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| 1. ​Because scientific theories are tentative explanations, they should not be taken seriously.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* | . | |

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| 2. Scientists use data to develop testable hypotheses, which are often written as “If… then” statements.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* | . | |

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| 3. When a natural system gets locked into a positive feedback loop, it can reach an ecological tipping point.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.4 What Are Systems and How Do They Respond to Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* | . | |

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| 4. Carbon is an element, meaning that it cannot be broken down further by chemical means.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* | . | |

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| 5. Logic and critical thinking are more important tools in science than imagination and creativity.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* | . | |

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| 6. When matter undergoes physical changes, the chemical composition also changes.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 7. ​Hydrocarbons are organic compounds.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* | . | |

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| 8. The process of peer review is important to help reduce bias and related problems.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 9. A positive feedback loop causes a system to change in the opposite direction from which it is moving.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.4 What Are Systems and How Do They Respond To Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 10. Pure water has a pH of 7, exactly neutral.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 11. The idea that all elements are made up of molecules is called the atomic theory.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 12. Two or more different elements can combine to form isotopes.​   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 13. Each cell of the human body has different chromosomes in its nucleus.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 14. A chart showing all known elements arranged by their chemical behavior is called the periodic table.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| 15. A scientific hypothesis must be testable.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | True/False | | *LEARNING OBJECTIVES:* |  | |

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| **Multiple Choice** |

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| 16. Recall the Bormann-Likens controlled experiment in the forested valleys of New Hampshire. Which statement best describes the effects of water flowing out of deforested areas into undisturbed areas?​   |  |  |  | | --- | --- | --- | |  | a. | ​The amount of water flowing out of the deforested valley following rain increased by 30–40%, and soil erosion increased. | |  | b. | ​The amount of water flowing out of the deforested valley decreased by 10–20%, and soil erosion decreased. | |  | c. | ​The flow of water did not change, but soil erosion increased. | |  | d. | ​Other types of plants took the place of the trees, preventing deforestation from affecting the flow of water. | |  | e. | ​Eroding soil dammed up the river, preventing the flow of water. |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | Core Case Study: How Do Scientists Learn about Nature? Experimenting with a Forest | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 17. The Bormann–Likens study in the Hubbard Brook Experimental Forest in New Hampshire can be described as \_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | ​a comparison of a control site with an experimental site in nature | |  | b. | ​a study using computer model simulations of a complex natural system | |  | c. | ​an experiment in which too many factors were varied to draw a conclusion from the results | |  | d. | ​missing a baseline for comparison, making it difficult to draw a conclusion from the results | |  | e. | ​an observational study that attempted not to interfere with a natural system |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | Core Case Study: How Do Scientists Learn about Nature? Experimenting with a Forest | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 18. Which of the following is the best definition of science?​   |  |  |  | | --- | --- | --- | |  | a. | ​A field in which observations are rarely tested | |  | b. | A field that is never investigated using statistical tools and models | |  | c. | ​Study that is best described as a collection of opinions | |  | d. | ​Data supported by small amounts of evidence | |  | e. | ​A broad field of study focused on discovering how nature works |  |  |  | | --- | --- | | *ANSWER:* | e | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* | . | |

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| 19. A(n) \_\_\_\_ is an approximate representation or simulation of a system.​   |  |  |  | | --- | --- | --- | |  | a. | ​model | |  | b. | ​datum | |  | c. | ​projection | |  | d. | ​experiment | |  | e. | ​study |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 20. Scientific hypotheses differ from scientific theories in that they are \_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | ​widely accepted descriptions of what we find happening over and over in nature | |  | b. | ​possible, but not yet well-tested, explanations of data | |  | c. | ​not able to be tested | |  | d. | ​arrived at after extensive mathematical modeling | |  | e. | ​facts rather than opinions |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* | . | |

