

## Skills Worksheet

**Concept Review****MATCHING**

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

- |                           |  |
|---------------------------|--|
| _____ 1. control group    | a. a logical statement about what will happen in an experiment                     |
| _____ 2. prediction       | b. a verbal or graphical explanation for how a system works or how it is organized |
| _____ 3. physical model   | c. in an experiment, that which does not receive the experimental treatment        |
| _____ 4. risk             | d. a three-dimensional model you can touch   |
| _____ 5. conceptual model | e. principles or standards considered to be important                              |
| _____ 6. value            | f. the probability of an unwanted outcome  |
| _____ 7. experiment       | g. information gathered during an experiment                                       |
| _____ 8. statistics       | h. procedure designed to test a hypothesis   |
| _____ 9. data             | i. collection and classification of data   |

**MULTIPLE CHOICE**

Choose the best response. Write the letter of that choice in the space provided.

- \_\_\_\_\_ 10. When it is not possible to conduct an experiment, scientists test their predictions by
- |                            |                              |
|----------------------------|------------------------------|
| a. examining correlations. | c. testing for one variable. |
| b. using a control.        | d. remaining skeptical.      |
- \_\_\_\_\_ 11. An essential feature of every good experiment is that it should
- |                            |                     |
|----------------------------|---------------------|
| a. use a control.          | c. graph data.      |
| b. test a single variable. | d. Both (a) and (b) |
- \_\_\_\_\_ 12. The experimental method includes which of the following steps?
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| a. remaining skeptical, organizing data, and analyzing data                        |
| b. drawing conclusions, being open to new ideas, and communicating results         |
| c. observing, hypothesizing, predicting, experimenting, and communicating results  |
| d. being curious, imagining, being able to see patterns, observing, and predicting |
- \_\_\_\_\_ 13. What is not a description of a good hypothesis?
- |   |
|---|
| a. It makes logical sense.                                  |
| b. It is a testable explanation of an observation.          |
| c. It follows from what you already know about a situation. |
| d. It is a guess based on previous experiments.             |

**Concept Review** *continued*

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- \_\_\_\_\_ **14.** One of the key habits of mind of scientists is \_\_\_\_\_, which allows scientists to expand the boundaries of what we know.
- a.** intellectual honesty
  - b.** imagination
  - c.** replication
  - d.** correlation
- \_\_\_\_\_ **15.** A road map is an example of a
- a.** graphical model.
  - b.** mathematical model.
  - c.** conceptual model.
  - d.** physical model.
- \_\_\_\_\_ **16.** Statistics are not used by scientists to
- a.** compare data.
  - b.** analyze data.
  - c.** gather data.
  - d.** All of the above
- \_\_\_\_\_ **17.** In a scientific investigation, the size of the sample population should be large enough to
- a.** reflect the probability of an unwanted outcome.
  - b.** give an accurate estimate of the whole population.
  - c.** closely resemble the system they represent.
  - d.** All of the above
- \_\_\_\_\_ **18.** If you consider what will add to our understanding of the natural world in making an environmental decision, you are examining a(n) \_\_\_\_\_ value.
- a.** ethical/moral
  - b.** aesthetic
  - c.** environmental
  - d.** scientific
- \_\_\_\_\_ **19.** What is the first step in an environmental decision-making model?
- a.** Explore the consequences of each option.
  - b.** Consider which values apply to the issue.
  - c.** Make a decision.
  - d.** Gather information.
- \_\_\_\_\_ **20.** When you examine a scientific value in making an environmental decision, you
- a.** consider what is right or wrong.
  - b.** consider what will maintain human health.
  - c.** use your understanding of the natural world.
  - d.** think about what will promote learning.
- \_\_\_\_\_ **21.** Which of the following is a possible short-term consequence of creating a nature preserve?
- a.** decrease in habitat destruction
  - b.** an increase in property values near the preserve
  - c.** a restriction of recreational activities on private land within the preserve by state officials
  - d.** all of the above

## Skills Worksheet

**Critical Thinking****ANALOGIES**

In the space provided, write the letter of the pair of terms or phrases that best completes the analogy shown. An analogy is a relationship between two pairs of words or phrases written as **a : b :: c : d**. The symbol **:** is read "is to," and the symbol **::** is read "as."

