

INQUIRY SKILL FOCUS Assessment

Warm-Up: Skills Test C - Design Experiments

Questions 1–10: Match each term in Column 1 with its correct definition from Column 2. Write the letter of the correct answer on the line at the left. Be sure to notice that Column 2 has more definitions than you need to use.

Column 1	Column 2
_____ 1. data	A. any factor that can change in an experiment
_____ 2. variable	B. a careful, orderly test of a hypothesis
_____ 3. designing an experiment	C. a statement that describe how a particular variable is to be measured, or how a term is to be defined
_____ 4. scientific question	D. comparing an object or process to a standard
_____ 5. operational definition	E. the information gained through observations and measurements
_____ 6. drawing conclusions	F. keeping all the relevant condition in an experiment the same expect for the manipulated variable
_____ 7. experiment	G. a question about the natural world that can be answered by gathering evidence
_____ 8. interpreting data	H. finding meaning in data by looking for patterns or trends
_____ 9. hypothesis	I. making a careful, compete plan for testing a hypothesis
_____ 10. controlling variables	J. making a statement that sums up what you have learned from an experiment
	K. using one or more of the five senses to gather information about the world
	L. a possible explanation that is tested by an experiment

Skills Test C: Design Experiments (continued)

Questions 11–20: Column 1 below describes steps that may occur before, during, or after an experiment. Column 2 describes a specific experiment. On the line at the left, write the letter(s) from Column 2 that matches the description in Column 1. Some items from Column 1 may have more than one matching answer from Column 2.

Column 1

- _____ 11. conclusion
- _____ 12. controlling variables
- _____ 13. hypothesis
- _____ 14. interpreting data
- _____ 15. materials
- _____ 16. observations
- _____ 17. operational definition
- _____ 18. procedure
- _____ 19. scientific question(s) that led to the experiment
- _____ 20. scientific question(s) that resulted from the experiment

Column 2

- A. On a cold winter day, Shelly, who lives near a lake, visits her friend Roberto, who lives near the ocean. Shelly is surprised to see that the ocean water has no ice on it. The lake near her home is covered with thick ice.
- B. Shelly asks, “Why doesn’t the ocean water have ice on it when the lake does?”
- C. Roberto responds, “Well, the lake has fresh water in it. Ocean water contains lots of salt. The salt causes the water to freeze at a lower temperature than usual. I know, because I did an experiment on this in school.”
- D. Shelly says, “I wonder why that happens. Does it just happen with salt? Would the same thing happen with sugar?”
- E. Shelly and Roberto decide to test this idea, so they write: “If water contains sugar, then it will freeze at a lower temperature than fresh water.”
- F. They write out these plans:
 - a. Fill Container *A* and Container *B* with tap water.
 - b. Dissolve 15 grams of sugar in Container *A*.
 - c. Place both containers in a freezer kept at -1°C .
 - d. Leave the containers in the freezer for 24 hours and then observe the contents.

- G.** They write a list of what they will need: 2 plastic containers, tap water, 15 grams of sugar, 2 wooden stirrers, a freezer.
- H.** In their notes, they write: “The two containers must be made of the same material and be the same size and shape. The amounts of water must be the same.”
- I.** They decide that if they tilt the container and see any movement in the water, it is not yet frozen. If they tilt it and they observe no change in the water, it is frozen.
- J.** After 24 hours, Shelly and Roberto tilt the containers. They see that the contents of Container *A* flow when they tilt the container. The contents of Container *B* do not move when they tilt the container.
- K.** They write, “The fresh water froze. The water with sugar dissolved in it did not freeze.”
- L.** They write, “Water that contains sugar freezes at a lower temperature than water without sugar.”
- M.** They then raise these questions: “How cold would it have to get before the water with sugar or salt would freeze? Does it matter how much sugar or salt is in the water? Why does sugar or salt in the water change the way water freezes?”

Skills Test C: Design Experiments (*continued*)

Questions 21–25: Write the letter of the correct answer on the line at the left.

- _____ 21. Which of the following is an example of a scientific question?
- a. Is experimenting on white mice right or wrong?
 - b. Should scientists make as much money as athletes?
 - c. Does tanning harm the skin?
 - d. Who is the most famous scientist in the world?
- _____ 22. Which of the following is an example of a properly written, testable hypothesis?
- a. People should taste this new health food and see whether it makes them stronger.
 - b. When dog owners don't feed their puppies Brand *A* food, the puppies do not grow properly.
 - c. If Francisco had added the leaves to the compost pile last year, he wouldn't have to buy organic fertilizer now.
 - d. If it is dark, then an owl will find a mouse by the sound the mouse makes.
- _____ 23. Which of the following might be the materials list for an experiment?
- a. data tables and graphs
 - b. meters, liters, and kilograms
 - c. plastic containers, soil, water, thermometers, and plants
 - d. temperature, light, and time
- _____ 24. In an experiment studying the effects of acid rain on pond water, which of the following could be the control?
- a. container of vinegar to represent the acid
 - b. the pond
 - c. a container of pond water with nothing added to it
 - d. a container of pond water with acid added to it
- _____ 25. In an experiment investigating how far model airplanes with different shapes can travel, which of the following are variables that need to be controlled?
- a. type of wood used; mass of the planes; glue used; air currents and breezes
 - b. whether the shapes look like real airplanes; how old the models are
 - c. what time the test starts; the time it takes for each test
 - d. whether the models land smoothly or become damaged during the test