facing the sun is an example of
    a. metabolism.
    b. growth.
    c. responsiveness.
    d. heredity.
21. The changes in human babies during their first year of life is an example of
    a. heredity.
    b. responsiveness.
    c. evolution.
    d. development.
22. Homeostasis means
    a. a change over long periods of time.
    b. keeping things the same.
    c. rapid change.
    d. the same thing as evolution.
23. Which of the following is not necessarily a distinct property of living things?
    a. homeostasis
    b. metabolism
    c. complexity
    d. reproduction
24. All organisms are composed of
    a. diatoms.
    b. cellulose.
    c. cells.
    d. None of the above

A SPECIFIC CASE: *Sandra eagerly accepted and worked on her assigned research project as a graduate student in the laboratory of Dr. Frederick, a leading scholar in the field. But after a few months she became concerned. Part of Dr. Frederick's work was supported by federal grants. However, the project on which she was working was totally supported by a grant from a single company. She had known this before coming to the lab and had not thought it would be a problem. But, she had not known that Dr. Frederick also was employed by the company as a consultant. She also heard from other graduate students that when it came time to publish her research, the research would be subject to review by the company to determine if any of her work was patentable.*

Experimental Techniques and the Treatment of Data

A SPECIFIC CASE: *Deborah, a junior, and Kathleen, a senior, have made a series of measurements on a new experimental semiconductor material using an expensive neutron source at a national laboratory. When they examine the data, they get the following data points. A newly proposed theory predicts results indicated by the curve.*



During the measurements at the national laboratory, Deborah and Kathleen observed that there were power fluctuations they could not control or predict. Furthermore, they discussed their work with another group doing similar experiments, and they knew that the other group had gotten results confirming the theoretical prediction and was writing a manuscript describing its results.

In writing their own results for publication, Kathleen suggests dropping the two anomalous data points near the abscissa (the solid squares) from the published graph and from a statistical analysis. She proposes that the existence of the data points be mentioned in the paper as possibly due to power fluctuations and being outside the expected standard deviation calculated from the remaining data points. "These two runs," she argues to Deborah, "were obviously wrong."

<u>Questions</u>:

1. *Describe potential sources of bias that may influence Sandra's research.*

2. *What strategy (checks) could reduce the influence of bias on her research?*

3. *What are the advantages and disadvantages of Sandra doing research sponsored entirely by a single company?*

4. *How would it affect further research?*

INTERPRETING AN EXPERIMENT

About three hundred years ago, the Italian scientist Francesco Redi wondered where maggots-small, wormlike organisms-came from. The popular belief at the time was that rotting meat turns into maggots. This idea, that living things could come from nonliving material, was called spontaneous generation. Redi designed an experiment to test this belief. He placed meat into eight jars. Four jars were left open; four were tightly sealed. Diagram 1 shows what Redi observed.

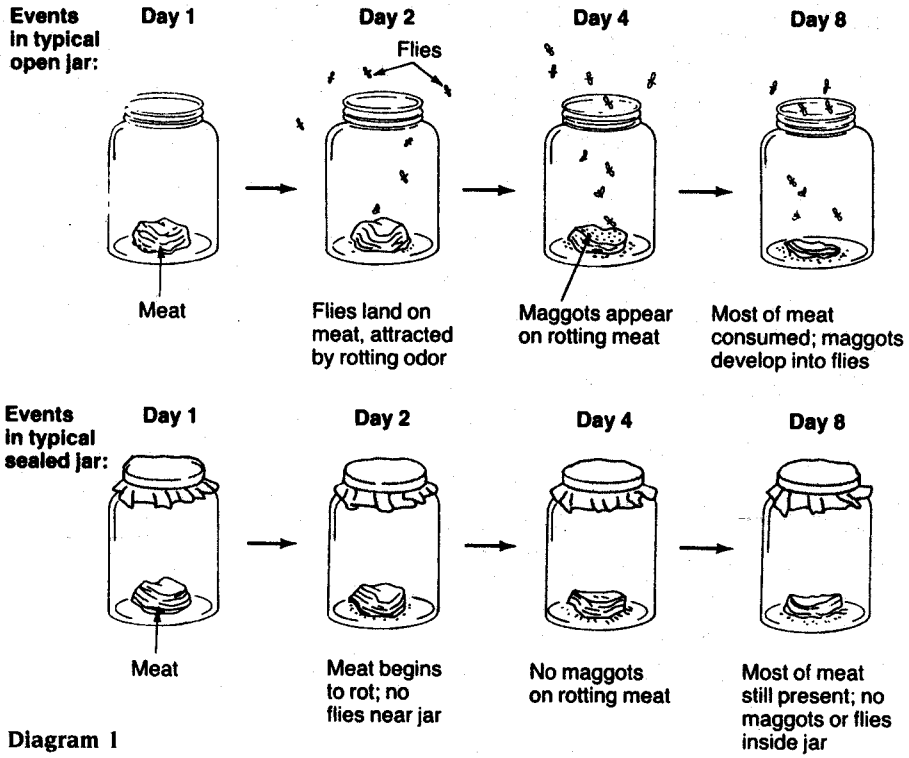


Diagram 1

As you can see, no maggots appeared on the rotting meat in the sealed jars. However, not everyone was convinced that Redi's experiment had disproved spontaneous generation. Some people claimed that fresh air was needed for spontaneous generation to occur. Therefore, Redi performed a second experiment. This time the jars were covered by fine netting, which allowed fresh air into the jars but prevented flies from entering and landing on the meat. Diagram 2, (next page), shows what Redi observed in his second experiment. Study both diagrams and then answer the questions.

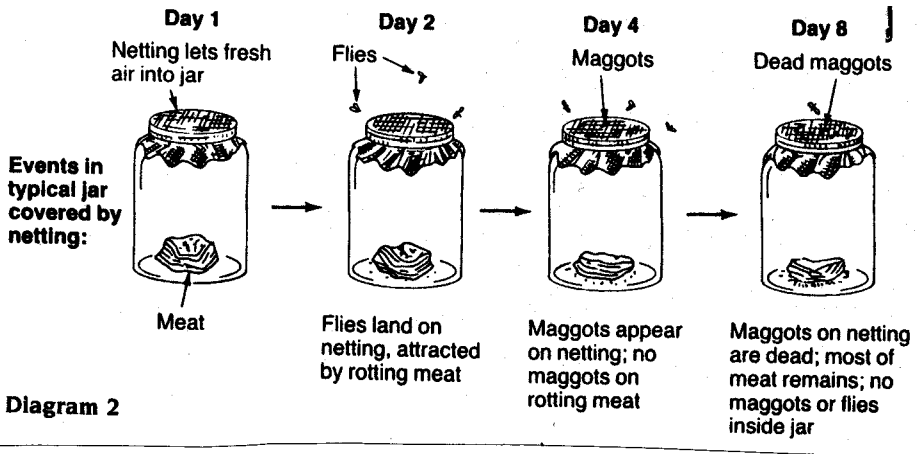


Diagram 2

18. Explain what Redi observed in both of his experiments. What clear evidence supports the source of the maggots and does this support spontaneous generation?

19. In the first experiment what is the independent variable? What is the dependent variable? What is the control?

20. Was this a controlled experiment? Explain your answer.