700 – 1200
Science 700 – 1200
Placement Tests

CONTENTS

Instructions ................................................................. 2
Science 700 ............................................................... 3
Science 800 ............................................................... 13
Science 900 ............................................................... 23
Science 1000 ............................................................. 33
Science 1100 ............................................................. 43
Science 1200 ............................................................. 53
Answer Keys .............................................................. 63
Student Placement Worksheet ................................. 76
PLACEMENT TEST for the LIFEPAC CURRICULUM

Science   700 – 1200

Instructions

This test is designed to aid the teacher or parent in proper placement of the student into the LIFEPAC curriculum. It has two sections: the Student Test and the Answer Key.

This is not a timed test and the student should be given an opportunity to answer each question adequately. If the student becomes bogged down and the test seems too difficult, skip to the next section. If the test is still too difficult, this child’s academic skill level has been reached and testing may stop. Each test level should take no longer than one hour.

Testing should begin approximately two grade levels below the student’s current or just completed grade level. For example, a student entering tenth grade [1000] should begin testing at the eighth grade [800] level. This allows for proper grade level placement as well as identification of any learning gaps that the student may have.

Once the test has been administered, it is ready to be scored. The teacher or parent does all of the scoring. Each section has 10 numbered questions. Each numbered question equals one point. Use the Answer Key to mark all incorrect answers on the Student Test. Next, record the total number of correct answers in the box beneath the LIFEPAC number in the right hand column. When all tests have been graded, transfer the number correct by LIFEPAC to the Student Placement Worksheet on the back page of the Answer Keys. Then add the total number of points per grade level.

<table>
<thead>
<tr>
<th>Test Level</th>
<th>Test Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>701 - 710</td>
<td>7</td>
</tr>
<tr>
<td>801 - 810</td>
<td>8</td>
</tr>
<tr>
<td>901 - 910</td>
<td>9</td>
</tr>
<tr>
<td>1001 - 1010</td>
<td>10</td>
</tr>
<tr>
<td>1101 - 1110</td>
<td>11</td>
</tr>
<tr>
<td>1201 - 1210</td>
<td>12</td>
</tr>
</tbody>
</table>
1. The standard metric unit of volume is the _________.  
   a. liter  
   b. cubic centimeter  
   c. cubic meter  
   d. milliliter  
2. The standard metric unit of mass is the _________.  
   a. pound  
   b. gram  
   c. ton  
   d. kilogram  
3. Objects are usually grouped together because they are _________.  
   a. small  
   b. large  
   c. similar  
   d. different  
4. In terms of internal structure, a cat is most like _________.  
   a. a worm  
   b. a jellyfish  
   c. an insect  
   d. a bird  
5. A scientific law is _________.  
   a. a deductive statement  
   b. an observation  
   c. a hypothesis  
   d. unbiblical  
6. Deductive reasoning begins with _________.  
   a. an observation  
   b. an experiment  
   c. a generalization  
   d. research  
7. The first step in applying the scientific method to solving a problem is _________.  
   a. identifying the problem  
   b. forming a hypothesis  
   c. conducting an experiment  
   d. drawing a conclusion  
8. A guess that must either be proved or be disproved is _________.  
   a. a law  
   b. an observation  
   c. a conclusion  
   d. a hypothesis  
9. Biological science deals with _________.  
   a. rocks and minerals  
   b. mathematics  
   c. plants and animals  
   d. money and laws  
10. The sciences that deal with customs, laws, religion, and behavior are _________.  
    a. mathematics and logic  
    b. the social sciences  
    c. the physical sciences  
    d. the biological sciences
1. The metric system began in ________.
   a. Germany
   b. the United States
   c. France
   d. Great Britain

2. The United States began a formal shift toward use of the metric system under President ________.
   a. Jackson
   b. Lincoln
   c. Wilson
   d. Ford

3. Divisions of the metric system are based on the number ________.
   a. twelve
   b. two
   c. ten
   d. three

4. The dimension of length has ________ basic metric units.
   a. one
   b. three
   c. two
   d. four

5. Mass is a measure of ________.
   a. density
   b. volume
   c. matter
   d. weight

6. The response of an object to a gravitational force field is its ________.
   a. mass
   b. weight
   c. density
   d. volume

7. This type of graph is a ________ graph.
   a. line
   b. circle
   c. bar
   d. picto-

8. This type of graph is a ________ graph.
   a. line
   b. circle
   c. bar
   d. picto-

9. A pictograph is most similar to a ________ graph.
   a. variable
   b. circle
   c. pie
   d. bar

10. To relate parts of a quantity to the whole quantity, a ________ graph is best.
    a. line
    b. circle
    c. bar
    d. picto-
1. The motions of the sun, moon, and stars give the appearance that the center of the universe is the __________.
   a. earth  
   b. sun  
   c. North Star  
   d. moon

2. Copernicus, Kepler, and Galileo promoted an explanation of planetary motion called the __________ theory.
   a. geocentric  
   b. heliocentric  
   c. concentric  
   d. eccentric

3. Five lights in the night sky that sometimes do not follow the normal paths of stars are __________.
   a. meteors  
   b. planets  
   c. comets  
   d. satellites

4. Something that could not happen if the sun and moon were on the same celestial sphere is __________.
   a. comets  
   b. eclipses  
   c. sunsets  
   d. tides

5. The astronomer who modified Aristotle’s geocentric theory with epicycles was __________.
   a. Aristarchus  
   b. Ptolemy  
   c. Copernicus  
   d. Galileo