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| 21. A classmate tells you that a statement heard on the news about an environmental process noted in a local ecosystem cannot be true because it has not been scientifically proven. Given what you know about the nature of scientific reasoning, you realize that \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​this classmate is misinformed because science cannot prove anything, but it can disprove events conclusively | |  | b. | ​this classmate is misinformed because science cannot prove or disprove anything absolutely | |  | c. | ​this classmate is misinformed because the environmental process in question actually has been proven scientifically | |  | d. | ​this classmate is correct | |  | e. | ​this classmate has confused scientific theories and scientific laws |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 22. Which list describes the sequence scientists typically follow in the beginning stages of their investigations about how nature works?​   |  |  |  | | --- | --- | --- | |  | a. | ​analyze data → search literature → perform experiment → identify a problem → ask a question | |  | b. | ​ask a question → search literature → perform experiment → analyze data → identify a problem | |  | c. | ​search literature → ask a question → identify a problem → analyze data → perform experiment | |  | d. | ​identify a problem → search literature → ask a question → perform experiment → analyze data | |  | e. | ​ask a question → search literature → identify a problem → perform experiment → analyze data |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 23. What is one reason that statistics and mathematical models are so important in science? ​   |  |  |  | | --- | --- | --- | |  | a. | ​Scientific data is often biased. | |  | b. | ​Scientific data is often incorrect due to poor experimental design and limitations on data collection, so mathematics can be used to smooth over these inaccuracies. | |  | c. | ​The process of peer review is flawed and insufficient. | |  | d. | ​These help to deal with complex interactions of variables and there is no way to measure every instance of a phenomenon. | |  | e. | It allows scientists to prove their results conclusively. |  |  |  | | --- | --- | | *ANSWER:* | D | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* | . | |

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| **Narrative: (questions 9 and 10)**  A tiny, tawny colored butterfly called the Carson Wandering Skipper was always known for its small and very localized populations. Typically, it was found along the western Nevada and eastern California high desert areas. It was always located close to hot springs and other wet areas that supported saltgrass, the host plant it depended on.  ​  Recently, the populations went into a steep decline, and a last hold-out area was threatened by imminent construction of a freeway bypass. Biologists became alarmed and began an intensive search for populations in locations other than the spot designated for the freeway bypass. They began their search by identifying all known locations of hot springs, in hopes of finding small populations of the Carson Wandering Skipper close by. |

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| 24. The biologists’ observations that the Carson Wandering Skipper populations had declined is an example of \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​reporting a conclusion | |  | b. | ​identifying a problem | |  | c. | ​performing an experiment | |  | d. | ​proposing a hypothesis | |  | e. | ​making testable predictions |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *PREFACE NAME:* | Narrative | | *LEARNING OBJECTIVES:* |  | |

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| 25. As biologists searched for previously unknown populations of the Carson Wandering Skipper, biologists wondered if hot springs were absolutely essential to its survival. This phase of the investigation is \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​finding out what is known and asking a question | |  | b. | ​analyzing data and asking a question | |  | c. | ​asking a question and testing predictions | |  | d. | ​accepting their hypothesis and analyzing data | |  | e. | ​accepting their hypothesis and asking a question |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *PREFACE NAME:* | Narrative | | *LEARNING OBJECTIVES:* |  | |

