Biology for a Changing World 2e, Chapter 1 Test Bank

1. A hypothesis is a statement that
    A. can be changed throughout the experiment.
    B. can be avidly accepted by scientists.
    C. can be tested and proven true.
    D. can be tested and proven false.
    E. precedes a theory.

Answer: D
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: understanding scientific studies

2. Where are the most reliable scientific results published?
    A. in the daily news
    B. in science magazines
    C. in science journals
    D. on scientific websites
    E. in peer-reviewed scientific journals

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: understanding scientific studies

3. Imagine that you read a study of the effects of exercise on the prevalence of heart disease in women ages 35 to 65. Although you believe the experiment was carried out in an appropriate manner, you still do not believe the results. You decide to conduct your own study to see for yourself. To determine if the results of the first study are valid, should you do everything the same way as the first study or would it be better if you changed several of the variables, such as studying men, or looking at different age groups? Explain your choice, and explain the consequences of the other choice.

    Answer: To be most comparable, you would conduct your new study in the exact same manner as the previous study. If you were to change any of the variables, then the results might change as well; thus, you would not be able to compare your new results to the first study.

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Easy
Important Words/Concepts: contradictory results, experimental differences, process of science

4. The scientific process from beginning to end can be outlined as:
    A. hypothesize, test, analyze, and conclude.

B. observe, hypothesize, test, analyze, and conclude.
C. observe, question, test, analyze, and conclude.
D. hypothesize, test, analyze, and conclude.
E. observe, test, hypothesize, analyze, and conclude.

Answer: B
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: the scientific process, peer review

5. Observations used as scientific evidence should NOT include
   A. peer-reviewed scientific literature.
   B. previous data generated.
   C. observations about past work.
   D. anecdotal evidence.
   E. other people's data.

Answer: D
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: the scientific process, peer review

6. A hypothesis can be everything EXCEPT
   A. proven true.
   B. not supported.
   C. supported.
   D. falsifiable.
   E. testable.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: the scientific process, peer review

7. All of the following are true of a scientific hypothesis EXCEPT
   A. it is an opinion.
   B. it is an educated guess to explain an observation.
   C. there must be a way to test the hypothesis.
   D. there must exist a possibility of obtaining a result that could prove your hypothesis wrong.
   E. there must exist a possibility of obtaining a result that could support your hypothesis.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: hypothesis, process of science

8. Which of the following places the steps of the scientific process in the correct order?
    A. experiment→questions→hypothesis→read literature→conclusions
    B. questions→experiment→read literature→hypothesis→conclusions
    C. read literature→experiment→questions→conclusion→hypothesis
    D. questions→read literature→hypothesis→experiment→conclusions
    E. read literature→questions→experiment→hypothesis→conclusions

Answer: D
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: hypothesis, process of science

9. Why can't science answer questions about the existence of a supernatural being?

    Answer: Science requires a hypothesis that is testable and falsifiable. There is no way to test the existence of a supernatural being, nor is it possible to prove that something does not exist.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: hypothesis, process of science

10. A scientific hypothesis must have two very important features. What are they?

    Answer: A scientific hypothesis must be testable and falsifiable.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: hypothesis, process of science

11. What does it mean to say that a scientific study has undergone "peer review"? Why is this important?

    Answer: When a study has undergone peer review it means that other scientists have examined the study to make sure the experiment was carried out properly and that the conclusions are appropriate. This is important to weed out studies with questionable methods and results to ensure scientific accuracy and reliability.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: peer review, process of science

12. Why do scientists say that a hypothesis is "supported" and never say that a hypothesis has been "proven"?

Answer: Because it is impossible to test a hypothesis under every possible scenario; there is no way to "prove" a hypothesis. Thus, a hypothesis can only be supported.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: hypothesis, process of science

13. What are the steps used in the process of a scientific study?
    A. making initial observations that generate questions, studying the literature, generating hypotheses that are both testable and falsifiable, testing the hypothesis with experiments and analyzing the data, and making conclusions that are supported by data
    B. generating hypotheses, conducting experiments, researching literature, making conclusions supported by the literature, and analyzing data
    C. making initial observations that generate questions, generating hypotheses, studying the literature, conducting experiments based on literature, and making conclusions supported by data
    D. generating hypotheses based on published literature, testing hypotheses, and making conclusions supported by data
    E. None of the above.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific studies, experimental design

14. What is the first step in the scientific process?
    A. designing an experiment
    B. choosing test subjects
    C. peer review of your study
    D. analyzing your data
    E. formulating a hypothesis

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific process, hypothesis, design

15. What is the importance of peer review in the scientific process?
    A. It helps a scientist formulate a hypothesis.
    B. It helps a scientist choose test subjects.
    C. It ensures that a study has been appropriately designed and correctly interpreted.

D. It helps the scientist collect data.
E. It is the first step in any scientific study.

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific process, peer review

16. I notice that all the students in my class seem very drowsy 45 minutes into my class period. Knowing that it could not possibly be my lecture putting them to sleep, I consider other factors such as the fact that my class is at 5pm and the sun is usually setting at that time of the day, which I think may make people drowsy. What type of evidence am I collecting in making this observation?
    A. experimental
    B. anecdotal
    C. peer reviewed
    D. coincidental
    E. untestable

Answer: B
DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific process, evidence, anecdotal

17. What are the criteria for a good hypothesis?
    A. It must be realistic and have only one possible result.
    B. It must have only one possible result and be peer reviewed.
    C. It must be based on anecdotal evidence and be testable.
    D. It must be based on peer-reviewed journal articles and be realistic.
    E. It must be testable and falsifiable.

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: scientific process, hypothesis, design

18. Based on previous published data and some preliminary experiments done in my lab, I hypothesize that a drug called “shrinkase” will inhibit the growth of a particular type of cancerous tumor. What is my next step in the scientific process?
    A. find people with that kind of tumor
    B. obtain a large supply of shrinkase
    C. determine what my control and experimental groups will be
    D. submit my hypothesis for peer review
    E. analyze the results of my experiments

Answer: C
DQ: How is the scientific method used to test hypotheses?