6. The astronomer whose observations with the unaided eye were used by other astronomers to predict the shape of orbits was __________.
   a. Kepler  
   b. Brahe  
   c. Newton  
   d. Copernicus

7. The time taken for a planet to revolve around the sun is known as the __________.
   a. month  
   b. period of revolution  
   c. orbital equation  
   d. speed of the planet

8. The sun occupies a point within the planetary orbits called the __________.
   a. center  
   b. focal point  
   c. equinox  
   d. directrix

9. Gravitational attraction exists __________.
   a. only between objects in our solar system  
   b. only between the earth and the moon  
   c. only between objects on the earth  
   d. between all objects everywhere

10. As the distance between objects increases, gravitational attraction __________.
    a. increases  
    b. decreases  
    c. remains constant  
    d. is unaffected
1. Most of the energy used on the earth comes directly or indirectly from the __________.
   a. center of the earth
   b. decay of radioactive elements in the mantle
   c. fusion reactions on the sun
   d. combustion of coal
2. Solar energy is stored as chemical energy in the form of __________.
   a. uranium
   b. salt
   c. petroleum
   d. hydrogen
3. The element that serves as fuel for solar energy is __________.
   a. uranium
   b. hydrogen
   c. petroleum
   d. helium
4. The scientist who explained mathematically the conversion of mass to energy was __________.
   a. Newton
   b. Bohr
   c. Einstein
   d. Planck
5. The word that best describes an eclipse is __________.
   a. surface
   b. shadow
   c. ring
   d. light
6. Umbr refers to __________.
   a. the darkest part of the eclipse
   b. partial eclipse
   c. the brilliant ring around the sun
   d. the new moon
7. The largest planet is __________.
   a. Mercury
   b. Jupiter
   c. Earth
   d. Mars
8. Jupiter most closely resembles __________.
   a. the sun
   b. the moon
   c. the earth
   d. Mars
9. The high high tides and low low tides are called __________ tides.
   a. flood
   b. ebb
   c. spring
   d. neap
10. A seacoast town experiences __________ high tide(s) every twenty-four hours.
    a. one
    b. two
    c. four
    d. eight
1. The two most abundant atmospheric gases make up __________ of the atmosphere.
   a. one-half
   b. three-quarters
   c. nine-tenths
   d. well over nine-tenths

2. The most abundant gas is __________.
   a. oxygen
   b. carbon dioxide
   c. nitrogen
   d. hydrogen

3. The lowest layer of the atmosphere is the __________.
   a. troposphere
   b. ozonosphere
   c. stratosphere
   d. ionosphere

4. The part of the atmosphere in which radiation from space produces charged particles is the __________.
   a. troposphere
   b. ozonosphere
   c. stratosphere
   d. ionosphere

5. Seawater and certain sedimentary rocks are two reservoirs in the __________ cycle.
   a. carbon
   b. nitrogen
   c. hydrogen
   d. water

6. The cycle whose energy is provided by the sun during evaporation is the __________ cycle.
   a. carbon
   b. nitrogen
   c. oxygen
   d. water

7. Sulfur oxide pollutants are formed by using __________ as a fuel.
   a. coal
   b. natural gas
   c. uranium
   d. geothermal steam

8. Lead in the atmosphere interferes with the body's ability to produce __________.
   a. carbon dioxide
   b. blood
   c. oxygen
   d. calcium

9. Our role as steward implies that we __________ our natural resources.
   a. consume
   b. sell abroad
   c. use wisely
   d. recycle

10. A reasonable goal for an industrialized nation is __________.
    a. to reduce pollution to zero
    b. to reduce pollution by 50 percent
    c. to accept the minimum pollution necessary to maintain a desirable life style
    d. to accept the present level of pollution
1. The greatest effect on weather is exerted by _________.
   a. wind
   b. temperature
   c. air pressure
   d. moisture
2. The temperature of an air mass directly affects the _________.
   a. winds around
   b. air pressure beneath
   c. moisture within
   d. precipitation from
3. Air pressure increases when _________.
   a. the temperature of the air mass decreases
   b. the temperature rises and the humidity remains constant
   c. the temperature rises and the humidity increases
   d. the temperature rises and the humidity decreases
4. The wind pattern around a low-pressure region is called _________.
   a. a cyclone
   b. an anticyclone
   c. an aneroid
   d. a downdraft
5. The air mass that typically forms over northern Canada is _________.
   a. maritime polar
   b. maritime tropical
   c. continental polar
   d. continental tropical
6. Tall, fluffy clouds are called _________.
   a. cirrus
   b. stratus
   c. nimbo-stratus
   d. cumulus
7. The boundary between two air masses is _________.
   a. a storm
   b. an isobar
   c. a weather front
   d. a downdraft
8. A drop in temperature is usually forecasted by the arrival of _________.
   a. a warm
   b. a cold
   c. an occluded
   d. a stationary
9. A small, local storm that forms from rapidly rising warm air is _________.
   a. a thunderstorm
   b. a tornado
   c. a hurricane
   d. a typhoon
10. The eye of a hurricane is characterized by _________.
    a. heavy rain and winds greater than 80 kph
    b. little rain and high winds
    c. heavy rain and light winds
    d. little rain and winds under 5 kph
1. The weather that characterizes an area is the __________ of that area.
   a. geography
   b. barometric pressure
   c. climate
   d. latitude

