



## Foundations of Science Learner Outcome Questions

### General

1. What is the temperature of freezing on the Celsius scale? 0
2. What is 37.0° C in Fahrenheit? 98.6
3. What is 212° F in Celsius? 100
4. In a chemical reaction, the law of conservation of mass says that the mass of the reactants always equals the mass of the \_\_\_\_\_. Products
5. What states that the matter in a chemical reaction can not be created or destroyed, but only rearranged? Law of Conservation of Mass
6. What is the study of weather called? Meteorology
7. What is the study of space called the universe called? Astronomy
8. \_\_\_\_\_ is the study of the history of the Earth as recorded in the rocks. Geology
9. \_\_\_\_\_ is the science of forces and energy. Physics
10. After formulating a hypothesis, you should design an \_\_\_\_\_. Experiment
11. What is a series of logical steps followed in order to solve a problem? Scientific Method
12. What SI prefix means one thousand (1000)? Kilo
13. What SI prefix means one one hundredth (1/100)? Centi
14. What SI prefix means one one thousandth (1/1000)? Milli
15. If you have a coil of wire that is 156 m long, how many cm would that be? 15,600
16. Write 564 milliseconds as seconds. .564
17. Write 3679 grams as kilograms. 3.679
18. How many significant figures does 4,560 have? 3
19. How many significant figures should your answer in  $24 \times 5,234$  have? 2
20. How many significant figures should your answer in  $8,675/459$  have? 3
21. How many significant figures does 3,986,568 have? 7
22. How many significant figures does 8,685.50 have? 6
23. How many significant figures does 5,056 have? 4
24. Write .0015 kg in scientific notation.  $1.5 \times 10^3$  kg
25. Write 10,687,000 in scientific notation.  $1.0687 \times 10^7$
26. What is a tested, possible explanation of a natural event where you can make predictions? Scientific Theory
27. What is a summary of an observed natural event? Scientific Law
28. A helium balloon will float on air because its \_\_\_\_\_ is lower than that of air. Density
29. The second floor of a building will be warmer than the first floor because \_\_\_\_\_ air rises due to its lower density. Warm
30. What is the density of 8 grams of a substance that takes up 2 centimeters cubed of space?  $4 \text{ g/cm}^3$
31. Biological, Earth, and Physical are the three branches of \_\_\_\_\_ science. Natural
32. \_\_\_\_\_ uses lenses to magnify distant objects. Telescopes
33. What scientific tool is used to detect distant radio signals from objects? Radio Telescopes

34. Scientists use \_\_\_\_\_ to study earthquakes and related phenomena.  
Seismographs

### General (continued)

35. Weather patterns, the movement of tectonic plates, and ocean currents move in circular patterns called \_\_\_\_\_ because of the differences in density.  
Convection Currents
36. Convection currents form when \_\_\_\_\_ dense substances descend and \_\_\_\_\_ less dense substances rise. Cool, Hot/Warm

### Chemistry

37. What is described at anything that has mass and occupies space? Matter
38. What is the charge of an electron? -1
39. What is the charge of a proton? +1
40. If nitrogen has atomic number 7, how many protons does it have? 7
41. The atomic number of an atom is the same as the number of \_\_\_\_\_? Protons
42. What is the weighted average of the masses of all naturally occurring isotopes of an element called? Average Atomic Mass
43. What is the total number of protons and neutrons in the nucleus of an atom called? Mass Number
44. When finding the mass number you should add what two subatomic particles together? Protons and Neutrons
45. What subatomic particle has very little mass in comparison to the other two subatomic particles? Electron
46. \_\_\_\_\_ is a substance that undergoes a chemical change. Reactant
47. \_\_\_\_\_ is a substance that is the result of a chemical change. Product
48. What is the attractive force that holds atoms or ions together called? Chemical Bond
49. A reaction in which energy is transferred to the reactants from the surroundings usually in the form of heat is called an \_\_\_\_\_? Endothermic Reaction
50. A reaction that transfers energy from the reactants to the surroundings usually as heat is called an \_\_\_\_\_? Exothermic Reaction
51. Which state of matter contains the most energy, has the most space between its atoms, and takes the shape of its container? Gas
52. Which state of matter has the most tightly packed atoms at room temperature?  
Solid
53. Which state of matter has atoms that are close together but has less attraction between molecules so that the substance can flow? Liquid
54. \_\_\_\_\_ change is required to convert one state of matter into another. Energy
55. A \_\_\_\_\_ substance has equal numbers of positives and negatives. Neutral
56. Balance the chemical equation:  $\text{AgNO}_3 + \text{CaCl}_2 = \text{AgCl} + \text{Ca}(\text{NO}_3)_2$   
 $2\text{AgNO}_3 + \text{CaCl}_2 = 2\text{AgCl} + \text{Ca}(\text{NO}_3)_2$
57. Balance the chemical equation:  $\text{CuSO}_4 + \text{Al} = \text{Al}_2(\text{SO}_4)_3 + \text{Cu}$   
 $3\text{CuSO}_4 + 2\text{Al} = \text{Al}_2(\text{SO}_4)_3 + 3\text{Cu}$
58. Balance the chemical equation:  $\text{C}_3\text{H}_8 + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O}$   
 $\text{C}_3\text{H}_8 + 5\text{O}_2 = 3\text{CO}_2 + 4\text{H}_2\text{O}$