Type: Use It
Difficulty: Hard
Important Words/Concepts: scientific process, hypothesis, design, experiment

19. What conclusions can be drawn from a hypothesis?
    A. If evidence supports the hypothesis, the hypothesis is considered scientific theory.
    B. If evidence rejects the hypothesis, then it can be removed from the list of possible answers to the original question.
    C. If data support the hypothesis, then it is accepted and further testing is not warranted.
    D. If there is data to support the hypothesis, then it is accepted until further testing suggests otherwise.
    E. Both B and D.

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: experiment, design, statistical significance, sample size

20. Evidence that is not based on systematic scientific study is known as ____ evidence.
    A. empirical
    B. causational
    C. anecdotal
    D. logical
    E. statistical

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: anecdotal evidence

21. If the results of an experiment contradict the hypothesis, you have _____ the hypothesis.
    A. supported
    B. falsified
    C. proved
    D. failed
    E. verified

Answer: B
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: hypothesis testing

22. Scientific journals send out potential articles to other scientists working in the same research area, and those scientists make comments regarding the research. This is known as
    A. jurisprudence.
    B. peer rebuttal.

C. journalistic integrity.
D. journalistic license.
E. peer review.

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: peer review

23. A hypothesis must be ____ and _____.
A. logical; verifiable
B. logical; falsifiable
C. testable; logical
D. irrefutable; testable
E. testable; falsifiable

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: hypothesis

24. You have the following known facts: Smoking causes accumulation of materials in the lungs, thereby decreasing oxygen-absorbing capability of the lungs. Long-term smoking causes more accumulation of materials in the lungs. Decreased lung capacity increases the workload of the heart. Which of the following hypotheses can you make from these observations?
A. People who never smoke will never develop lung problems.
B. Long-term smokers have poorer heart health than non-smokers.
C. New smokers have poorer heart health than long-term smokers.
D. Stopping smoking eliminates lung problems within two years.
E. Stopping smoking eliminates heart problems within two years.

Answer: B
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: hypothesis

25. A hypothesis is often called an educated guess. Why is it a guess and why is it educated?

Answer: It is a guess because it is a possible answer to a question that has been formulated but not yet answered. It is educated because that question and the possible answer are both based on prior knowledge gained from previous observation and research.

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Easy

Important Words/Concepts: hypothesis

26. A controlled experiment describes the use of
   A. separate control and experimental groups.
   B. precise measurements.
   C. accurate and careful measurements.
   D. more than one variable changing separately.
   E. careful testing of the hypothesis.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: independent and dependent variable, control and experimental groups

27. In a controlled experiment, the control and experimental groups differ in the
   A. environmental variable.
   B. controlled variable.
   C. independent variable.
   D. dependent variable.
   E. result.

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: independent and dependent variable, control and experimental groups

28. A placebo is given to the:
   A. dependent group.
   B. control group.
   C. independent group.
   D. experimental group.
   E. variable group.

Answer: B
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: independent and dependent variable, control and experimental groups

29. In a controlled experiment usually only one factor is changed, which is the
   A. placebo.
   B. controlled variable.
   C. coordinate variable.
   D. independent variable.

E. dependent variable.

Answer: D
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: independent and dependent variable, control and experimental groups

Use the following information to answer Questions 30-33.

To test the effectiveness of a new drug designed to improve concentration in children with hyperactivity disorder, a researcher divided 100 children with hyperactivity disorder into two groups of 50 children each. First, both groups received a test to determine the length of time they could study a word list before their attention wandered. Then, group 1 received the new drug while group 2 received a sugar pill. One hour later, both groups took the concentration test again.

30. Which group is the experimental group and which is the control group?
Answer: Group 1 is the experimental group; group 2 is the control group.

31. Why did group 2 receive a sugar pill instead of simply not taking anything at all?
Answer: Group 2 received the sugar pill so that as many variables as possible would be the same between the two groups.

32. What is the independent variable in this study?
Answer: The independent variable is the drug.

33. What is the dependent variable in this study?
Answer: The dependent variable is attention span.

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Hard
Important Words/Concepts: control group, dependent variable, experimental group, independent variable, process of science

34. A study is conducted to see if walking reduces joint stiffness in people suffering from arthritis of the knee. Half the participants are instructed to walk an additional 1 mile every day, while the other half are told to go about their normal daily routine with no additional exercise. In this study, the group that walks an extra mile every day is referred to as the
    A. control group.
    B. experimental group.
    C. placebo group.
    D. dependent group.
    E. independent group.

Answer: B

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Hard
Important Words/Concepts: control group, dependent variable, experimental group, independent variable, placebo, process of science

35. A study was conducted to determine if the growth rate of babies differs between babies that are bottle-fed and babies that are breast-fed. In this experiment, growth rate is referred to as the
    A. controlled variable.
    B. experimental variable.
    C. dependent variable.
    D. independent variable.
    E. placebo variable.

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: control group, dependent variable, experimental group, independent variable, placebo, process of science

36. Two groups of people are given a drug that they are told will make them drowsy. However, only one group actually receives this drug, while the other group secretly receives a sugar pill. Strangely, both groups report feeling very tired 30 minutes later. The group receiving the sugar pill is said to be experiencing the
    A. control effect.
    B. experimental effect.
    C. dependent effect.
    D. independent effect.
    E. placebo effect.

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: control group, dependent variable, experimental group, independent variable, placebo, process of science

37. What is a placebo treatment and why is it important in a properly designed experiment?

    Answer: A placebo treatment is a fake treatment given to the control group to mimic the experience of the experimental group. It is important to keep as many factors as possible identical between the experimental and control groups so that only the variable being studied is different. By doing this, you ensure that the result you observe is due to the experimental factor and not to any other unknown factor.

DQ: How is the scientific method used to test hypotheses?

Type: Know It
Difficulty: Hard
Important Words/Concepts: control group, experimental group, placebo, process of science

38. Describe the features of an experimental group versus a control group—for example, in an experiment whose hypothesis is "consuming coffee improves memory."