2. A statement that might be part of a region’s weather report is __________.
   a. a yearly rainfall of 50 cm
   b. a daily high of 35° C
   c. an average seasonal temperature of 25° C
   d. the Sunshine State

3. Primary control of a region’s temperature results from __________.
   a. radioactive decay
   b. solar radiation
   c. volcanic activity
   d. geothermal heat

4. The coolest climates occur at __________.
   a. high altitude and high latitude
   b. low altitude and low latitude
   c. high altitude and low latitude
   d. low altitude and high latitude

5. Climate that has characteristics derived from being near water is called __________.
   a. mesothermal
   b. tropical
   c. maritime
   d. polar

6. The term desert is commonly a synonym for __________.
   a. polar
   b. tropical
   c. maritime
   d. arid

7. Communities within the Arctic Circle do not regulate their lives by __________.
   a. the sun
   b. laws
   c. tradition
   d. a clock

8. Rain forests provide adequate hunting and gathering for __________.
   a. Pygmies
   b. Bedouins
   c. Eskimos
   d. Mediterraneans

9. The continent whose entire interior is a desert is __________.
   a. North America
   b. Australia
   c. Europe
   d. South America

10. Tropical rain forests make up the interior of __________.
    a. Australia
    b. North America
    c. Antarctica
    d. South America
1-3 Answer these three questions by referring to the illustration.

1. X labels the part of the cell which is the _________.
   a. membrane
   b. nucleus
   c. Golgi
   d. cytoplasm

2. Y labels the part of the cell which is the _________.
   a. membrane
   b. granules
   c. cytoplasm
   d. corpuscle

3. Z labels the part of the cell which is the _________.
   a. membrane
   b. nucleus
   c. cytoplasm
   d. corpuscle

4. Parts of the body, such as the nose, trachea, and lungs, that work together are collectively called _________.
   a. tissues
   b. organs
   c. systems
   d. organisms

5. The heart, kidney, liver, and other bodily parts that each carry out one or more jobs are individually called _________.
   a. a tissue
   b. an organ
   c. a system
   d. an organism

6. The flexible support tissue that gives shape to, among other things, the tip of the nose and the ears is _________.
   a. cartilage
   b. ossicle
   c. cilia
   d. osteum

7. Stomach and intestinal movement are controlled by _________.
   a. voluntary muscles
   b. cardiac muscles
   c. involuntary muscles
   d. striped muscles

8. The gap between nerve cells is called _________.
   a. a synapse
   b. an axon
   c. a neuron
   d. a dendrite

9. The part of the brain that controls coordination and voluntary movements is the _________.
   a. medulla
   b. cerebellum
   c. cerebrum
   d. spinal cord

10. The central nervous system is made up of the _________.
    a. cerebellum, eyes, and ears
    b. cerebellum, speech center, and eyes
    c. cerebrum, eyes, and ears
    d. cerebrum, cerebellum, and spinal cord
1. The circulatory system is made up of the __________.
   a. heart, lungs, kidneys, and liver
   b. heart, veins, capillaries, and arteries
   c. lungs, kidneys, liver, and thyroid
   d. mouth, stomach, small intestine, and large intestine

2. Blood that arrives at the heart goes first to the __________.
   a. lungs
   b. brain
   c. abdomen
   d. kidneys

3. White blood cells are designed to __________.
   a. transport oxygen
   b. carry nutrients
   c. fight infection
   d. prevent hemorrhages

4. The purpose of blood platelets is to __________.
   a. stop bleeding
   b. carry oxygen
   c. prevent infection
   d. produce antibodies

5. Digestion of protein begins in the __________.
   a. mouth
   b. stomach
   c. small intestine
   d. large intestine

6. In the mouth digestion of __________ begins.
   a. protein
   b. starch
   c. fat
   d. sugar

7. The function of the kidneys is similar to the function of __________.
   a. a carburetor
   b. a brake cylinder
   c. an oil filter
   d. a windshield wiper

8. The bladder is connected directly to the __________.
   a. heart
   b. stomach
   c. large intestine
   d. kidneys

9. The master control gland for the body is the __________ gland.
   a. pituitary
   b. pancreas
   c. thymus
   d. adrenal

10. Physical or emotional stress produces a response in the __________ gland.
    a. pituitary
    b. pancreas
    c. adrenal
    d. thymus
1. Information gained during an experiment is called __________.
   a. data
   b. conclusions
   c. hypothesis
   d. laws

2. The prefix kilo- means __________.
   a. one-thousandth
   b. one-hundredth
   c. one thousand
   d. one million

3. The word geocentric means __________.
   a. astronomical
   b. sun-centered
   c. solar
   d. earth-centered

4. The scientist whose name is given to the law of gravitation is __________.
   a. Kepler
   b. Aristotle
   c. Newton
   d. Copernicus

5. The type of reaction that generates the sun's energy is __________.
   a. fusion
   b. fission
   c. chemical
   d. oxidation

6. The gas comprising about 21 percent of our atmosphere is __________.
   a. oxygen
   b. carbon dioxide
   c. nitrogen
   d. hydrogen

7. A narrow, funnel-shaped cloud of rapidly rotating winds around a low-pressure center is __________.
   a. a thunderstorm
   b. a tornado
   c. a hurricane
   d. a typhoon

8. Air pressure at high elevations is less than at sea level because __________.
   a. warm air is lighter than cold air
   b. winds blow up mountain slopes
   c. less air overlies high elevations
   d. temperatures are cooler at high elevations