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| 26. Science that is based on thorough testing with appropriate statistics and that has withstood peer review is considered​ \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​limited but accurate | |  | b. | ​scientific laws | |  | c. | ​scientific theories | |  | d. | ​unreliable science | |  | e. | ​reliable science |  |  |  | | --- | --- | | *ANSWER:* | e | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 27. The finding that objects fall to earth at predictable speeds is described by \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​the law of conservation of energy | |  | b. | ​the law of kinetic energy | |  | c. | ​the law of potential energy | |  | d. | ​the law of energy transformations | |  | e. | ​the law of gravity |  |  |  | | --- | --- | | *ANSWER:* | e | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 28. A scientific law \_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | ​is a hypothesis that has been proven | |  | b. | ​is what a theory becomes when it passes experimental tests | |  | c. | ​is called that because there are consequences when it is broken | |  | d. | ​is a well-tested and widely accepted description of what we find happening repeatedly and in the same way in nature | |  | e. | ​determines the series of steps that should be followed when designing an experiment to test a hypothesis |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 29. Matter is best described as \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​thermodynamic | |  | b. | ​something that has the capacity to do work | |  | c. | ​positively charged | |  | d. | ​something that can produce change | |  | e. | ​anything that has mass and takes up space |  |  |  | | --- | --- | | *ANSWER:* | e | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter And What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 30. Which of the following is true of matter?​   |  |  |  | | --- | --- | --- | |  | a. | ​It can exist as three physical states. | |  | b. | It can exist as two physical states. | |  | c. | It can exist as three chemical forms. | |  | d. | ​It can exist as four chemical forms. | |  | e. | ​It can exist as a physical state or as a chemical form. |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter And What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 31. The atomic number of an element is the number of \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​atoms in a molecule | |  | b. | ​protons in an atom | |  | c. | ​nuclei in a molecule | |  | d. | ​electrons in an atom | |  | e. | ​protons and neutrons in an atom |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter And What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 32. ​Protons, neutrons, and electrons are all \_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | ​forms of energy | |  | b. | ​equal in mass | |  | c. | ​subatomic particles | |  | d. | ​negative ions | |  | e. | ​charged particles |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 33. An atom’s mass number is equal to the total number of \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​neutrons and isotopes | |  | b. | ​neutrons and electrons | |  | c. | ​neutrons and protons | |  | d. | ​protons, neutrons, and electrons | |  | e. | ​protons only |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 34. An element \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​can combine with protons to make an atom | |  | b. | ​is made up of compounds | |  | c. | ​can combine with one or more other elements to make a compound | |  | d. | ​is defined by the number of electrons it has | |  | e. | ​can only be organic |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 35. You are studying atoms in the lab and realize that you have two atoms with the same atomic number but different numbers of neutrons. These atoms must be \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​molecules | |  | b. | ​compounds | |  | c. | ​ions | |  | d. | ​isotopes | |  | e. | organic |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 36. Ions are atoms or groups of atoms that have \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​gained or lost electrons | |  | b. | ​gained or lost protons | |  | c. | ​gained or lost neutrons | |  | d. | ​gained or lost both protons and electrons | |  | e. | ​different numbers of both protons and neutrons from other atoms of that type |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 37. Which of the following lists of items contains only ions?   |  |  |  | | --- | --- | --- | |  | a. | ​CO2, H2O, Na+, H− | |  | b. | ​ Na+, H−, Pb, Hg | |  | c. | ​Pb, Hg, CO2, NaCl | |  | d. | ​Cl−, Na+, Ca2+, NO3− | |  | e. | ​NaCl, NO, CO, NaOH |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 38. An acidic solution would have \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​more hydroxide ions than hydrogen ions and a pH greater than 7 | |  | b. | ​more hydrogen ions than hydroxide ions and a pH greater than 7 | |  | c. | ​more hydroxide ions than hydrogen ions and a pH less than 7 | |  | d. | ​more hydroxide ions than hydrogen ions and a pH of 7 | |  | e. | ​more hydrogen ions than hydroxide ions and a pH less than 7 |  |  |  | | --- | --- | | *ANSWER:* | e | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 39. All organic compounds are primarily characterized by the presence of \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​carbon | |  | b. | ​hydrogen | |  | c. | ​oxygen | |  | d. | ​nitrogen | |  | e. | ​phosphorus |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 40. Why do we have pairs of each chromosome type in the cell nucleus?   |  |  |  | | --- | --- | --- | |  | a. | ​One is a spare in case the other is damaged. | |  | b. | ​One is always redundant. | |  | c. | ​One is inherited from each parent. | |  | d. | ​One contains DNA molecules and one contains genes. | |  | e. | ​One contains nucleotides and the other does not. |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 41. The nucleus of a human cell contains \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​genes only | |  | b. | ​DNA molecules only | |  | c. | ​chromosomes only | |  | d. | ​genes on chromosomes, which are made up of DNA molecules | |  | e. | chromosomes on genes |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 42. \_\_\_\_ are the fundamental structural and functional units of life.​   |  |  |  | | --- | --- | --- | |  | a. | ​Ions | |  | b. | ​Atoms | |  | c. | ​Compounds | |  | d. | ​Molecules | |  | e. | ​Cells |  |  |  | | --- | --- | | *ANSWER:* | e | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 43. Which term means the molecule produced when simple organic molecules called monomers are linked together by chemical bonds?​   |  |  |  | | --- | --- | --- | |  | a. | ​Chromosomes | |  | b. | ​Lipids | |  | c. | ​Polymers | |  | d. | ​Hydrocarbons | |  | e. | ​Elements |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 44. Genes are composed of sequences of \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​ions | |  | b. | ​chromosomes | |  | c. | ​cells | |  | d. | ​nucleotides | |  | e. | ​proteins |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 45. The law of conservation of matter states that whenever matter undergoes a physical or chemical change, \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​atoms can be created | |  | b. | ​atoms can be destroyed | |  | c. | ​atoms cannot be created or destroyed | |  | d. | ​atoms can be destroyed if we compost them | |  | e. | ​atoms can be created by reactions between organic compounds |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 46. A reaction in which a carbon atom combines with oxygen atoms to form CO2 is \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​a physical change | |  | b. | ​a chemical change | |  | c. | ​both a physical and chemical change | |  | d. | ​first a physical change, but then it becomes a chemical change | |  | e. | ​neither a physical change or a chemical change, but a scientific change |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 47. Energy can be formally defined as the \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​velocity of any moving object | |  | b. | ​heat generated by atoms losing electrons | |  | c. | ​capacity to do work | |  | d. | ​displacement of heat from the sun to the earth | |  | e. | ​process of moving objects |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 48. What happens when you place a cold pot on a hot stovetop?   |  |  |  | | --- | --- | --- | |  | a. | ​Energy flows from the air to the stovetop. | |  | b. | There is no net movement of energy. | |  | c. | ​Energy flows evenly back and forth between the pot and the stovetop. | |  | d. | ​Energy flows from the base of the pot to the stovetop. | |  | e. | ​Energy flows from the stovetop to the base of the pot. |  |  |  | | --- | --- | | *ANSWER:* | e | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 49. An example of kinetic energy is \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​water in a reservoir behind a dam | |  | b. | ​water flowing down a waterfall | |  | c. | ​a rock held in your hand several feet above ground | |  | d. | ​the chemical energy in gasoline | |  | e. | ​the chemical energy in food |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 50. Kinetic energy and potential energy differ in that\_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​heat is a type of potential energy, not kinetic energy | |  | b. | ​kinetic energy is energy of motion and potential energy is stored energy | |  | c. | ​potential energy is energy of motion and kinetic energy is commercial energy | |  | d. | ​only potential energy involves movement | |  | e. | ​only kinetic energy involves energy storage |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 51. The first law of thermodynamics is also known as\_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​the law of energy quality | |  | b. | the law of conservation of energy | |  | c. | ​the law of potential energy | |  | d. | ​the law of kinetic energy | |  | e. | ​the law of energy consumption |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 52. Energy that is greatly dispersed and low temperature is considered\_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​ medium-quality energy | |  | b. | ​high-quality energy | |  | c. | ​ low-quality energy | |  | d. | medium or high-quality energy depending on whether it is from wind or burning | |  | e. | ​kinetic or potential energy depending upon its quality |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 53. The second law of thermodynamics says that whenever energy is converted from one form to another in a physical or chemical change, \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​more energy will be present in the second form | |  | b. | ​heat is absorbed | |  | c. | ​light is produced | |  | d. | ​we end up with lower-quality or less useable energy than we started with | |  | e. | ​the second form of energy will always be kinetic |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 54. \_\_\_\_ is a measure of the amount of energy available to do useful work.​   |  |  |  | | --- | --- | --- | |  | a. | ​Energy quality | |  | b. | ​Energy effectiveness | |  | c. | ​Energy conservation | |  | d. | ​Energy efficiency | |  | e. | ​Energy radiation |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* | -. | |