    Answer: The experimental group will contain subjects who are observed under the conditions being tested. In this case, experimental and control groups would both have their memories tested. The experimental group would be individuals who have had caffeinated coffee versus the control group, who would have had decaf coffee (no caffeine).

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: experimental, control, experiment

39. What is the importance of a placebo?
    A. It allows the researcher to treat control and experimental groups differently while allowing them to believe they are being treated the same.
    B. It allows the researcher to treat control and experimental groups the same while allowing them to believe they are being treated differently.
    C. It allows the researcher to use an experimental drug on more people.
    D. It removes the need for a control group.
    E. All of the above.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: experimental, control, experiment, placebo

40. In a well-designed experiment the independent variable
    A. does not depend on another factor or condition.
    B. changes from subject to subject randomly.
    C. can never be manipulated by the researcher.
    D. will depend on the dependent variable.
    E. None of the above.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: experimental, control, independent variable

Use the following information to answer Questions 41-43.

A scientific study looked at the effect of tanning beds on DNA damage. The scientists took skin cells and exposed them to UV radiation (the type used in indoor tanning beds) for different lengths of time: some for 1 minute, some for 5 minutes, some for 15 minutes, and some for 30 minutes. They then looked for signs of DNA damage and compared the results to cells that had never been exposed to UV light.

41. What is the independent variable in this experiment?
    A. the number of skin cells
    B. the type of light
    C. the length of time the cells are exposed to UV light
    D. the untreated cells
    E. the amount of DNA damage in the cells

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Hard
Important Words/Concepts: experimental, control, independent variable

42. What is the control in this experiment?
    A. the number of skin cells
    B. the type of light
    C. the length of time the cells are exposed to UV light
    D. the untreated cells
    E. the amount of DNA damage in the cells

Answer: D
DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Hard
Important Words/Concepts: experimental, control, independent variable

43. What is the independent variable in this experiment?
    A. the number of skin cells
    B. the type of light
    C. the length of time the cells are exposed to UV light
    D. the untreated cells
    E. the amount of DNA damage in the cells

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Hard
Important Words/Concepts: experimental, control, independent variable

44. You finish a research project and submit your findings to a journal for peer review. The reviewers decide that they do not think your experimental results were convincing enough to support or disprove your hypothesis. What is your next step?
    A. cry

B. formulate a new hypothesis that better fits your data
C. design and carry out more experiments to support or disprove your hypothesis
D. reanalyze your data
E. fix your results so they better fit your hypothesis

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Easy
Important Words/Concepts: experimental design, scientific process

45. A controlled experiment must
A. have a dependent variable.
B. have an independent variable.
C. be falsifiable.
D. be repeatable.
E. All of the above.

Answer: E
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: controlled experiment, variables

46. You are running an analysis on different food items to test for the presence of the major biological macromolecules starch, proteins, and lipids. For each test you examine four food items and distilled water. What is the role of the distilled water?

Answer: It is a control.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: control

47. Numerous studies have shown that the more often a person performs a workout routine that increases heart rate, the better their overall heart health is. You have two groups of individuals who are willing to participate in a heart-health experiment. Fifty are non-smoking males, ages 18 to 22, who work out three times per week. Fifty are non-smoking males, ages 18 to 22, who do not work out on a regular basis. In the experiment, they will step up and down on an 8-inch-high cinder block 120 times/minute for 3 minutes. Researchers will examine their heart rate before starting, immediately after they finish, and every minute after finishing until their heart rate returns to their original rate. Two common measures of heart health are the percentage increase in heart rate caused by exercise and the time the heart rate takes to return to the base rate. Based on these parameters, what is your hypothesis regarding the heart health and test performance of the two groups?

Answer: The non-exercising group will have a greater increase in heart rate and a longer recovery time than the exercising group, indicating an overall lower level of heart health in the non-exercising group.

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Easy
Important Words/Concepts: hypothesis, experimental design

48. You are performing a bacterial transformation where you are trying to transfer DNA that contains the gene for resistance to the antibiotic ampicillin into the bacterium *E. coli*. Ampicillin normally kills *E. coli*, but if you are successful in your transfer of the DNA, the *E. coli* will now be unaffected by ampicillin. *E. coli* grows best on Luria Broth agar plates. Giving a cold period and then a brief heat shock and a cold period has been shown to help bacteria cells take up pieces of DNA.

    You take some cultures of *E. coli*, add cold calcium chloride, keep these on ice for 15 minutes, heat shock them for 90 seconds, then chill them on ice for 1 minute before putting them onto Luria Broth agar plates with ampicillin and Luria Broth plates without ampicillin. These bacteria should be killed by the plates with ampicillin.

    You take some other cultures of *E. coli*, add cold calcium chloride, then add the new DNA, then keep these on ice for 15 minutes, heat shock them for 90 seconds, then chill them on ice for 1 minute before putting them onto Luria Broth agar plates that contain ampicillin and Luria Broth agar plates without ampicillin. If you successfully transferred the DNA, these bacteria should grow on the plates with ampicillin and the ones without ampicillin.

    In this experiment, why were the colonies without the added DNA and the colonies with the added DNA treated the same way (15 minutes cold, then heat shock, then cold)?

    Answer: As a control to show that you handled both types of *E. coli* colonies the same way. Even though there was no DNA to be taken up by the one set of *E. coli*, if you had not handled them the same as the ones with DNA, you might conclude that the cold/heat/cold treatment conferred the ability to resist ampicillin.

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Hard
Important Words/Concepts: control

49. Which of the following is an example of an everyday (non-scientific) theory?
    A. Objects are attracted to one another by gravity.
    B. Broccoli tastes better than cauliflower.
    C. All life forms are related to each other through common ancestry.
    D. All living things are made of cells.
    E. The universe was created from a large cosmic explosion.

Answer: B
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: process of science, theory

50. Which is NOT an everyday (non-scientific) theory?
    A. If you carry and umbrella it won't rain.
    B. Evolution occurs by natural selection.
    C. The freezer is the best place for valuables.
    D. Wearing bright clothes cheers one up.
    E. 3000 subjects perform better after a full night's sleep.