9. The outer skin layer is the __________.
   a. hairline
   b. dermis
   c. epidermis
   d. fatty layer

10. Metabolism and growth rate are controlled by the __________ gland.
    a. pancreas
    b. thyroid
    c. thymus
    d. adrenal
1. Science is best defined as __________.
   a. an orderly arrangement of knowledge
   b. an accumulation of information
   c. the study of physics, chemistry, and geology
   d. incorrect and unscriptural assumptions

2. A complete and correct statement is that technology __________.
   a. is the cause of the world’s pollution problems
   b. draws people away from the good things in life
   c. is amoral; that is, neither good nor bad
   d. will solve the world’s basic problems

3. Most Greek philosophers were not true scientists because they __________.
   a. could not read
   b. did not experiment
   c. were concerned more with art and literature than with things of nature
   d. were not government funded

4. The birth of technology occurred with the __________.
   a. Industrial Revolution
   b. Renaissance
   c. invention of the wheel
   d. atomic age

5. The number 93 million, in scientific notation, is __________.
   a. 93,000,000
   b. 93 million
   c. $93 \times 10^6$
   d. $9.3 \times 10^7$

6. A correct scientific notation is __________.
   a. $431 \times 10^{-3}$
   b. $7 \times 10^8$
   c. $16 \times 10^5$
   d. $0.05 \times 10^{-8}$

7. The metric unit of mass is the __________.
   a. kilogram
   b. meter
   c. pound
   d. liter

8. A measure of volume is __________.
   a. meter
   b. liter
   c. second
   d. gram

9. A scientist is most likely to find out if his guess is correct by __________.
   a. performing experiments
   b. asking a graduate student
   c. thinking about the question
   d. using a computer

10. The announced or published result of interpreting the data collected in an investigation is __________.
    a. a law
    b. a theory
    c. a problem
    d. an experiment
1. All matter in the universe has __________.
   a. magnetism
   b. momentum
   c. mass
   d. motion

2. Matter on earth exists in at least one of __________ states.
   a. two
   b. three
   c. twelve
   d. twenty

3. Generally, molecules of a solid are more __________ than are molecules of other states.
   a. spread out
   b. close together
   c. highly active
   d. free to move

4. The gaseous state of a substance (for example, water) differs from the solid state in that
   the gaseous state has __________.
   a. a definite volume
   b. high speed molecules
   c. less energy
   d. a definite shape

5. The nuclei of most atoms are made of __________.
   a. protons and electrons
   b. electrons and nucleons
   c. neutrons and protons
   d. neutrons and electrons

6. Of the following choices the compound is __________.
   a. H₂O
   b. H₂
   c. saltwater
   d. Ne

7. An example of a mixture is __________.
   a. hot water
   b. salt water
   c. sodium hydroxide
   d. hydrogen

Answer Items 8 through 10 by referring to the entry for potassium.

8. The number of protons in an atom of potassium is __________.
   a. 2
   b. 19
   c. 20
   d. 39

9. The number of protons in an atom is called the __________.
   a. mass number
   b. atomic mass
   c. valence
   d. atomic number

10. The number of particles in the nucleus of a potassium atom is __________.
    a. 2
    b. 19
    c. 20
    d. 39
1. Common table salt (NaCl) is composed of sodium, a highly reactive metal, and chlorine, a poisonous gas. The harmless product is a result of a ________ reaction.
   a. nuclear
   b. chemical
   c. physical
   d. phase

2. An extremely small amount of matter is converted to energy in a ________ reaction.
   a. nuclear
   b. chemical
   c. physical
   d. phase

3. The fuel for a fusion reaction is ________.
   a. hydrogen
   b. helium
   c. radium
   d. uranium

4. A common fuel for fission reactions is ________.
   a. hydrogen
   b. helium
   c. lead
   d. uranium

5. Beta radiation consists of ________ emitted from an atomic nucleus.
   a. protons
   b. neutrons
   c. electrons
   d. mesons

6. Gamma radiation is most similar to ________.
   a. alpha radiation
   b. sound
   c. light
   d. electrons

7. Of the following choices the acid is ________.
   a. NaOH
   b. KCl
   c. HNO₃
   d. NaHCO₃

8. An identifying characteristic of an acid in solution is ________.
   a. H⁺
   b. OH⁻
   c. K⁺
   d. O²⁻

9. All bases contain ________.
   a. oxygen and sodium
   b. helium and potassium
   c. oxygen and hydrogen
   d. hydrogen and potassium

10. Of the following choices the base is ________.
    a. NaHCO₃
    b. HNO₃
    c. NaOH
    d. KCl
1. Starches and sugars are both classified as __________.
   a. proteins
   b. fats
   c. carbohydrates
   d. vitamins

2. The nutrient class that is neither animal nor vegetable is __________.
   a. proteins
   b. fats
   c. minerals
   d. carbohydrates

3. The nutrient that transports vitamins A, D, and E and that is a slow-energy source is __________.
   a. proteins
   b. minerals
   c. fats
   d. carbohydrates

4. Complex organic substances necessary in small amounts for normal growth and health are __________.
   a. minerals
   b. vitamins
   c. carbohydrates
   d. fats

5. Cheese and butter belong to the __________ food group.
   a. vegetable and fruit
   b. bread and cereal
   c. milk
   d. meat

6. The bread and cereal food group includes __________.
   a. macaroni, rice, and spaghetti
   b. spaghetti, peas, and peanut butter
   c. cheese, rice, and bread
   d. beans, fish, and rice

