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| 1. Living organisms have been on Earth for \_\_\_\_\_\_\_\_\_ of Earth's history.   |  |  |  | | --- | --- | --- | |  | a. | less than 1% | |  | b. | about 20% | |  | c. | about 50% | |  | d. | about 80% |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 2. Which of the following statements about the scientific method is false?   |  |  |  | | --- | --- | --- | |  | a. | A scientific theory is never considered finally proved. | |  | b. | Data used to generate a hypothesis may come from observations, experiments, and chance findings. | |  | c. | A theory that has accumulated a substantial body of experimental support is called a hypothesis. | |  | d. | A scientific model represents some aspect of nature based on a set of hypotheses and theories. |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 3. How old is the Earth?   |  |  |  | | --- | --- | --- | |  | a. | approximately 4.5 thousand years old | |  | b. | approximately 4.5 billion years old | |  | c. | approximately 4.5 million years old | |  | d. | approximately 4.5 trillion years old |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 4. A \_\_\_\_\_\_\_\_\_\_\_ aims to predict the complex behavior of Earth systems.   |  |  |  | | --- | --- | --- | |  | a. | scientific hypothesis | |  | b. | scientific observation | |  | c. | scientific plan | |  | d. | scientific model |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 5. A scientific hypothesis that stands repeated testing can be elevated to a scientific \_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | model | |  | b. | fact | |  | c. | theory | |  | d. | idea |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 6. Which of the following statements about the scientific method is not true?   |  |  |  | | --- | --- | --- | |  | a. | A tentative explanation of a body of data is called a hypothesis. | |  | b. | Theories are less likely than hypotheses to be correct. | |  | c. | A hypothesis is strengthened if it successfully predicts the outcomes of new experiments. |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 7. According to the principle of uniformitarianism, \_\_\_\_\_\_\_\_ .   |  |  |  | | --- | --- | --- | |  | a. | geologic processes we observe today have operated in the past | |  | b. | animals evolved at a uniform rate | |  | c. | all of the planets formed from a uniform solar nebula | |  | d. | early Earth was covered by a uniform magma ocean |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 8. The \_\_\_ is the information preserved in rocks formed at various times throughout Earth history.   |  |  |  | | --- | --- | --- | |  | a. | geologic data | |  | b. | geologic record | |  | c. | geodynamic information |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 9. Which of the following is "a tentative explanation based on observational data and experiments"?   |  |  |  | | --- | --- | --- | |  | a. | scientific theory | |  | b. | scientific hypothesis | |  | c. | scientific model | |  | d. | scientific thesis |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 10. Complete the following sentence: A \_\_\_\_\_\_\_\_ is a representation of how a natural process operates or how a natural system behaves.   |  |  |  | | --- | --- | --- | |  | a. | scientific theory | |  | b. | scientific hypothesis | |  | c. | scientific model | |  | d. | scientific thesis |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 11. Scientific knowledge that has been elevated to the status of a scientific theory is no longer subject to change.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | |

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| 12. Complete the following sentence: Scientific hypotheses should always be\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | testable | |  | b. | correct | |  | c. | complex | |  | d. | simple |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 13. Change in the ground elevation of the Earth's surface is called \_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | geodesy | |  | b. | topography | |  | c. | uniformitarianism | |  | d. | none of the above |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 14. Elevation of the ground surface is measured relative to \_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | Mt. Everest | |  | b. | the equator | |  | c. | sea level | |  | d. | the North Pole |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 15. The typical elevation of the land surface occurs within a range of \_\_\_\_\_\_\_ above sea level.   |  |  |  | | --- | --- | --- | |  | a. | 0–20 km | |  | b. | 0–1 km | |  | c. | 0–10 km | |  | d. | 0–5 km |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 16. The typical depth of ocean basins are \_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | 1–2 km | |  | b. | 10–12 km | |  | c. | 4–5 km | |  | d. | 8–10 km |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 17. The highest topographic point above sea level on Earth is at \_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | Mount Himalaya | |  | b. | Mount Mauna Loa | |  | c. | Mount Marianas | |  | d. | Mount Everest |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 18. The vertical distance above sea level is called the \_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | elevation | |  | b. | contour | |  | c. | relief | |  | d. | topography |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 19. How high is Mount Everest, the highest mountain in the world?   |  |  |  | | --- | --- | --- | |  | a. | approximately 3000 meters | |  | b. | approximately 6000 meters | |  | c. | approximately 9000 meters | |  | d. | approximately 12,000 meters |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 20. The shape of the Earth is best described as   |  |  |  | | --- | --- | --- | |  | a. | a perfect sphere. | |  | b. | near spherical with flattening at the equator and bulging at the poles. | |  | c. | near spherical with bulging at the equator and flattening at the poles. |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 21. Which of the following techniques are used by geologists in their research?   |  |  |  | | --- | --- | --- | |  | a. | creating computer models | |  | b. | laboratory experiments | |  | c. | observing the natural environment | |  | d. | all of these |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 22. Geologic phenomena cannot be directly observed because geologic processes all operate over timescales much longer than a human lifespan.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | |

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| 23. Which of the following phrases was used by James Hutton to summarize the Principle of Uniformitarianism?   |  |  |  | | --- | --- | --- | |  | a. | Earth processes are uniform through time. | |  | b. | The present is the key to the past. | |  | c. | The laws of nature are unchangeable. | |  | d. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 24. The Earth's core is made up primarily of \_\_\_\_\_\_\_\_ .   |  |  |  | | --- | --- | --- | |  | a. | iron | |  | b. | lead | |  | c. | oxygen | |  | d. | silicon |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 25. Which part of the Earth depicted in the figure above is molten?   |  |  |  | | --- | --- | --- | |  | a. | crust | |  | b. | mantle | |  | c. | outer core | |  | d. | inner core |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 26. Which of the following makes up the bulk of the Earth?   |  |  |  | | --- | --- | --- | |  | a. | crust | |  | b. | inner core | |  | c. | mantle | |  | d. | outer core |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 27. Ninety percent of the Earth is made up of which four elements?   |  |  |  | | --- | --- | --- | |  | a. | iron, oxygen, silicon, and magnesium | |  | b. | oxygen, nitrogen, hydrogen, and silicon | |  | c. | magnesium, aluminum, silicon, and oxygen | |  | d. | silicon, calcium, aluminum, and iron |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 28. Approximately 50% of the Earth's crust is made up of which element?   |  |  |  | | --- | --- | --- | |  | a. | aluminum | |  | b. | iron | |  | c. | oxygen | |  | d. | silicon |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 29. Stony meteorites are similar in composition to the Earth's \_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | mantle | |  | b. | crust | |  | c. | inner core | |  | d. | outer core |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 30. The group of meteorites that are similar in composition to the Earth's core are \_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | stony meteorites | |  | b. | high-density meteorites | |  | c. | iron-nickel meteorites | |  | d. | none of the above |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 31. The Mohorovicic discontinuity coincides with the \_\_\_\_\_\_\_\_\_\_ boundary.   |  |  |  | | --- | --- | --- | |  | a. | mantle-core | |  | b. | crust-mantle | |  | c. | lithosphere-mantle | |  | d. | inner core-outer core |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 32. Continental crust is \_\_\_\_\_\_\_\_ oceanic crust.   |  |  |  | | --- | --- | --- | |  | a. | less dense than | |  | b. | the same density as | |  | c. | more dense than | |  | d. | Geoscientists have no idea. |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 33. The Earth's major layers include (from outermost to innermost) \_\_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | inner core, outer core, mantle, crust | |  | b. | outer core, inner core, mantle, crust | |  | c. | crust, mantle, outer core, inner core | |  | d. | crust, outer core, inner core, mantle |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 34. The average density of continental crust is \_\_\_\_\_\_\_\_ g/cm3.   |  |  |  | | --- | --- | --- | |  | a. | 2.8 | |  | b. | 3.4 | |  | c. | 3.0 | |  | d. | 4.0 |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 35. Continents float high because they are \_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | denser than the mantle | |  | b. | less dense than the mantle | |  | c. | the same density as the mantle | |  | d. | thicker than the mantle |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 36. The two most common elements in the Earth's crust are \_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | calcium and carbon | |  | b. | iron and sulfur | |  | c. | chlorine and sodium | |  | d. | oxygen and silicon |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 37. How thick is the oceanic crust?   |  |  |  | | --- | --- | --- | |  | a. | approximately 7 km | |  | b. | approximately 70 km | |  | c. | approximately 35 km | |  | d. | approximately 240 km |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 38. Which of the following statements about the Moho (Mohovoricic discontinuity) is false?   |  |  |  | | --- | --- | --- | |  | a. | The Moho marks the top of a partially molten layer. | |  | b. | The Moho separates denser rocks below from less dense rocks above. | |  | c. | The Moho separates the crust from the mantle. | |  | d. | The speed of seismic waves increases as they pass down through the Moho. |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 39. Why is the average elevation of the continents higher than the average elevation of the seafloor?   |  |  |  | | --- | --- | --- | |  | a. | because melting of large ice caps has caused isostatic rebound of the continents | |  | b. | because oceanic crust is composed of denser rocks than the continental crust | |  | c. | because the continents are supported by upwelling mantle currents | |  | d. | because subduction pulls down the seafloor |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 40. The temperature at which a rock melts generally \_\_\_ with increasing pressure.   |  |  |  | | --- | --- | --- | |  | a. | increases | |  | b. | remains the same | |  | c. | decreases |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 41. What are the two most abundant elements (by weight) in the whole Earth?   |  |  |  | | --- | --- | --- | |  | a. | iron and oxygen | |  | b. | oxygen and silicon | |  | c. | silicon and iron |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 42. What happens when seismic waves encounter a boundary between two materials?   |  |  |  | | --- | --- | --- | |  | a. | All the wave energy bounces off the boundary. | |  | b. | All the wave energy passes through the boundary. | |  | c. | Some of the wave energy bounces off the boundary and some passes through the boundary. |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 43. Beneath mountain belts, the Moho is   |  |  |  | | --- | --- | --- | |  | a. | deeper than it is beneath normal continental crust. | |  | b. | shallower than it is beneath normal continental crust. | |  | c. | at the same depth as it is beneath normal continental crust. |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 44. Which region of the Earth consists primarily of iron and magnesium silicates?   |  |  |  | | --- | --- | --- | |  | a. | region A | |  | b. | region B | |  | c. | region C |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 45. The Earth exchanges \_\_\_\_\_\_\_\_\_\_ with the rest of the cosmos.   |  |  |  | | --- | --- | --- | |  | a. | energy and mass | |  | b. | mass, but not energy, | |  | c. | energy, but not mass, | |  | d. | neither energy nor mass |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 46. In which of the following subsystems is the Earth's magnetic field generated?   |  |  |  | | --- | --- | --- | |  | a. | climate system | |  | b. | hydrologic system | |  | c. | geodynamo system | |  | d. | plate tectonic system |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 47. The Earth's climate system involves interactions between the atmosphere and the \_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | biosphere | |  | b. | hydrosphere | |  | c. | lithosphere | |  | d. | biosphere, hydrosphere, and lithosphere |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 48. On average, the Earth's lithosphere is approximately \_\_\_\_ km thick.   |  |  |  | | --- | --- | --- | |  | a. | 4 | |  | b. | 20 | |  | c. | 100 | |  | d. | 500 |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 49. The asthenosphere is \_\_\_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | cool and strong | |  | b. | cool and weak | |  | c. | hot and strong | |  | d. | hot and weak |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 50. What are the "plates" of plate tectonics made up of?   |  |  |  | | --- | --- | --- | |  | a. | asthenosphere | |  | b. | crust | |  | c. | lithosphere | |  | d. | mantle |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 51. Which of the following relationships is correct?   |  |  |  | | --- | --- | --- | |  | a. | asthenosphere = crust | |  | b. | lithosphere = crust | |  | c. | asthenosphere = crust + upper mantle | |  | d. | lithosphere = crust + upper mantle |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 52. The motion of a flowing material where hot matter rises from the bottom and cool matter sinks from the surface is called \_\_\_\_\_\_\_\_\_\_\_\_ .   |  |  |  | | --- | --- | --- | |  | a. | accretion | |  | b. | convection | |  | c. | differentiation | |  | d. | fusion |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 53. How old are the earliest fossil remains?   |  |  |  | | --- | --- | --- | |  | a. | about 65 billion years old | |  | b. | about 2200 billion years old | |  | c. | about 540 billion years old | |  | d. | about 3500 billion years old |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 54. The plate tectonic system is driven by \_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | magnetism | |  | b. | the climate system | |  | c. | solar heat | |  | d. | internal heat |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 55. The three major global geosystems are \_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | climate system, solar system, and geodynamo system | |  | b. | geodynamo system, plate tectonic system, and solar system | |  | c. | climate system, geodynamo system, and plate tectonic system | |  | d. | plate tectonic system, climate system, and solar system |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 56. Solar energy energizes which of the Earth's components?   |  |  |  | | --- | --- | --- | |  | a. | atmosphere | |  | b. | biosphere | |  | c. | hydrosphere | |  | d. | all of the above |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 57. The ability of the Earth's atmosphere to retain heat is referred to as the \_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | solar effect | |  | b. | radiation effect | |  | c. | biosphere effect | |  | d. | greenhouse effect |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 58. Magnetic reversals of the Earth's magnetic field are when \_\_\_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | the Earth's north and south poles flip | |  | b. | the Earth's magnetic field decreases in intensity | |  | c. | the Earth's magnetic poles wander | |  | d. | the Earth's magnetic field increases in intensity |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 59. Which of the following powers the Earth's internal heat engine?   |  |  |  | | --- | --- | --- | |  | a. | radioactivity | |  | b. | heat trapped during the formation of the Earth | |  | c. | A and B | |  | d. | neither A nor B |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 60. How thick is average lithosphere?   |  |  |  | | --- | --- | --- | |  | a. | 25 km | |  | b. | 100 km | |  | c. | 250 km | |  | d. | 1000 km |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 61. Which of the following statements about the asthenosphere is false?   |  |  |  | | --- | --- | --- | |  | a. | The asthenosphere lies beneath the lithosphere. | |  | b. | The asthenosphere is stronger than the lithosphere. | |  | c. | The asthenosphere rises close to the surface beneath mid-ocean ridges. | |  | d. | The asthenosphere is partially molten. |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 62. The boundary between the mantle and the core lies at a depth of approximately \_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | 300 kilometers | |  | b. | 1000 kilometers | |  | c. | 3000 kilometers | |  | d. | 10,000 kilometers |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 63. Which of the following regions is the source of most basaltic magma?   |  |  |  | | --- | --- | --- | |  | a. | the asthenosphere | |  | b. | the lithosphere | |  | c. | the lower mantle | |  | d. | the outer core |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 64. What element makes up most of the Earth's core?   |  |  |  | | --- | --- | --- | |  | a. | iron | |  | b. | oxygen | |  | c. | magnesium | |  | d. | silicon |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 65. What drives plate tectonics?   |  |  |  | | --- | --- | --- | |  | a. | erosion | |  | b. | solar energy | |  | c. | thermal conduction | |  | d. | thermal convection |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 66. Over geologic time, most of the heat lost from the Earth's interior has been transported by \_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | conduction | |  | b. | convection | |  | c. | radioactive decay | |  | d. | solar radiation |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 67. Which of the following regions is hottest?   |  |  |  | | --- | --- | --- | |  | a. | the crust | |  | b. | the inner core | |  | c. | the mantle | |  | d. | the outer core |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 68. The temperature at the center of the Earth is approximately \_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | 200°C | |  | b. | 500°C | |  | c. | 2000°C | |  | d. | 5000°C |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 69. Above what temperature do materials lose their permanent magnetism?   |  |  |  | | --- | --- | --- | |  | a. | 100°C | |  | b. | 500°C | |  | c. | 1000°C | |  | d. | 5000°C |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 70. Approximately how often does the Earth's magnetic field reverse itself?   |  |  |  | | --- | --- | --- | |  | a. | every 50 years | |  | b. | every 5000 years | |  | c. | every 500,000 years | |  | d. | every 50,000,000 years |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 71. Which of the following Earth systems is powered by solar energy?   |  |  |  | | --- | --- | --- | |  | a. | climate system | |  | b. | geodynamic system | |  | c. | plate tectonic system |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 72. Which of the following statements about the lithosphere is not true?   |  |  |  | | --- | --- | --- | |  | a. | The lithosphere is cool and relatively brittle. | |  | b. | The lithosphere includes the crust and uppermost mantle. | |  | c. | The lithosphere is easily deformed, like a tube of toothpaste. |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 73. The Earth's lithosphere is broken into approximately \_\_\_ large, rigid plates.   |  |  |  | | --- | --- | --- | |  | a. | 2 | |  | b. | 12 | |  | c. | 50 |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 74. In a convecting system, like a pot of boiling water or the Earth's mantle,   |  |  |  | | --- | --- | --- | |  | a. | cool material rises. | |  | b. | warm material rises. | |  | c. | both cool and warm material rise. |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 75. Which of the following statements is correct?   |  |  |  | | --- | --- | --- | |  | a. | The Earth's asthenosphere is much stronger than the lithosphere. | |  | b. | The Earth's asthenosphere is much weaker than the lithosphere. | |  | c. | The Earth's asthenosphere and lithosphere are similar in strength. |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 76. Which of the following statements is correct?   |  |  |  | | --- | --- | --- | |  | a. | biosphere system, atmosphere system, and hydrosphere system. | |  | b. | lithosphere system, asthenosphere system, and deep mantle system. | |  | c. | climate system, plate tectonic system, and geodynamic system. |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 77. The geodynamo system is responsible for producing the Earth's   |  |  |  | | --- | --- | --- | |  | a. | magnetic field. | |  | b. | convecting mantle. | |  | c. | weather. |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 78. In the plate tectonic system, the lithospheric plates ride on the hot, weak \_\_\_ layer.   |  |  |  | | --- | --- | --- | |  | a. | asthenosphere | |  | b. | deep mantle | |  | c. | outer core |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 79. Which of the following rock types would be least likely to record the magnetic field at the time the rock formed?   |  |  |  | | --- | --- | --- | |  | a. | basaltic lava flow | |  | b. | deep-sea shale | |  | c. | alluvial conglomerate |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 80. The Earth has had a magnetic field for the last \_\_\_ years.   |  |  |  | | --- | --- | --- | |  | a. | 5 million | |  | b. | 1 billion | |  | c. | 3.5 billion |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 81. Which of the following statements is true?   |  |  |  | | --- | --- | --- | |  | a. | The Earth's magnetic poles are aligned with its rotation axis. | |  | b. | The Earth's magnetic poles are inclined about 11° from its rotation axis. | |  | c. | The Earth's magnetic poles are inclined about 45° from its rotation axis. |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 82. What is the lower mantle made up of?   |  |  |  | | --- | --- | --- | |  | a. | dense silicate minerals | |  | b. | iron-nickel alloy | |  | c. | silicate melt |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 83. How old are the oldest rocks now found on the Earth's surface?   |  |  |  | | --- | --- | --- | |  | a. | 0.5 billion years old | |  | b. | 4.0 billion years old | |  | c. | 2.5 billion years old | |  | d. | 4.5 billion years old |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 84. The Earth's atmosphere has been oxygen-rich for \_\_\_\_\_\_\_\_\_\_ of the Earth's history.   |  |  |  | | --- | --- | --- | |  | a. | about 25% | |  | b. | about 50% | |  | c. | about 75% | |  | d. | about 99% |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 85. Large continental masses had formed on the Earth by \_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | 0.3 billion years ago | |  | b. | 2.5 billion years ago | |  | c. | 1.0 billion years ago | |  | d. | 4.0 billion years ago |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 86. What caused the mass extinctions 65 million years ago that ended the Age of Dinosaurs?   |  |  |  | | --- | --- | --- | |  | a. | major bolide impact | |  | b. | massive volcanic eruptions | |  | c. | global glaciation | |  | d. | all of the above |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 87. The first evidence of erosion by water in the rock record occurred \_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | 4000 Ma | |  | b. | 3500 Ma | |  | c. | 2500 Ma | |  | d. | 3800 Ma |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 88. The first appearance of *Homo sapiens* on Earth occurred \_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | 16 Ma | |  | b. | 0.16 Ma | |  | c. | 1.6 Ma | |  | d. | 1600 Ma |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 89. How many major mass extinction events have occurred throughout Earth's history?   |  |  |  | | --- | --- | --- | |  | a. | 5 | |  | b. | 10 | |  | c. | 2 | |  | d. | 1 |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 90. Which of the following statements about the age of the Earth and Moon is true?   |  |  |  | | --- | --- | --- | |  | a. | The Earth is approximately 3 billion years older than the Moon. | |  | b. | The Earth and Moon are approximately the same age. | |  | c. | The Earth is approximately 1.5 billion years younger than the Moon. | |  | d. | The Earth is approximately 4.5 billion years younger than the Moon. |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 91. The oldest terrestrial material found on the Earth is approximately \_\_\_\_\_\_\_ old.   |  |  |  | | --- | --- | --- | |  | a. | 4.4 billion years | |  | b. | 4400 years | |  | c. | 4.4 million years | |  | d. | 440 hundred years |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 92. Humans have been on Earth for \_\_\_ of Earth's history.   |  |  |  | | --- | --- | --- | |  | a. | less than 1% | |  | b. | approximately 50% | |  | c. | more than 90% |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 93. When did our solar system form?   |  |  |  | | --- | --- | --- | |  | a. | about 540 million years ago | |  | b. | about 2.5 billion years ago | |  | c. | about 4.6 billion years ago |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 94. Evidence in the rock record shows that there have been \_\_\_ major extinction events during Earth's history.   |  |  |  | | --- | --- | --- | |  | a. | 10 | |  | b. | 5 | |  | c. | 2 |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 95. About when did the first animals evolve on Earth, according to current geological understanding?   |  |  |  | | --- | --- | --- | |  | a. | 10 million years ago | |  | b. | 60 million years ago | |  | c. | 100 million years ago | |  | d. | 600 million years ago |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 96. About when are *Homo sapiens* thought to have evolved?   |  |  |  | | --- | --- | --- | |  | a. | 6000 years ago | |  | b. | 10,000,000 years ago | |  | c. | 200,000 years ago | |  | d. | 65,000,000 years ago |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 97. How did Earth's atmosphere become oxygenated?   |  |  |  | | --- | --- | --- | |  | a. | volcanic outgassing | |  | b. | gasses from asteroid impacts | |  | c. | radiation interacting with the atmosphere | |  | d. | oxygen-producing organisms |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 98. Geologic evidence indicates Earth's moon and core formed within about the first 100 million years of Earth history.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | |

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| 99. Approximately when did the mass-extinction event that led to the demise of the dinosaurs occur?   |  |  |  | | --- | --- | --- | |  | a. | 50 thousand years ago | |  | b. | 443 million years ago | |  | c. | 1.4 billion years ago | |  | d. | 65 million years ago |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 100. Which class of animals rose to dominance after the extinction of the dinosaurs?   |  |  |  | | --- | --- | --- | |  | a. | amphibians | |  | b. | mammals | |  | c. | marine invertebrates | |  | d. | reptiles |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 101. Earth's hydrosphere did not begin to form until at least 2 billion years ago.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 102. About what percentage of species went extinct during the largest mass extinction in Earth history?   |  |  |  | | --- | --- | --- | |  | a. | 15% | |  | b. | 40% | |  | c. | 70% | |  | d. | 95% |  |  |  | | --- | --- | | *ANSWER:* | d | |