Answer: B
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific theory

51. Which of the following is NOT a scientific theory?
    A. Cells come from pre-existing cells.
    B. Objects are attracted to one another by gravity.
    C. A hypothesis supported by results from an experiment with 3,000 subjects.
    D. All life forms are related to each other through common ancestry.
    E. The universe was created from a large cosmic explosion.

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific theory

52. Explain why evolution is not dismissed as "just a theory" with reference to the Theory of Evolution.

Answer: Evolution has been supported by many experiments in many diverse fields. Fossils, comparative anatomy, biochemical, and biographical data support the theory of evolution by natural selection. Theories in science differ from the mainstream or colloquial interpretations, as scientific theories are based on results and conclusions from many experiments. Over time, supported hypotheses, backed by much data, become recognized as scientific theory.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific theory

53. What is the difference between a hypothesis and a theory?

Answer: A hypothesis is an explanation that may or may not have undergone scientific testing, whereas a theory is a hypothesis that has undergone numerous tests over many years and has accumulated a large body of evidence in support of the explanation.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: hypothesis, process of science, theory

54. A hypothesis is
    A. an idea that has been rigorously tested and never been disproven.
    B. an idea that has been rigorously tested and only been disproven a few times.
    C. an idea that can be tested and falsified.
    D. an opinion.
    E. an idea based on a person's experience or knowledge.

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: hypothesis, process of science, theory

55. A scientific theory is
    A. a hypothesis that has been rigorously tested and never been disproven.
    B. a hypothesis that has been rigorously tested and only been disproven a few times.
    C. a hypothesis that has been tested at least five times.
    D. an opinion.
    E. an idea based on a person's experience or knowledge.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: hypothesis, process of science, theory

56. Does science ever prove a hypothesis or theory? Why or why not?

Answer: Science never proves anything because no idea can be tested under every possible circumstance. Thus, the best science can do is rigorously test a hypothesis, and with rigorous testing comes increased support in favor of the hypothesis.

DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: hypothesis, process of science, theory

57. A scientific theory

A. is a hypothesis that has been upheld by many experiments.
B. is an uneducated guess.
C. has not been tested.
D. is an educated guess.
E. can never be proven wrong.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: theory, hypothesis

58. I observe that squirrels that live in the southeastern United States are much thinner than squirrels that live in the northeastern part of the country. I theorize that this is because the squirrels that live in the northeast have greater fat reserves for the winter months when food is scarce. Is this a scientific theory?
    A. Yes, it is a good educated guess.
    B. Yes, I am taking into consideration physiological reasons for their larger size, so it's scientific.
    C. No, it's just a hypothesis; it has not been proven to be true through extensive experimentation or quantification.
    D. No, it cannot be proven true.
    E. Yes, I theorized it so it qualifies as a theory.

Answer: C
DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Easy
Important Words/Concepts: theory, hypothesis

59. An idea that has been examined numerous times and has never been falsified may be called a
    A. theory.
    B. hypothesis.
    C. conclusion.
    D. conundrum.
    E. ideology.

Answer: A
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Easy
Important Words/Concepts: theory

60. In everyday usage, the word "theory" is used to mean an untested idea. Which of the following scientific terms is most similar to the everyday usage of "theory"?
    A. concept
    B. conclusion
    C. observation

D. hypothesis
E. theory

Answer: D
DQ: How is the scientific method used to test hypotheses?
Type: Know It
Difficulty: Hard
Important Words/Concepts: theory

61. Define the meaning of the word "theory" in everyday usage and scientific usage and give two examples of each type of theory.

Answer: In everyday usage, theory means an untested idea, but that is often based on observation; however, it can also be used in the derogatory sense "just a theory." (Examples will vary.) In scientific usage, theory means an idea that has been rigorously tested and repeatedly supported. (Examples may vary but may likely include the cell theory and theory of evolution.)

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Easy
Important Words/Concepts: theory

62. In several reported incidents, local school boards have insisted that biology texts have a stamp placed inside that states that "Evolution is a theory." To their surprise, most science faculty have not objected to this language. Explain how each group interprets the statement that "Evolution is a theory."

Answer: In everyday usage, the word theory has come to mean "idea," and often it is used to indicate an idea that is unlikely to be true. Thus, when school board members call evolution a theory, they are implying that it is untrue. However, when a scientist uses the word theory, it means a hypothesis that has been tested numerous times and has never been falsified. It is equivalent to a mathematician using the word "theorem." So, the biology faculty could use the school boards' own language to support the theory of evolution when covering that in class, simply by defining the word theory in a scientific context.

DQ: How is the scientific method used to test hypotheses?
Type: Use It
Difficulty: Hard
Important Words/Concepts: theory

63. In a scientific study evaluating the beneficial effects of caffeine on the elderly, who would be the best subjects to test?
A. elderly men and women
B. elderly women
C. pregnant women

D. elderly men
E. teenagers

Answer: A
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: understanding scientific studies

64. Studies involving the benefits or risks of drinking coffee may be obscured by
A. side effects of caffeine.
B. how the coffee was roasted or processed.
C. other chemicals in coffee.
D. the age of the people studied.
E. All of the above.

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: understanding scientific studies

65. Studies involving coffee drinking have shown
A. a link to pancreatic cancer.
B. no link to pancreatic cancer.
C. a link to infertility.
D. a lowering of the incidence of ovarian cancer.
E. All of the above.

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: understanding scientific studies

66. Two studies were conducted to determine if a new drug was effective at reducing tumor size in patients with lung cancer. One study examined men and found that the drug reduced tumor size by 45%; the other study, conducted on women, concluded that the drug had no effect. Is it possible that the results of both studies are correct? Why or why not?

Answer: The results of both studies may be correct because there may be differences in how the drugs affect men compared to women.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It

Difficulty: Easy
Important Words/Concepts: contradictory results, experimental differences, process of science

67. Two researchers wish to examine the effect of caffeine on alertness. One researcher has the participants drink a cup of coffee with 100 mg of caffeine, while the other researcher has the participants take a capsule with 100 mg of caffeine. In all other respects, these two studies are identical. Which method do you think will answer the question best? Why? Are there any complicating factors that could compromise the results of one of the studies?