7. Fats begin digestion in the __________.
   a. mouth
   b. stomach
   c. small intestine
   d. large intestine

8. Proteins begin digestion in the __________.
   a. mouth
   b. stomach
   c. small intestine
   d. large intestine

9. Exposure to sunshine is necessary for the body to produce __________.
   a. Vitamin A
   b. Vitamin B
   c. Vitamin C
   d. Vitamin D

10. Vitamin C-deficiency symptoms, such as excessive bleeding and bruising, may be relieved by adding __________ to the diet.
    a. whole-grain cereals
    b. lean meats
    c. oranges and tomatoes
    d. milk and cheese
1. Any push or pull is the definition of __________.
   a. force  
b. mass  
c. energy  
d. work

2. Every object in the universe is always __________.
   a. at rest  
b. doing work  
c. exerting force  
d. curving

3. An example of an object with potential energy is __________.
   a. an airplane at 35,000 feet  
b. a car traveling 80 km/hr  
c. an engine on a siding  
d. a pendulum at the bottom of its swing

4. The total energy an object possesses equals __________.
   a. kinetic energy minus potential energy  
b. potential energy minus kinetic energy  
c. one-half kinetic energy plus potential energy  
d. kinetic energy plus potential energy

5. The handle of a spoon in a soup bowl feels hot because of __________.
   a. conduction  
b. convection  
c. radiation  
d. both a and c

6. Heat is distributed throughout the water in a teakettle because of __________.
   a. conduction  
b. convection  
c. radiation  
d. none of these

7. Ten percent of the energy needed for the United States is supplied by the energy of falling water converted to __________ energy.
   a. electrical  
b. chemical  
c. atomic  
d. geothermal

8. The most frequent energy conversion is that of mechanical energy to __________.
   a. chemical energy  
b. radiant energy  
c. heat energy  
d. electrical energy

9. The disorder of creation in general is __________.
   a. increasing  
b. decreasing  
c. remaining constant  
d. increasing and decreasing

10. The Second Law of Thermodynamics states that the amount of available energy in the universe is __________.
    a. decreasing  
b. increasing  
c. constant  
d. radiant
1. A magnet has __________ pole(s).
   a. one  
   b. two  
   c. three  
   d. four

2. A substance commonly used to show a magnet’s lines of force is __________.
   a. sawdust  
   b. iron filings  
   c. water  
   d. salt

3. Electrical charges are different from magnetic poles in that __________.
   a. unlikes attract  
   b. likes repel  
   c. charged objects attract all uncharged objects  
   d. magnetic poles attract all nonmagnetic objects

4. The statement that is not a law of electrostatics is __________.
   a. objects with unlike charges attract each other  
   b. objects with like charges repel each other  
   c. charged objects repel neutral objects  
   d. charged objects attract neutral objects

5. An electric circuit that has only one path is a __________ circuit.
   a. complex  
   b. series  
   c. perpendicular  
   d. parallel

6. If in Item 5 \( V \) equals 6 volts and \( R \) equals 2 ohms, the current, \( I \), is __________ amperes.
   a. 4  
   b. 12  
   c. 3  
   d. 8

7. The first battery of silver and zinc was constructed by __________.
   a. Fred E. Eveready  
   b. Al Volta  
   c. Ray O’Vac  
   d. Thomas Edison

8. The first working light bulb was developed in the laboratory of __________.
   a. Franklin  
   b. Coulomb  
   c. Edison  
   d. Morse

9. The most abundant fuel in the United States is __________.
   a. petroleum  
   b. coal  
   c. natural gas  
   d. uranium

10. Solar power does not produce a high percentage of our electricity needs because __________.
    a. the sun’s energy that reaches the earth is insufficient  
    b. no means exist to conduct sunlight to cities  
    c. the technology is expensive  
    d. the Federal government has imposed a moratorium
1. Surveyors and mapmakers use __________ to represent distances that cannot be drawn directly.
   a. arithmetic  
   b. geometry  
   c. calculus  
   d. statistics

2. Indirect measurement is used __________.
   a. along highways between cities  
   b. in building houses  
   c. in measuring distances to planets  
   d. in designing automobiles

3. A symbol commonly used to represent a force is __________.
   a. x  
   b. •  
   c. →  
   d. 0

4. The result of a force to the north and a force to the east is a force to the __________.
   a. northeast  
   b. southeast  
   c. southwest  
   d. northwest

5. An object that has no force acting on it is likely to __________.
   a. move in a straight line  
   b. come to a stop  
   c. move in a circle  
   d. fall to the ground

6. The result of a single force acting on an object is __________.
   a. cancelled by the object’s weight  
   b. acceleration  
   c. no movement  
   d. rotation

7. The rate of doing work is __________.
   a. power  
   b. energy  
   c. force  
   d. mass

8. If work is “bought,” __________ must be “spent.”
   a. power  
   b. joules  
   c. energy  
   d. mass

9. The work done in lifting a forty-pound crate three feet is __________ foot-pounds.
   a. forty-three  
   b. thirteen  
   c. one hundred twenty  
   d. thirty-seven

10. If twenty-four joules of energy are spent in four seconds, the rate of output is __________ watts.
   a. six  
   b. ninety-six  
   c. twenty  
   d. twenty-eight
1. The friction that brings a boat to a stop after the motor has been cut is ________ friction.
   a. rolling
   b. sliding
   c. atomic
   d. fluid
2. Dragging a flatbed across the ground produces ________ friction.
   a. sliding
   b. rolling
   c. atomic
   d. fluid
3. To lessen resistance of a boat moving through water, engineers often adjust the ________.
   a. grease on the bearings
   b. number of sails
   c. size of the engine
   d. shape of the hull
4. An application of the inclined plane is the ________.
   a. wedge
   b. wheel and axle
   c. lever
   d. gear