59. A solution with a pH of 2 is considered to be strongly \_\_\_\_\_. Acidic  
60. A solution with a pH of 14 is considered to be strongly \_\_\_\_\_. Basic

### Chemistry (continued)

61. A solution with a pH of 7 is \_\_\_\_\_. Neutral  
62. A covalent bond, such as water, that shares the electrons in each molecule but not evenly is called \_\_\_\_\_. Polar  
63. Water is an excellent solvent because its molecules are \_\_\_\_\_ covalently bonded.  
Polar  
64. When Mendeleev developed his periodic table arranged by proton number rather than atomic mass, it allow scientists to predict \_\_\_\_\_ elements. Unknown  
65. What is a mixture that looks uniform when stirred or shaken that separates into different layers when it is no longer agitated? Suspension  
66. \_\_\_\_\_ is a mixture of very tiny particles of pure substances that are dispersed in another substance but do not settle out of the substance. Colloid  
67. An \_\_\_\_\_ is any mixture of immiscible liquids in which the liquids are spread throughout one another. Emulsion  
68. What is a homogeneous mixture of two or more substances uniformly spread throughout a single phase? Solution  
69. \_\_\_\_\_ is the change of a substance from a liquid to a gas. Evaporation  
70. What is the change of a substance from a gas to a liquid? Condensation  
71. The change of a substance from a solid to a gas is called \_\_\_\_\_. Sublimation  
72. The \_\_\_\_\_ electrons of an atom determine its properties, characteristics and the number of bonds it can form. Valence  
73. Atoms are most stable when they have \_\_\_\_\_ electrons in their outermost energy levels. Eight  
74. Which atomic model describes the electrons as planets orbiting a central nucleus like a solar system? Bohr  
75. Nitrogen is in group number 15. How many bonds does it generally form? 3  
76. Carbon is in group number 14. How many bonds does it generally form? 4  
77. The Kinetic Theory states that as the temperature increases in a substance, the volume of space it requires \_\_\_\_\_. Increases  
78. The Kinetic Theory states that as the temperature decreases, the amount of energy in a substance \_\_\_\_\_. Decreases  
79. How many atoms are in the molecule  $C_{16}H_{10}N_2O_2$ ? 30  
80. The number 2 in the formula  $H_2O$  is called a \_\_\_\_\_. Subscript  
81. To balance a chemical equation you may only change the \_\_\_\_\_.  
Coefficient  
82. \_\_\_\_\_ bonds form by the attraction between oppositely charged ions. Ionic  
83. What kind of bond is formed when atoms share one or more pairs of electrons?  
Covalent  
84. A bond formed by the attraction between positively charged metal ions and the electrons around them is called a \_\_\_\_\_ bond. Metallic  
85. What kind of reaction occurs when one compound breaks into at least two products? Decomposition  
86. What kind of reaction occurs when a compound and oxygen burn? Combustion

87. What kind of reaction occurs when at least two substances form a new more complex compound? Synthesis

### Chemistry (continued)

88. The reaction in which atoms of one element take the place of atoms of another element in a compound is called \_\_\_\_\_? Single Displacement
89. The reaction in which a gas, solid precipitate, or molecular compound is formed from the apparent exchange of ions between ion compounds. Double Displacement
90. What kind of reaction is  $A + B = AB$  Synthesis
91. What kind of reaction is  $AB = A + B$  Decomposition
92. What kind of reaction is  $AB + C = AC + B$  Single Displacement
93. What kind of reaction is  $AB + CD = AD + CB$  Double Displacement