    Answer: The study in which participants are given caffeine in pill form will best answer the question about the effect of caffeine on alertness. Even though the amounts of caffeine are equal, there could be other compounds in the coffee that could influence the results.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: contradictory results, experimental differences, process of science

68. Two studies were carried out to determine if children in daycare got more ear infections than children who stayed at home. The first study compared ear infection rates in 50 Canadian girls ages 1 to 2, half of whom attended daycare and half of whom stayed home. The second study compared ear infection rates in 1000 Swedish boys ages 3 to 4, half of whom attended daycare and half of whom stayed home. The results of these two studies differed greatly. Which of the following is LEAST likely to be the cause of such differences?
    A. different genders
    B. different mothers
    C. different ages
    D. different sample sizes
    E. different countries

Answer: B
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: contradictory results, experimental differences, process of science

69. Would it be possible for a scientist to bias a scientific study?
    A. No, there are so many checks and balances outside of the scientist's control that it's impossible to show bias in a scientific study.
    B. No, because all scientific experiments are designed to be fair.
    C. Yes, if the scientist used a large number of test subjects.
    D. Yes, if the scientist chose specific individuals to include in the study.
    E. Yes, if it was a randomized double-blind study.

Answer: D

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific studies, bias, results

70. How can two studies on the same topic have conflicting conclusions?

    Answer: There may be other factors that can influence the outcome of the study that were not considered in the experimental design.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Hard
Important Words/Concepts: scientific studies, experimental design

71. An experiment was performed using 1000 non-smoking males ages 18 to 22. Which of the following experimental groups would most likely produce the most similar results?
    A. 800 non-smoking females ages 30 to 45
    B. 800 smoking males ages 30 to 45
    C. 1000 smoking females ages 25 to 40
    D. 1000 non-smoking males ages 30 to 55
    E. 800 non-smoking males ages 20 to 25

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Hard
Important Words/Concepts: experimental parameters

72. Researchers ran three clinical trials, each using a different one of the following populations:
    - 250 non-smoking men ages 18 to 25
    - 500 smoking and non-smoking men and women ages 20 to 55
    - 300 smoking women ages 45 to 60

    Would you expect the results of these three experiments to be the same? Explain.

    Answer: No, because the three experimental groups were different in age, gender, and whether or not they smoked, so there are many different factors that may have had an effect on the results of the clinical trial.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy

Important Words/Concepts: experimental parameters

73. You have been asked to review and summarize three experiments regarding caffeine consumption and cancer.
    A. In experiment A, researchers looked at the incidence of colon cancer among 100 regular tea drinkers and 100 non-tea drinkers in Japan, all between the ages of 18 and 38, and found that tea drinkers had less colon cancer than non-tea drinkers.
    B. In experiment B, researchers looked at the incidence of pancreatic cancer among 300 heavy drinkers of yerba mate (*Ilex paraguensis*, a tree whose leaves and stems contain high levels of caffeine), 300 moderate yerba mate drinkers, and 300 non–yerba mate drinkers in Argentina, all between the ages of 40 and 60. This study showed that heavy yerba mate drinkers had higher levels of pancreatic cancer than moderate yerba mate drinkers, and moderate yerba mate drinkers had higher levels than non-drinkers.
    C. In experiment C, researchers looked at the levels of prostate cancer among men ages 40 to 80 in the United States. The study examined 1000 coffee drinkers and 1000 non-coffee drinkers and found slightly lower levels of prostate cancer among the coffee-drinking men.

    How do you summarize and reconcile these three experiments that have varying results with respect to the relationship between caffeine and cancer? Are some of them wrong?

    Answer: The three experiments looked at three different types of cancer, three different populations from three different countries, and three different plant sources of caffeine. It would therefore be illogical to think they would have similar results. While we like to speak of "cancer" as if it was a single disease, it is in fact quite variable. All of these results may be quite accurate, but all are narrow in scope; we can't make any general conclusions regarding caffeine and cancer from these results.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Hard
Important Words/Concepts: experimental parameters

74. Increasing a sample size
    A. provides more reliable data.
    B. increases likelihood of getting a positive result.
    C. increases likelihood of getting a negative result.
    D. provides better variables.
    E. provides better controls.

Answer: A
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy

Important Words/Concepts: independent and dependent variable, control and experimental groups

75. In a clinical trial with 400 subjects, the most reliable results would be obtained if ____subjects were in the experimental group and ____in the control.
    A. 200; 200
    B. 300; 100
    C. 100; 300
    D. 350; 50
    E. 50; 350

Answer: A
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: control and experimental groups

76. Statistical significance
    A. indicates a high likelihood that your results are due to your treatment versus due to chance.
    B. is more likely to be reliable if you have a small sample size versus a large sample size.
    C. is a requirement of the data from a scientific experiment.
    D. indicates that the hypothesis should be rejected.
    E. depends on large data sets.

Answer: A
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Hard
Important Words/Concepts: experiment, design, statistical significance, sample size

77. In designing a scientific research project, the ideal control group should
    A. be identical to the placebo group.
    B. be identical to the experimental group but receive the placebo.
    C. receive the placebo or receive no experimental manipulation.
    D. be identical to the experimental group.
    E. be identical to the independent variable.

Answer: B
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: experiment, design, placebo

78. You are testing the following hypothesis: Left-handed people have better hand-eye coordination than right-handed people. Based on a review of literature, you have learned that one common test of hand-eye coordination is measuring the percentage of times that someone can drop a coin into a small container from a height of 3 feet. To perform this experiment, you use a group of 25 left-handed males, 25 right-handed males, 25 left-handed females, and 25 right-handed females. Design an experiment to test your hypothesis and be sure to define your independent and dependent variables.

Answer: Experimental design may vary but should include a gender and handedness balance. It is important that each individual has multiple attempts to drop the coin into the container. The dependent variable is the number of times each person is successful in getting the coin into the container. The independent variables are gender and handedness. The best experimental designs will also incorporate the concepts of participants' ages and heights.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Hard
Important Words/Concepts: independent variable, dependent variable

79. Increasing sample size increases
    A. the control group.
    B. the experimental group.
    C. randomness.
    D. reliability of data.
    E. variation.