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| 55. Which of the following energy forms is low quality?​   |  |  |  | | --- | --- | --- | |  | a. | ​The energy released by burning coal | |  | b. | ​The heat dispersed in the ocean | |  | c. | ​Concentrated sunlight | |  | d. | ​High-speed wind | |  | e. | ​The energy released by burning wood |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* | -. | |

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| 56. A positive feedback loop \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​increases a change to a system | |  | b. | ​always results in a beneficial change to a system | |  | c. | ​decreases a change to a system | |  | d. | ​never results in a beneficial change to a system | |  | e. | ​stabilizes a system |  |  |  | | --- | --- | | *ANSWER:* | a | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.4 What Are Systems and How Do They Respond To Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* | - | |

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| 57. A thermostat set to 62°F turns on the furnace when a house cools below that temperature, and shuts the furnace off when a house warms above that temperature. This is an example of a simple \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​positive feedback loop | |  | b. | ​negative feedback loop | |  | c. | ​system loop | |  | d. | ​tipping point | |  | e. | ​thermodynamic loop |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.4 What Are Systems and How Do They Respond To Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* | --. | |

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| 58. A form of kinetic energy that travels in the form of a wave as a result of changes in electrical and magnetic fields is \_\_\_\_.​   |  |  |  | | --- | --- | --- | |  | a. | ​wind | |  | b. | ​electromagnetic radiation | |  | c. | ​waterfalls | |  | d. | ​chemical energy | |  | e. | heat energy |  |  |  | | --- | --- | | *ANSWER:* | b | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 59. Which form of electromagnetic radiation has the shortest wavelength?​   |  |  |  | | --- | --- | --- | |  | a. | ​Infrared radiation | |  | b. | ​Radio waves | |  | c. | ​Visible light | |  | d. | ​Ultraviolet (UV) radiation | |  | e. | ​Microwaves |  |  |  | | --- | --- | | *ANSWER:* | d | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| 60. Most living systems can be described as having inputs, \_\_\_\_, and outputs.​   |  |  |  | | --- | --- | --- | |  | a. | ​Thermodynamics | |  | b. | ​Positive transfers | |  | c. | ​Throughputs | |  | d. | ​Kinetics | |  | e. | ​Creations |  |  |  | | --- | --- | | *ANSWER:* | c | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.4 What Are Systems and How Do They Respond To Change? | | *QUESTION TYPE:* | Multiple Choice | | *LEARNING OBJECTIVES:* |  | |

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| **Matching** |

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| ​​*Match items with their appropriate chemical description.*   |  |  | | --- | --- | | a. | chemical formula | | b. | ​molecule | | c. | ​electron | | d. | ​proton | | e. | ​neutron | | f. | ​pH | | g. | ​O2 | | h. | ​monomers | | i. | ​mass number | | j. | ​polymers | | k. | ​C6H12O6 |  |  |  | | --- | --- | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Matching | | *LEARNING OBJECTIVES:* |  | |

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| 61. The chemical symbol for oxygen gas​   |  |  | | --- | --- | | *ANSWER:* | g | |

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| 62. A subatomic particle with no net electrical charge​   |  |  | | --- | --- | | *ANSWER:* | e | |

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| 63. A large molecule made up of repeating subunits.​   |  |  | | --- | --- | | *ANSWER:* | j | |

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| 64. Simple molecules that can be joined together to form large molecules.   |  |  | | --- | --- | | *ANSWER:* | h | |

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| 65. The total number of protons and neutrons in an atom’s nucleus​   |  |  | | --- | --- | | *ANSWER:* | i | |

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| 66. A subatomic particle with a positive charge​   |  |  | | --- | --- | | *ANSWER:* | d | |