Answer Items 5 through 7 from the illustration.
5. The ideal mechanical advantage of the single fixed pulley is ________.
   a. 0
   b. 1
   c. 100
   d. 200
6. The actual mechanical advantage of the pulley is ________.
   a. 0
   b. 1
   c. 100
   d. 200
7. The efficiency of the pulley is ________ percent.
   a. 0
   b. 1
   c. 100
   d. 200

Answer Items 8 through 10 from the illustration.
8. The work input on the inclined plane is ________ foot-pounds.
   a. 100
   b. 25
   c. 125
   d. 2,500
9. The work output is ________ foot-pounds.
   a. 100
   b. 25
   c. 125
   d. 2,500
10. The efficiency of the inclined plane is ________ percent.
    a. 80
    b. 100
    c. 50
    d. 25
1. About five people could be fed by one United States farmer in 1910, and by 1970 more than ________ people could be fed.
   a. 40
   b. 80
   c. 120
   d. 160

2. The forerunner of the wheat grown today for bread and cereal was most like ________.
   a. wild grass
   b. bulrushes
   c. corn cobs
   d. green beans

3. The result of crossing two different strains of plants or animals is called a ________.
   a. thoroughbred
   b. hybrid
   c. halfbreed
   d. crossbreed

4. A desired trait that has resulted from selective breeding of corn is ________.
   a. taller plants
   b. more green leaves
   c. larger ears
   d. more silk

5. Decomposers in the soil ________.
   a. produce compounds poisonous to plants
   b. return dead material to simpler forms
   c. have little significant value
   d. live in leaf nodules

6. A common practice that reintroduces nutrients into the soil is ________.
   a. one-crop agriculture
   b. terrace farming
   c. contour plowing
   d. crop rotation

7. The energy-input part of the water cycle is ________.
   a. evaporation
   b. precipitation
   c. run-off
   d. percolation

8. The rate of evaporation depends on the temperature of the air and water, the wind, and ________.
   a. the amount of moisture already in the air
   b. the angle of the sun
   c. the amount of water in the ocean
   d. the presence of trees and shrubs

9. The term ecology comes from a Greek word that means ________.
   a. pollution
   b. home
   c. recycling
   d. gum wrapper

10. The total amount of living material in an area is called ________.
    a. biomass
    b. protoplasm
    c. food pyramid
    d. omnivore
1. A complete and correct definition of technology is the ________.
   a. application of science
   b. source of pollution
   c. opposite of simplicity
   d. basis of war

2. Science as an orderly system of thought began with the philosopher ________.
   a. Copernicus
   b. Newton
   c. Aristotle
   d. Democritus

3. Substances that have only one kind of atom are called ________.
   a. matter
   b. elements
   c. molecules
   d. atoms

4. An example of a physical change (only) is ________.
   a. metal rusting
   b. an acid dissolving limestone
   c. water evaporating
   d. wood burning

5. Kinetic energy depends upon ________.
   a. matter and motion
   b. matter and force
   c. height and force
   d. matter and height

6. A measure of disorder is called ________.
   a. energy
   b. entropy
   c. power
   d. wattage

7. The formula for work is ________.
   a. \( F = ma \)
   b. \( F = G \frac{mm}{d} \)
   c. \( I = Prt \)
   d. \( W =Fd \)

8. To reduce friction the powdered lubricant ________ is used.
   a. silicone
   b. grease
   c. graphite
   d. grabtite

9. The simple machine that has a fulcrum is the ________.
   a. wedge
   b. wheel and axle
   c. lever
   d. gear

10. Bacteria in leguminous plants produce ________ compounds.
    a. oxygen
    b. carbon
    c. hydrogen
    d. nitrogen
1. For a substance that can exist in the three phases, the phase in which the atoms are not free to move around very much is __________.
   a. solid  
   b. liquid  
   c. gas  
2. A phase of matter that has neither definite shape nor definite volume is __________.
   a. solid  
   b. liquid  
   c. gas  
3. The mass of an atom is __________.
   a. distributed uniformly throughout the atomic sphere  
   b. concentrated in the electrons  
   c. divided equally between the nucleus and the electrons  
   d. concentrated in the nucleus  
4. An atom’s positive charge is balanced by negative charges on its __________.
   a. nucleus  
   b. neutrons  
   c. electrons  
   d. protons  
5. Fuel for a fusion reaction is __________.
   a. oxygen  
   b. uranium  
   c. helium  
   d. hydrogen  
6. Radiation was first detected by a __________.
   a. photographic plate  
   b. Geiger counter  
   c. microscope  
   d. X-ray machine  
7. The rate at which reaction occurs in a nuclear reactor is regulated by __________.
   a. control rods  
   b. the moderator  
   c. the core  
   d. water  
8. In an atomic reactor, atomic energy is converted directly to __________ energy.
   a. electrical  
   b. heat  
   c. light  
   d. nuclear  
9. A disadvantage of atomic energy is the __________.
   a. unavailability of fuel  
   b. limited number of good plant sites  
   c. heating of water  
   d. problem of waste disposal  
10. Compared to the energy produced, the amount of atomic fuel is __________ the amount of coal.
    a. greater than  
    b. about the same as  
    c. slightly less than  
    d. much less than
1. The measure of the amount of matter an object is made of is __________.
   a. mass
   b. weight
   c. density
   d. volume