Answer: D
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: sample size, statistical significance

80. A significant result from a scientific study indicates
    A. a statistical error.
    B. it occurred by chance.
    C. a positive result.
    D. a negative result.
    E. a non-random result.

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: sample size, statistical significance

81. Why does having a large sample size give more reliable results?

Answer: The larger the sample size, the less likely the results are due to chance alone.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: process of science, sample size

82. A large sample size is important for all of the following reasons EXCEPT
    A. large sample sizes reduce the possibility that results are due to chance alone.
    B. large sample sizes increase the likelihood of finding a statistically significant result.
    C. large sample sizes make the results more reliable.
    D. large sample sizes increase the accuracy of the results.
    E. large sample sizes increase the likelihood that a very rare result will be noticed.

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Hard
Important Words/Concepts: process of science, sample size, statistical significance

83. Which sample group would give the most statistically significant data?
  A. 10 individual mice each tested once
  B. one mouse tested 10 times
  C. one pig
  D. five pigs each tested five times
  E. one mouse tested 100 times

Answer: A
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: sample size, statistical significance

84. A small sample size
    A. will likely yield a high degree of statistical significance.
    B. is unacceptable in scientific studies.
    C. is usually a benefit to researchers.
    D. does not allow the use of dependent and independent variables.
    E. None of the above.

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?

Type: Know It
Difficulty: Easy
Important Words/Concepts: experiment, design, statistical significance, sample size, variables

85. What is/are the major factor(s) affecting the strength of a conclusion?
    A. sample size
    B. independent variable
    C. dependent variable
    D. the type of study carried out
    E. Both A and D.

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: experiment, design, statistical significance, sample size, variables

86. I carried out a series of experiments testing the effect of caffeine on mice. I used two mice. I fed one mouse caffeinated water and fed the other plain water. I then measured the ability of each mouse to find its way through a maze. I timed their progress. My results were exciting and conclusive, the caffeinated mouse found his way through the maze much more rapidly and accurately than the non-caffeinated mouse. I sent my results to a peer-reviewed journal but they rejected my paper. They said the results were not valid. Why?
    A. I should have let the mice go through the maze at different times.
    B. I should have given the mouse different amounts of caffeine.
    C. I didn't use the right form of caffeine.
    D. I didn't have enough mice in the study.
    E. None of the above.

Answer: D
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: experiment, design, statistical significance, sample size, variables

87. Experiments with a small sample size are ____ likely to produce statistically significant results than experiments with a large sample size.

    Answer: less

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: sample size

88. You are reviewing the results of five similar experiments, but each had a different sample size. Which of the following experiments has the most reliable results?
    A. the experiment with a sample size of 10
    B. the experiment with a sample size of 100
    C. the experiment with a sample size of 1000
    D. the experiment with a sample size of 10,000
    E. the experiment with a sample size of 100,000

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: sample size

89. You have two experiments to review. One looks at 1000 of the 1,000,000 rabbits in an area. The other study looks at 100 of the 100,000 wolves in an area. Is one study more statistically accurate than the other? Why or why not?

    Answer: Neither, they both looked at 1 out of every 1000 individuals.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Hard
Important Words/Concepts: sample size

90. Explain the importance of sample size in experiments.

    Answer: Experiments performed with a small number of participants have a higher probability that their results can be attributed to the nature of the participants. The greater the number of participants, the greater the probability that the results cannot be attributed the chance.

DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: sample size

91. Scientific studies involving a subjectively assessed benefit (i.e., caffeine and enhanced memory recall) can be complicated by
    A. too few observations.
    B. improper controls.
    C. poor subject selection.
    D. side effects from the drug.
    E. All of the above.

Answer: E
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific studies/drugs

92. You conduct an experiment to test the effectiveness of a new drug in controlling blood sugar levels in diabetics. Unfortunately, half the participants experienced nausea. Nausea would be considered
    A. a control effect.
    B. an experimental effect.
    C. a tangential effect.
    D. a side effect.
    E. a placebo effect.

Answer: D
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Easy
Important Words/Concepts: control group, experimental group, placebo, process of science, side effect

93. All of the following are true of side effects EXCEPT
    A. side effects may make data interpretation difficult.
    B. side effects are unintended results.
    C. side effects are usually considered problematic.
    D. side effects always invalidate the results of the study.
    E. side effects may vary from person to person.

Answer: D
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Know It
Difficulty: Hard
Important Words/Concepts: process of science, side effect

94. Many chemicals can cause positive reactions in the human system but may also cause a variety of negative effects. These are called
    A. side effects.
    B. causal effects.
    C. peripheral effects.
    D. homeopathic effects.
    E. indirect effects.

Answer: A
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?

Type: Know It
Difficulty: Easy
Important Words/Concepts: side effects

95. Scientific studies within a single ethnic population
   A. demonstrate cause and effect for that population only.
   B. may miss correlations in other ethnicities.
   C. are usually done to determine cause and effect for all populations.
   D. can be extrapolated to other ethnicities.
   E. show links between multi-variables in that population.

Answer: B
DQ: What factors influence the strength of scientific studies and whether the results of any given study are applicable to a particular population?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific studies, ethnic groups

96. A positive correlation on a memory test and drinking coffee would show
    A. decreasing coffee consumption correlates with increasing memory test score.
    B. increasing coffee consumption correlates with increasing memory test score.
    C. decreasing coffee consumption has no relationship to memory test score.
    D. increasing coffee consumption correlates with decreasing memory test score.
    E. no change on memory test score with or without coffee.

Answer: B
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: sample size, statistical significance

97. If you read about several studies on the effectiveness of a new drug to treat diabetes, which of the following would give you the most confidence in the results?
    A. one study with 50 people
    B. one study with 500 people
    C. one study with 1000 people
    D. three studies done the same way, each with 50 people
    E. three studies done the same way, each with 1000 people

Answer: E
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: process of science, sample size

98. A correlation in a scientific study indicates
    A. insufficient data.
    B. a cause and effect between variables.
    C. a clear link between two variables.
    D. a possible link between two variables.
    E. the necessity for a new hypothesis.

