Tools of Environmental Science

MATCHING
In the space provided, write the letter of the description that best matches the term or phrase.

_____ 1. correlation
_____ 2. prediction
_____ 3. value
_____ 4. probability
_____ 5. experiment
_____ 6. conceptual model
_____ 7. hypothesis
_____ 8. statistics
_____ 9. data
_____ 10. observation

MULTIPLE CHOICE
In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

_____ 11. What essential characteristic does a good experiment have?
   a. A control group is given the experimental treatment.
   b. A single variable is tested.
   c. A control is used.
   d. both (b) and (c)

_____ 12. Why are mathematical models important?
   a. They are especially useful in situations with many variables.
   b. They can be used to create useful digital images.
   c. They can represent how a system or process works.
   d. all of the above

_____ 13. The average mass of a wolf in a pack of wolves is an example of
   a. mean.
   b. distribution.
   c. sample size.
   d. statistical population.
14. A model of a dinosaur is an example of a ________ model.
   a. graphical
   b. mathematical
   c. conceptual
   d. physical

15. The chance that an earthquake will occur in your town during the next year is an example of
   a. correlation.
   b. skepticism.
   c. risk.
   d. distribution.

16. Before you can make a decision using a decision-making model, what step must you take?
   a. Explore the consequences of each option.
   b. Consider which values apply to the issue.
   c. Gather information.
   d. all of the above

17. If you consider what will protect our natural resources when making an environmental decision, you are examining a(n) ________ value.
   a. ethical/moral
   b. aesthetic
   c. scientific
   d. environmental

18. Your county is considering buying land to form a nature preserve. On this land, an endangered species of mammal is known to breed. Which of the following is a possible positive long-term consequence of this decision?
   a. The population of the endangered species increases.
   b. Habitat destruction is immediately slowed.
   c. Environmental controls are made less strict outside the preserve area.
   d. Habitats outside the preserve area are damaged by over development.

19. In a scientific investigation, it is important that the number of objects or events being sampled be
   a. a guess of how likely an unwanted outcome will occur.
   b. large enough to give an accurate estimate for the whole population.
   c. equal to the mean number of objects or events not sampled.
   d. equal to the total statistical population.

20. A good hypothesis is more than a guess because it
   a. is based on intuition rather than observation.
   b. states what is likely to happen.
   c. makes logical sense.
   d. Both (b) and (c)
Chapter Test General

MATCHING    MULTIPLE CHOICE
1. g         11. d
2. j         12. a
3. d         13. a
4. i         14. d
5. h         15. c
6. e         16. d
7. a         17. d
8. f         18. a
9. b         19. b
10. c        20. c

Chapter Test Advanced

MATCHING    MULTIPLE CHOICE
1. c         10. d
2. b         11. c
3. e         12. b
4. d         13. b
5. a         14. a
6. i         15. c
7. h         16. a
8. g         17. f
9. f

SHORT ANSWER

17. Mathematical models can be used to represent how a system or process works. They are especially useful in situations with many variables such as weather forecasting. They can also be used to create useful images, such as digital satellite images. Possible examples include any equations familiar to the students.

18. Conceptual models can help explain how a system works or is organized. They help scientists understand the components of a system, or how something works or is put together. Examples include a flow chart of how heat is generated from burning coal, and a diagram of how oxygen cycles through the atmosphere.

19. Answers may vary. Sample answer: Physical models are three dimensional models you can touch, such as a model of the structure of DNA or a hydrogen atom. Graphical models include maps and charts, such as a road map and a star chart.

20. The sample size is 20 rolls of the die.
21. The result was two out of 20, or 2/20 or 0.1, which is less than the calculated probability of 1/6 or 0.17.
22. Because the two probabilities were different, you should infer that the sample size was too small, resulting in an inaccurate result. For example a sample size of one roll is unlikely to match the calculated probability, while a sample size of 1,000 rolls is likely to match the calculated probability unless the die was one of a pair of “loaded” or “weighted” dice.

23. First I would find out how many students are in the school and what all their ages are. Then I would add all the ages and divide the sum by the number of students in the school. This would give me the “arithmetic average” or “mean.”

24. The scientist demonstrated skepticism about the lack of natural water sources and curiosity when she investigated the dark rock section.

25. Skepticism and curiosity lead the scientist to make the important discovery of a water source, adding to scientific knowledge about the desert.