2. A gram is the amount of matter contained in one cubic centimeter of __________.
   a. air
   b. gold
   c. water
   d. helium

3. A helium-filled balloon breaks. The volume of the helium __________.
   a. remains the same as the balloon’s volume
   b. decreases to zero
   c. depends on temperature
   d. expands without limit

4. The easiest method of measuring the volume of a rock is to __________.
   a. multiply length by width by height
   b. substitute for it an even piece of wood and to measure the wood
   c. measure the volume of water displaced when the rock is lowered into a full container
   d. measure the shadow of the rock

5. The quotient of mass and volume is __________.
   a. weight
   b. density
   c. length
   d. area

6. Density multiplied by volume equals __________.
   a. area
   b. weight
   c. density
   d. mass

7. The specific gravity of water is __________.
   a. 0
   b. 1
   c. 2
   d. 8

8. Specific gravity is a ratio of the density of a substance to the density of __________.
   a. air
   b. water
   c. ice
   d. silver

9. A one-half kilogram piece of cork, lowered into a brimful container of water, will displace __________ of water.
   a. one-half kilogram
   b. slightly less than one-half kilogram
   c. slightly more than one-half kilogram
   d. much more than one-half kilogram

10. An object that weighs three pounds when submerged will weigh __________ out of water.
    a. one pound
    b. two pounds
    c. three pounds
    d. four pounds
1. The rock of which the entire earth was originally composed was __________.
   a. sedimentary
   b. metamorphic
   c. igneous
   d. schistose

2. Examples of sedimentary rocks are __________.
   a. sandstone, mudstone, and conglomerate
   b. granite, sandstone, and gneiss
   c. granite, basalt, and rhyolite
   d. gneiss, phyllite, and pegmatite

3. The layer of the earth believed to be the source of the earth’s magnetic field is the __________.
   a. core
   b. mantle
   c. asthenosphere
   d. crust

4. The earth’s layer presumed to be liquid is the __________.
   a. outer core
   b. crust
   c. inner core
   d. mantle

5. Perhaps the most effective agent of erosion is __________.
   a. running water
   b. glaciers
   c. wind
   d. ocean currents

6. Most sediment is finally deposited __________.
   a. on mountain slopes
   b. on continental slopes
   c. in river beds
   d. as deltas

7. Evidence that rock is able to flow under pressure is a __________.
   a. fault
   b. plateau
   c. fold
   d. canyon

8. A thick vertical sequence of alternating marine and continental rocks probably indicates __________.
   a. a series of seasonal floods
   b. several mountain-building episodes
   c. variations in sea level
   d. a reversal of magnetic polarity

9. The “ring of fire” surrounding the Pacific Ocean marks the coincidence of volcanic activity and __________.
   a. earthquakes
   b. deep-sea trenches
   c. deserts
   d. mid-ocean ridges

10. If the present movement at the mid-Atlantic ridge continues, North America and Europe will eventually __________.
    a. coincide
    b. collide
    c. be in a north-south line
    d. be farther apart
1. An experimental science deals with ideas that _________.
   a. are passed down in folk stories
   b. are contained in early literature
   c. can be duplicated
   d. cannot be duplicated

2. Examples of highly experimental sciences are _________.
   a. physics and chemistry
   b. chemistry and astronomy
   c. astronomy and geology
   d. geology and biology

3. The all-inclusive term applied to rock lithified from sediment between gravel and mud is _________.
   a. shale
   b. sandstone
   c. conglomerate
   d. claystone

4. Sandstone is a sedimentary rock made of _________.
   a. particles of quartz
   b. pebbles and cobbles
   c. particles smaller than 0.5 inches
   d. particles of any substance within the sand-size classification

5. When organic remains have been removed from a rock, the small opening is called a _________.
   a. cast
   b. shell
   c. mold
   d. fragment

6. The least common fossils are those that have been _________.
   a. petrified
   b. frozen
   c. buried
   d. distilled

7. An example based on relative time is _________.
   a. plutonism
   b. radiometric dating
   c. the law of superposition
   d. neptunism

8. Varves are associated with _________.
   a. deserts
   b. rivers
   c. glaciers
   d. deltas

9. Two unreliable techniques for measuring absolute time are _________.
   a. ocean saltiness and sediment thickness
   b. radioactivity and tree rings
   c. varves and annuli
   d. varves and tree rings

10. The rate at which the earth is losing heat is an unreliable age indicator because _________.
    a. the earth is not losing heat
    b. the earth was originally cold
    c. heat from radioactivity confuses the problem
    d. the atmosphere traps heat
1. The smallest disease-causing organism is a _________.
   a. virus  
   b. fungus  
   c. protozoan  
   d. rickettsia

2. The only disease-causing organisms that can be classified as animals are _________.
   a. viruses  
   b. fungi  
   c. protozoans  
   d. rickettsiae

3. The time between infection with disease and first symptoms is called _________.
   a. secondary infection  
   b. incubation  
   c. symptom lag  
   d. pathogen

4. Most common childhood diseases are characterized by _________.
   a. a rash  
   b. sweating  
   c. boils  
   d. hunger

5. Improperly canned food is a potential source of _________.
   a. influenza  
   b. botulism  
   c. rabies  
   d. tetanus

6. Polluted drinking water is the source of _________.
   a. pneumonia  
   b. salmonella  
   c. cholera  
   d. scarlet fever