Answer: D
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific studies, correlation

99. A negative correlation in a scientific study means
    A. one variable causes a change in another variable.
    B. one variable is linked to another variable.
    C. one variable increases while the other decreases.
    D. there is no link between the variables studied.
    E. both variables decrease proportionately.

Answer: C
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It

Difficulty: Hard
Important Words/Concepts: Correlation: positive and negative

100. A positive correlation in a scientific study means
    A. both variables increase proportionately.
    B. one variable is linked to another variable.
    C. one variable increases while the other decreases.
    D. there is a link between the variables studied.
    E. both variables decrease proportionately.

Answer: A
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: Correlation: positive and negative

101. Based on Infographic 1.7, which statement is TRUE?
  A. Parkinson's disease is caused by drinking too much coffee.
  B. Parkinson's disease is reduced by drinking coffee.
  C. Japanese male coffee drinkers have a lower incidence of Parkinson's disease than Japanese males who do not drink coffee.
  D. Japanese coffee drinkers have a lower incidence of Parkinson's disease than Japanese who do not drink coffee.
  E. There is no link between caffeine and Parkinson's disease.

Answer: C
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific studies, ethnic groups

102. Correlation is
    A. a problem encountered when the drug under study causes many different reactions.
    B. a type of study in which researchers examine what happens to a group of people over time.
    C. when one variable causes an observed result.
    D. when two variables are related to one another in a predictable manner.
    E. when the effect of one variable hides the effect of the other variable.

Answer: D
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Hard
Important Words/Concepts: causation, correlation, process of science

103. You are a researcher studying alcohol intake and smoking. You find that as alcohol intake increases, the number of cigarettes smoked also increases. Which of the following is an appropriate conclusion?
    A. Alcohol consumption causes smoking.

B. Smoking causes alcohol consumption.
C. Alcohol consumption and smoking are not related.
D. Alcohol consumption and smoking are correlated.
E. No appropriate conclusions can be drawn from this study.

Answer: D
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Easy
Important Words/Concepts: causation, correlation, process of science

104. You read an article in the newspaper that says people who consume large amounts of red meat show an increased risk of having a heart attack. Is it correct, then, to say that red meat causes heart attacks? Why or why not? If not, what would be an appropriate conclusion?

Answer: No, you cannot say that red meat causes heart attacks. You can only say that consuming red meat is correlated with increased cancer risk. Correlation does not equal causation.

DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Easy
Important Words/Concepts: causation, correlation, process of science

105. Differentiate between a simple correlation and causation.

Answer: A correlation is a link between two factors that may not indicate causation. An example is the link between coffee drinkers and smokers and the incidence of Parkinson's disease. Both coffee drinkers and smokers have a lower incidence of Parkinson's disease, yet these can be quite different activities. It MAY indicate that something about smoking or drinking coffee plays a role in reducing the incidence level of Parkinson's disease, but no causation is proven.

Causation is a definitive link between two factors. Smoking deposits materials into the lungs, decreasing their oxygen-absorbing capacity, causing the heart to work harder. Thus, there is causation between smoking and increased heart rate.

DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Hard
Important Words/Concepts: correlation, causation

106. Which published scientific data would be most reliable?
A. A local daily newspaper
B. A website
C. A drug company's clinical trial results

D. A popular scientific magazine
E. A peer-reviewed scientific journal

Answer: E
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific studies, peer review

107. Peer review means what in relation to scientific journals?
A. Review by specialists in the field
B. Review by the editor
C. Review by top scientists
D. Review by an editorial board
E. Review by people of the same age, gender, and ethnicity

Answer: A
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific studies, peer review

108. Imagine you are a journalist whose latest assignment is to write a magazine article on the latest findings about vaccines and autism. What are some of the concerns you might have about how best to convey such a vast amount of information to the general public?

Answer:

- How to reduce the material down to the essence of what is important
- How to take complex issues and make them easily understood by non-scientists
- How to convey the information clearly, accurately, and concisely, so as not to mislead the public or cause misunderstandings
- How to report any limitations to the study

DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Hard
Important Words/Concepts: media, process of science, public understanding

109. Some of the issues faced by media personnel when reporting the latest scientific findings include all of the following EXCEPT
A. simplifying complex issues.
B. conveying information clearly.
C. avoiding misunderstandings.
D. determining what is most important about a study.
E. communicating the researcher's opinion about the study.

Answer: E
DQ: How can you evaluate the evidence in media reports of scientific studies?

Type: Know It
Difficulty: Easy
Important Words/Concepts: media, process of science, public understanding

110. Rank the following in order from *most* reliable to *least* reliable sources of information.
    A. scientific journals→magazine article written by scientist→magazine article written by journalist→public opinion
    B. scientific journals→magazine article written by journalist→magazine article written by scientist→public opinion
    C. magazine article written by scientist→scientific journal→magazine article written by journalist→public opinion
    D. magazine article written by scientist→scientific journal→public opinion→magazine article written by journalist
    E. magazine article written by scientist→magazine article written by journalist→scientific journal→public opinion

Answer: A
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: media, process of science, public understanding

111. Why do some media reports about scientific discoveries end up being exaggerations?
    A. Findings can be misunderstood and misinterpreted.
    B. Some studies are not done using the proper controls or scientific method, so they are unreliable; however, journalists often do not realize the distinction.
    C. Media reports can come from sources that are not peer reviewed.
    D. Media agencies may sensationalize news to draw more attention.
    E. All of the above.

Answer: E
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: media, science, misinterpretation

112. Why would the media choose to report on one scientific study versus another? Is their decision always based in science?

    Answer: Often, the media choose to report on the most sensational or headline-grabbing scientific studies without regard to the scientific merit of the work.

DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Easy
Important Words/Concepts: media, science, misinterpretation

113. Which news source is the most reliable source of scientific advances?

A. Wikipedia
B. A peer-reviewed scientific journal
C. A newspaper
D. A popular science news website
E. The evening television news

Answer: B
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: media reporting of scientific data

114. Which of the following plays a factor in misrepresentation of research data in the media?
A. lack of understanding of the topic by the reporter
B. overstating the importance of the study results by the researcher
C. misinterpretation of the scientific terminology when trying to disseminate it to the public
D. time and space limitations by the media
E. All of the above.

Answer: E
DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Know It
Difficulty: Easy
Important Words/Concepts: media reporting of scientific data

115. Write true (T) or false (F) after each statement.
A. Clinical trials use experimental drugs or placebos in randomly chosen subjects. (T)
B. Correlation implies causation. (F)
C. Studies in a male population can be useful in epidemiological studies of women. (F)
D. Studies in ethnic populations can be extrapolated to other ethnicities. (F)

DQ: How can you evaluate the evidence in media reports of scientific studies?
Type: Use It
Difficulty: Easy
Important Words/Concepts: scientific studies, peer review

116. Caffeine can
A. help enhance memory.
B. cause anxiety.
C. cause seizures.
D. increase urination.
E. All of the above.

Answer: E
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific studies/drugs/side effects

117. Some side effects of caffeine are
    A. vomiting.
    B. fevers.
    C. confusion.
    D. fever.
    E. All of the above.

Answer: E
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific studies/drugs/side effects

118. Which of the following is NOT considered to be a side effect of caffeine consumption?
    A. dehydration
    B. rapid breathing
    C. ringing in ears
    D. memory enhancement
    E. twitching

Answer: D
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: side effects

119. Side effects of caffeine may include all of the following EXCEPT
    A. shaking.
    B. irregular heartbeat.
    C. frequent urination.
    D. slower breathing.
    E. anxiety.

Answer: D
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Hard
Important Words/Concepts: caffeine, process of science, side effect

120. Epidemiologists
    A. study the incidence of diseases and risk factors in populations.
    B. investigate skin diseases.
    C. perform clinical trials on health issues.
    D. examine autopsy data.
    E. assess cancer treatments and survival outcomes.

Answer: A

DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific studies, epidemiology

121. Pitfall(s) to avoid from the analysis of data from single epidemiological studies is/are
    A. non-randomized subjects.
    B. too small of a sample size.
    C. disease complexity.
    D. lack of proper controls.
    E. All of the above.

Answer: E
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: scientific studies, epidemiology

122. Epidemiological studies
    A. are the least common form of human health study.
    B. have a small number of participants.
    C. are used when manipulating people is unethical.
    D. make conclusions based on laboratory studies.
    E. are usually very expensive to conduct.

Answer: C
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: epidemiological study, process of science

123. A researcher wishes to determine the quantity of caffeine intake required to improve alertness. The participants are divided into two groups, with one group receiving a low dose of caffeine and the other group receiving a high dose of caffeine. The subjects are all coffee drinkers who regularly consume more than 100 mg of caffeine per day. All participants, however, are required to abstain from caffeine intake for 12 hours prior to the study. Caffeine is addictive and therefore causes unpleasant side effects when the user stops consuming it. Is the addictiveness of caffeine a potential problem in this study? Why or why not?

    Answer: The addictiveness of caffeine is a potential problem because the caffeine may simply alleviate the withdrawal symptoms rather than actually increase alertness. Furthermore, the results of this study would not be relevant to people who do not regularly consume caffeine.

DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Use It
Difficulty: Hard
Important Words/Concepts: caffeine, process of science, side effect

124. All of the following are true of a clinical trial EXCEPT
    A. participants are randomly assigned to different treatment groups.
    B. it can often be conducted with a large survey.
    C. it can be very expensive.
    D. it can be difficult to get participants to adhere to the treatment regime.
    E. it can be unethical if the treatment group can cause serious harm.

Answer: B
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: clinical trial, process of science

125. The study of the incidence of disease in a population that cannot be directly manipulated is called
    A. an experiment.
    B. population biology.
    C. evolutionary biology.
    D. epidemiology.
    E. systemic biology.

Answer: D
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy
Important Words/Concepts: epidemiology, scientific study

126. Do epidemiologists perform planned scientific experiments with rigorous controlled experimentation?
    A. Yes, they work in labs and perform lab experiments to prove their hypothesis.
    B. Yes, they use the standard scientific method.
    C. No, they only form a hypothesis but do not analyze or compile any data.
    D. No, they examine data that have already been compiled and look for patterns.
    E. No, they only do uncontrolled experiments.

Answer: D
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Easy

Important Words/Concepts: epidemiology scientific study

127. An epidemiologist looks at a compilation of studies done at a medical center in which they have catalogued the lifestyle and habits of thousands of women. When she looks at the women in this group who have contracted breast cancer versus those who are healthy, she finds that women who have breast cancer drink more milk then those who do not have cancer. Does this mean drinking milk causes breast cancer?
    A. Yes, if there is a correlation between the two, milk causes cancer.
    B. Yes, an epidemiologist uses statistics to look at populations, so it is not a coincidence.
    C. No, just because there is a correlation, it does not mean that milk is the cause of the cancer.
    D. No, it's just a coincidence; correlations never indicate a cause-and-effect relationship.
    E. None of the above.

Answer: C
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Use It
Difficulty: Easy
Important Words/Concepts: epidemiology scientific study

128. You should not use just one epidemiological study to make policy decisions because
    A. diseases are complex.
    B. all variables cannot be controlled in one study.
    C. sample size can affect accuracy.
    D. one population may not be representative of the entire population.
    E. All of the above.

Answer: E
DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Know It
Difficulty: Hard
Important Words/Concepts: pitfall, epidemiology, study

129. To differentiate between a simple correlation and causation, researchers often divide subjects into treatment and control groups and follow them for a number of years to see if one group has a higher incidence of disease than the other group. What is this type of study called?

    Answer: A randomized clinical trial

DQ: How does the scientific method apply in clinical trials designed to investigate important issues in human health?
Type: Use It
Difficulty: Easy
Important Words/Concepts: randomized clinical trial