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| 67. A way to describe the number of each type of atom or ion in a compound​   |  |  | | --- | --- | | *ANSWER:* | a | |

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| 68. The scale used to measure acidity​   |  |  | | --- | --- | | *ANSWER:* | f | |

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| 69. The chemical formula for glucose   |  |  | | --- | --- | | *ANSWER:* | k | |

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| 70. A subatomic particle with a negative charge​   |  |  | | --- | --- | | *ANSWER:* | c | |

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| 71. Two or more atoms held together by chemical bonds​   |  |  | | --- | --- | | *ANSWER:* | b | |

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| **Completion** |

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| 72. Well-designed scientific experiments compare something between two groups, an experimental group and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_group. These groups are as similar as possible except for the variable of interest.   |  |  | | --- | --- | | *ANSWER:* | ​control | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 73. ​A well-tested and widely accepted scientific hypothesis or a group of related hypotheses is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​scientific theory | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 74. The statement that, “If land is cleared of vegetation and exposed to rain and melting snow, then the land retains less water and loses soil nutrients,” is an example of a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​hypothesis | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 75. ​DNA molecules are coiled and shaped around proteins to form larger structures called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | chromosomes | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 76. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a type of matter that has a unique set of properties and that cannot be broken down into simpler substances by chemical means.   |  |  | | --- | --- | | *ANSWER:* | ​element | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 77. A chemical that is a combination of two or more different elements in fixed proportions is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​compound | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 78. ​Ions are formed when an atom or group of atoms gains or losses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​electrons | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 79. The pH of a solution is a measure of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ions and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ions in that solution.   |  |  | | --- | --- | | *ANSWER:* | hydrogen; hydroxide  hydroxide; hydrogen  ​ | | *DIFFICULTY:* | Moderate | | *QUESTION TYPE:* | Completion | |

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| 80. One essential nutrient for plant growth studied by Bormann and Likens is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​nitrate | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 81. ​A simple carbohydrate that plants and animals use to obtain energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​glucose | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 82. A molecule consists of two or more atoms connected by ​\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​chemical bonds | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 83. The only organic molecule with fewer than two carbon atoms is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.​   |  |  | | --- | --- | | *ANSWER:* | ​methane | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 84. ​Flowing water is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy.   |  |  | | --- | --- | | *ANSWER:* | ​kinetic | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 85. ​Organic compounds always contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ atoms.   |  |  | | --- | --- | | *ANSWER:* | ​carbon | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 86. Within some DNA molecules are certain sequences of nucleotides called​   |  |  | | --- | --- | | *ANSWER:* | genes | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 87. Macromolecules formed from a number of monomers are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  | | --- | --- | | *ANSWER:* | ​polymers | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 88. The law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of matter states that whenever matter undergoes a physical or chemical change, no atoms are created or destroyed.   |  |  | | --- | --- | | *ANSWER:* | ​conservation | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| 89. ​A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a set of components that function and interact in some regular way.   |  |  | | --- | --- | | *ANSWER:* | system​ | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.4 What Are Systems and How Do They Respond To Change? | | *QUESTION TYPE:* | Completion | | *LEARNING OBJECTIVES:* |  | |

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| **Subjective Short Answer** |

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| 90. ​Give an example of a way you can convert potential energy into kinetic energy.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | *ANSWER:* | *Sample answers:*   |  |  | | --- | --- | | · | Eat food to keep body working. | | · | Drop an object. | | · | Burn wood for heat. | | | *DIFFICULTY:* | Bloom’s: Apply | | *REFERENCES:* | 2.3 What Is Energy and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Subjective Short Answer | | *LEARNING OBJECTIVES:* |  | |

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| 91. ​A scientific hypothesis must be testable. What does this mean?   |  |  | | --- | --- | | *ANSWER:* | ​It must be possible to use the hypothesis to generate predictions about what will happen if the hypothesis is true and that can be tested using a scientific experiment. | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Subjective Short Answer | | *LEARNING OBJECTIVES:* |  | |