### Nuclear

94. The process by which an unstable nucleus emits one or more particles or energy in the form of electromagnetic radiation is called \_\_\_\_? Nuclear Decay
95. Radium-226 has a half-life of almost 1600 years. If I have 10 grams, how many years would it take to decay the sample to 2.5 grams? 3200 years
96. If you have 20 grams of a radioactive substance, how much would be left after 3 half lives? 2.5 g
97. You had 40 grams of a radioactive substance. Over time, it decays to only 10 grams. How many half lives have passed? 2
98. In the nuclear formula below, What is the atomic mass of Francium? 213
- $$\begin{array}{ccc} 217 & & ? & & 4 \\ \text{Ac} & \longrightarrow & \text{Fr} & + & \text{He} \\ 89 & & 87 & & 2 \end{array}$$
99. \_\_\_\_\_ is the process by which a nucleus splits into two or more smaller fragments, releasing neutrons and energy. Fission
100. What is the process in which light nuclei combine at extremely high temperatures, forming heavier nuclei and releasing energy? Fusion
101. The \_\_\_\_\_ is unstable in radioactive substances. Nucleus

### Physics

102. What is the force with which gravity pulls on quantity of matter? Weight
103. A 50 kg rock is sitting on a cliff's edge 10 m above the base of the cliff. What is the rock's gravitational potential energy? 50,000 J
104. To calculate acceleration, you should divide the change in velocity by \_\_\_\_\_.  
Time
105. A car is at a stop sign and accelerates to a speed of 15 m/s in 3 seconds. What is the car's acceleration?  $5 \text{ m/s}^2$
106. You are cleaning the garage by stacking some boxes on shelves. If each box requires approximately 200 N of forces to lift and you pick each box approximately 2 m off the floor, how much work do you do for each box? 400 J
107. \_\_\_\_\_ developed three laws of physics to describe the motion of physical situations. Newton

108. \_\_\_\_\_ is the distance traveled divided by the time interval during which the motion occurred. Speed

109. \_\_\_\_\_ is the quantity that describes both speed and direction. Velocity

### **Physics (continued)**

110. The change in velocity divided by the time interval in which the change occurred is called \_\_\_\_\_? Acceleration

111. The difference between speed and velocity is that velocity includes \_\_\_\_\_.  
Direction

### **Earth**

112. Under mountains is the thickest part of this layer of Earth. Crust

113. What name do we give crust that is the thickest and least dense? Continental

114. What kind of crust is thin and dense? Oceanic

115. What layer of the Earth is composed of the crust and upper mantle? Lithosphere

116. What layer of the Earth is the zone of the mantle beneath the lithosphere that consists of slowly moving rock? Asthenosphere

117. What name do we use to describe the solid inner most layer of our planet? Inner Core

118. What two layers of the Earth are considered to be solid? Crust and Inner Core

119. What is the name of the layer of the Earth that is thought to be liquid rock?  
Mantle

120. What kind of plate boundary occurs when two lithospheric plates move away from each other? Divergent

121. What kind of plate boundary occurs when two lithospheric plates move towards each other? Convergent

122. What kind of boundary occurs when lithospheric plates slide past each other?  
Transform

123. Marble is a metamorphic rock that originally came from what sedimentary rock?  
Limestone

124. Quartz is a metamorphic rock that was once what sedimentary rock? Sandstone

125. Shale is a sedimentary rock that becomes \_\_\_\_\_ after metamorphosis?  
Slate

126. What kind of rock is formed from cooled and hardened magma or lava? Igneous

127. Rocks formed from compressed or cemented deposits of sediment in a process called \_\_\_\_\_? Deposition

128. \_\_\_\_\_ rocks commonly contain fossils. Sedimentary

129. Metamorphic rocks are formed from other rocks as a result of \_\_\_\_\_, \_\_\_\_\_, or chemical processes. Heat and Pressure

130. \_\_\_\_\_ are common at plate boundaries where friction occurs. Earthquakes

131. \_\_\_\_\_ waves are described as primary waves; the longitudinal waves generated by an earthquake. P Waves