- \_\_\_\_\_ 1. gathering information : decision-making model ::  
 a. variable : experimental model  
 b. experimental model : correlations  
 c. observing : experimental model  
 d. map : graphical model
- \_\_\_\_\_ 2. mathematical formula : mathematical model ::  
 a. mass = density/volume : equation  
 b. flow chart : conceptual model  
 c. risk : probability  
 d. statistics : probability
- \_\_\_\_\_ 3. curiosity : imagination ::  
 a. sample size : number of objects      c. creativity : art  
 b. ability : inability                      d. creativity : intellectual honesty
- \_\_\_\_\_ 4. values : principles ::  
 a. models : representations              c. silence : noise  
 b. noise : airplanes                      d. airplanes : models
- \_\_\_\_\_ 5. positive short-term consequence : slowing of habitat destruction ::  
 a. positive long-term consequence : population increase  
 b. geology : environmental science  
 c. slowing of habitat destruction : no consequence  
 d. short-term consequence : negative short-term consequence
- \_\_\_\_\_ 6. good scientists : scientific habits of mind ::  
 a. hypothesis : prediction  
 b. bad experiments : one variable and a control  
 c. good experiments : one variable and a control  
 d. good decisions : models
- \_\_\_\_\_ 7. mean : average ::  
 a. distribution : normal                      c. data : graph  
 b. hypothesis : guess                      d. sample : group of individuals
- \_\_\_\_\_ 8. experimenting : correlating ::  
 a. directly counting : estimating      c. observing : drawing conclusions  
 b. reflecting : mirror                      d. guessing : estimating

**Critical Thinking** *continued*

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**INTERPRETING OBSERVATIONS**

**Read the following paragraph, and answer the questions below.**

Students noticed that, since the time that grass began to grow on a barren hillside, less soil and water seemed to wash down the slope into the school yard during a rainstorm. The students thought that the grass helped hold the soil in place on the slope. The students predicted that more soil would wash down a slope without grass than a slope covered with grass. To find out if they were correct, the students conducted an experiment with three identical rectangular pans of soil. In pan 1, they planted grass seed and allowed it to grow to several centimeters tall. The students filled pan 2 with only soil. Then they took pan 1 and pan 2, and propped up at one end of each pan 15 cm high to create a slope. Pan 3, also filled with only soil, was propped up at one end 5 cm at one end to create a slope. Students poured equal amounts of water on the raised end of each pan and the students recorded their observations.

**9.** What hypothesis did the students test in their experiment?

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**10.** What prediction did the students use to test their hypothesis?

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**11.** Which steps in the experimental method are missing from the description above?

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**12.** Did the students conduct a good experiment? Explain your answer.

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**Critical Thinking** *continued*

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**AGREE OR DISAGREE**

**Agree or disagree with the following statements, and support your answer.**

**13.** You encounter or use statistics and probability often in your day-to-day life.

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**14.** The positive long-term consequences of car pooling or taking a bus to school outweigh the negative short-term consequences of driving yourself to school.

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**15.** In order to become a good scientist, a scientist should believe everything he or she is told by other scientists and should disregard the new ideas of nonscientists.

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**Critical Thinking** *continued*

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**REFINING CONCEPTS**

**The statements below challenge you to refine your understanding of concepts covered in the chapter. Think carefully, and answer the questions that follow.**

**16.** What impact might the increasing worldwide use of the Internet have on the final step of the experimental method?

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**17.** Describe two ways in which you can benefit from applying scientific habits of mind in your everyday life.

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**18.** When lawmakers consider legislation concerning environmental disasters, how might they be able to use their knowledge of “risk?”

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