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| 92. Give an example of a positive feedback loop.​   |  |  | | --- | --- | | *ANSWER:* | ​Examples could include:  Hubbard Brook experiments, where removing vegetation from a stream valley caused soil erosion and losses of nutrients, which caused more vegetation to die.  A stock market crash, in which falling stock values cause investors to sell, which lowers values further. | | *DIFFICULTY:* | Bloom’s: Apply | | *REFERENCES:* | 2.4 What Are Systems and How Do They Respond To Change? | | *QUESTION TYPE:* | Subjective Short Answer | | *LEARNING OBJECTIVES:* |  | |

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| 93. ​What are the physical states and chemical forms of matter?   |  |  | | --- | --- | | *ANSWER:* | ​Matter has three physical states: solid, liquid and gas.  It has two chemical forms: elements and compounds. | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Subjective Short Answer | | *LEARNING OBJECTIVES:* |  | |

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| **Essay** |

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| 94. The Bormann-Likens scientific investigation of clear-cutting forest watersheds is an example of reliable science. What does that tell you about the work?   |  |  | | --- | --- | | *ANSWER:* | ​It has been subjected to peer review, and other scientists have repeated the study and produced similar results. Reliable science consists of data, hypotheses, models, theories, and laws that are widely accepted by all or most of the scientists who are considered experts in the field under study. | | *DIFFICULTY:* | Bloom’s: Apply | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Essay | | *LEARNING OBJECTIVES:* |  | |

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| 95. What are the three steps involved in critical thinking?   |  |  | | --- | --- | | *ANSWER:* | Be skeptical about everything you read or hear  Evaluate evidence and hypotheses using inputs and opinions from a variety of reliable sources  Identify and evaluate your personal assumptions, biases, and beliefs and distinguish between facts and opinions before coming to a conclusion. | | *DIFFICULTY:* | Bloom’s: Remember | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Essay | | *LEARNING OBJECTIVES:* |  | |

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| 96. Describe the three major types of organic polymers important for life. Give examples of why at least two types are important.   |  |  | | --- | --- | | *ANSWER:* | ​The important organic polymers for life are carbohydrates, proteins, and nucleic acids. Carbohydrates are used for energy and structure. Proteins have a wide range of roles, and nucleic acids such as DNA are important repositories of information (DNA contains genes). | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.2 What Is Matter and What Happens When It Undergoes Change? | | *QUESTION TYPE:* | Essay | | *LEARNING OBJECTIVES:* |  | |

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| 97. Why do scientists not talk about “proof” when discussing scientific research?   |  |  | | --- | --- | | *ANSWER:* | Scientists cannot prove or disprove anything absolutely because there is always some degree of uncertainty in scientific measurements, observations, and models. | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Essay | | *LEARNING OBJECTIVES:* |  | |

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| 98. Theories are well supported by evidence and are considered key outcomes of science. However, we can’t prove things conclusively in science. Is it possible to find evidence that contradicts a theory? Does your answer affect how you view theories?​   |  |  | | --- | --- | | *ANSWER:* | ​Although theories are based on considerable evidence and are very important, scientific studies do not prove anything absolutely. As a result, it is always possible that a theory could be contradicted by future data. That should not mean that people take theories lightly as they are based on so much evidence and unlikely to be contradicted. | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Essay | | *LEARNING OBJECTIVES:* |  | |

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| 99. Describe three limitations of science in general (as well as environmental science).   |  |  | | --- | --- | | *ANSWER:* | ​1.  Scientists cannot prove or disprove anything absolutely because there is always some degree of uncertainty in scientific measurements, observations and models.  ​  2.  Scientists are humans and thus are not totally free of bias about their own results and hypotheses.  ​  3.  Many systems in the natural world involve a huge number of variables with complex interactions. | | *DIFFICULTY:* | Bloom’s: Understand | | *REFERENCES:* | 2.1 What Do Scientists Do? | | *QUESTION TYPE:* | Essay | | *LEARNING OBJECTIVES:* |  | |