132. This kind of wave is the secondary transverse wave generated by an earthquake.  
S Wave

133. \_\_\_\_\_ waves are seismic waves that travel along the Earth's surface causing much or the damage we see during an earthquake. Surface

134. Electromagnetic waves do not require a medium to travel through unlike seismic waves that travel through \_\_\_\_\_ as a medium. Rocks
135. The region where a tectonic plate dives beneath another plate into the asthenosphere is called a \_\_\_\_\_ zone. Subduction

### **Earth (continued)**

136. Wegener's theory of continental drift was rejected because it lacked \_\_\_\_\_.  
Evidence
137. Which theory explained the magnetic bands discovered on our ocean floors and the puzzle like appearance of our coastlines? Theory of Plate Tectonics
138. The theory of plate tectonics described the movement of lithospheric plates on the Earth's surface and predicted that they are being moved by large \_\_\_\_\_ currents in the asthenosphere. Convection
139. Which of the following is the most powerful weathering and erosional force on Earth: Sun, Wind or Water? Water
140. What is a natural, inorganic solid with a definite chemical composition and characteristic internal structure? Mineral

### **Astronomy**

141. As the distance between two objects decreases, the gravity between them \_\_\_\_\_.  
Increases
142. As the mass of an object increases, the object's gravitational pull \_\_\_\_\_.  
Increases
143. What is the name of the spiral shaped galaxy we live in? Milky Way
144. The color of a star tells us the \_\_\_\_\_ of the star's surface. Temperature
145. What kind of nuclear reaction is responsible for the energy of a star? Fusion
146. Fusion on the sun forms Helium from what element? Hydrogen
147. What scientist is famous for his theories of universal expansion and red shift?  
Hubble
148. A \_\_\_\_\_ is when the moon blocks the sun and creates a shadow on Earth. Solar Eclipse
149. A \_\_\_\_\_ is when the Earth blocks the sun's rays from reaching the moon thus shadowing it. Lunar Eclipse
150. Which scientist stated that everything in our solar system orbited Earth? Ptolemy
151. \_\_\_\_\_ was the scientist that first stated that the Earth went around the sun in perfectly circular orbits. Copernicus
152. Who was the mathematician that supported the theory that the Earth went around the sun but added that the orbits were elliptical not circular? Kepler

### **Light**

153. What is the transfer of energy as heat between particles as they collide within a substance or between two objects in contact called? Conduction
154. \_\_\_\_\_ is the transfer of energy by the movement of fluids with different temperatures. Convection
155. What is the transfer of energy by electromagnetic waves called? Radiation
156. Electromagnetic waves such as sunlight transfer energy through \_\_\_\_\_.  
Radiation

157. Waves such as white light that do not require a medium to travel and can not travel through solids well are called \_\_\_\_\_ waves. Electromagnetic  
158. Radio waves can only be generated by \_\_\_\_\_ objects. Vibrating

### **Weather & Atmosphere**

159. The general weather condition over many years is called \_\_\_\_? Climate  
160. \_\_\_\_ and \_\_\_\_ determine a climate's characteristics. Temperature and Moisture  
161. Scientists do not understand the cause of massive glaciers that once covered much of our continents during \_\_\_\_ \_\_\_\_\_. Ice Ages  
162. Although not likely in our lifetime, another glacier during an \_\_\_\_\_ \_\_\_\_\_ may creep over the Earth's continents. Ice Age  
163. \_\_\_\_\_ is the layer of the atmosphere that is closest to Earth's surface where nearly all weather occurs. Troposphere  
164. The layer of the atmosphere that extends upward from the troposphere to an altitude of 50 km and contains the ozone layer is called \_\_\_\_\_. Stratosphere  
165. The \_\_\_\_\_ layer is the coldest layer of the atmosphere. Mesosphere  
166. Which layer is located above the mesosphere? Thermosphere  
167. Which layer is the region where electrically charged ions are formed as a result of absorption of solar energy? Ionosphere

### **Natural Resources**

168. \_\_\_\_\_ are any resources that are used faster than they can be replaced.  
Nonrenewable Resources  
169. What is any fuel formed from the remains of ancient plant and animal life?  
Fossil Fuel  
170. Sunlight, wind, and water are all examples of \_\_\_\_\_.  
Renewable Resources  
171. Coal, natural gas and oil are examples of what kind of nonrenewable resources?  
Fossil Fuel