7. The pathogen of pneumonia, meningitis, and typhoid is a _________.
   a. virus  
   b. bacterium  
   c. fungus  
   d. protozoan

8. The pathogen of food poisoning, scarlet fever, and cholera is a _________.
   a. virus  
   b. bacterium  
   c. fungus  
   d. protozoan

9. The pathogen of typhus and Rocky Mountain spotted fever is a _________.
   a. virus  
   b. rickettsia  
   c. fungus  
   d. protozoan

10. The pathogen of ringworm and athletes foot is a _________.
    a. virus  
    b. rickettsia  
    c. fungus  
    d. protozoan
1. Antibodies are found in __________.
   a. blood serum
   b. tissue
   c. urine
   d. phagocytes

2. Blood cells that feed on foreign particles are __________.
   a. fibroblasts
   b. antibiotics
   c. leukocytes
   d. red blood cells

3. The primary technique of disease prevention is __________.
   a. inoculation
   b. personal hygiene
   c. antibiotics
   d. vitamins

4. Draining swamps and spraying for mosquitoes is effective in the prevention of __________.
   a. measles
   b. malaria
   c. chicken pox
   d. pneumonia

5. Cowpox vaccine is used to prevent __________.
   a. scarlet fever
   b. measles
   c. smallpox
   d. typhoid

6. A broad-spectrum antibiotic that is effective against most bacteria, rickettsias, and certain viruses is __________.
   a. chlortetracycline
   b. amphotertererin B
   c. merthiolate
   d. isoniazid

7. The Food and Drug Administration and Public Health Service are community health agencies on the __________ level.
   a. international
   b. national
   c. state
   d. local

8. New drugs, additives, and foods are tested by the __________.
   a. Food and Drug Administration
   b. American Medical Association
   c. World Health Organization
   d. Hygienic Laboratory

9. Wilhelm Roentgen discovered the valuable diagnostic tool, __________.
   a. the microscope
   b. X rays
   c. the stethoscope
   d. the thermometer

10. The contribution to medicine of Louis Pasteur was the __________.
    a. invention of the microscope
    b. discovery of penicillin
    c. discovery of blood types
    d. association of disease with microbes
1. The item that is not a celestial body in the universe is a __________.
   a. planetoid
   b. satellite
   c. nebula
   d. parsec

2. The largest planet in our solar system, Jupiter, has a diameter about __________ times greater than the diameter of the earth.
   a. three
   b. eleven
   c. fifty
   d. one thousand

3. An astronomical unit is the average radius of the __________.
   a. sun
   b. earth
   c. earth's orbit
   d. solar system

4. A light-year is a unit of __________.
   a. time
   b. mass
   c. distance
   d. frequency

5. The earliest type of telescope was the __________ telescope.
   a. reflecting
   b. refracting
   c. radio
   d. condensing

6. A telescope that can “see” through the clouds is a __________.
   a. reflecting
   b. refracting
   c. radio
   d. condensing

7. One force that keeps a satellite in orbit is __________.
   a. gravitational
   b. nuclear
   c. solar
   d. magnetic

8. Another force that keeps a satellite in orbit is __________.
   a. center-fleeing
   b. axial
   c. centripetal
   d. centrifugal

9. In 1976 two unmanned Viking spacecraft were sent by the United States to determine __________.
   a. if life existed on Mars
   b. the make-up of Jupiter
   c. if Venus has a magnetic field
   d. if the moon has an atmosphere

10. The first artificial satellite to orbit the earth did so in __________.
    a. 1945
    b. 1952
    c. 1957
    d. 1969
1. The ocean basins are basically __________.
   a. totally flat plains  
   b. grooved and ridged  
   c. mountainous  
   d. flat plain with grooves  

2. The Hawaiian Islands are a line of __________.
   a. mid-ocean ridges  
   b. plateaus  
   c. volcanoes  
   d. fault blocks  

3. In general, very fine biological sediments are considered __________.
   a. oozes  
   b. mud  
   c. sand  
   d. silt  

4. Sediment deposits close to land masses often reach depths of __________ meters.
   a. 4  
   b. 40  
   c. 4,000  
   d. 40,000  

5. England and northwest Europe have mild climates for their latitude because of the __________ current.
   a. Canary  
   b. West Wind Drift  
   c. North Atlantic  
   d. Gulf Stream  

6. The northeast flowing current near Japan is the __________ current.
   a. North Equatorial  
   b. Kuroshio  
   c. Benguela  
   d. Agulhas  

7. The world’s largest consumer of fish products is __________.
   a. Russia  
   b. the United States  
   c. Peru  
   d. Norway  

8. The largest fish-catch country in the world is __________.
   a. Peru  
   b. Afghanistan  
   c. Bermuda  
   d. Switzerland  

9. As of 1964 the United States had recovered from the ocean about __________ worth of sulfur.
   a. $500,000  
   b. $15,000,000  
   c. $25,000  
   d. $5,000  

10. France produces yearly 500 million kilowatt-hours of electricity from __________.
    a. fusion plants  
    b. turbidity-current stations  
    c. tidal-power stations  
    d. offshore coal deposits
1. The primary use man has made of the biosphere is for ________.
   a. transportation
   b. communication
   c. food supply
   d. disease prevention

2. The term that best defines ecology is ________.
   a. food
   b. plant
   c. home
   d. animal

3. Cellulose from corn stalks and wood chips has been treated to make a ________.
   a. pancake batter
   b. durable tennis shoe
   c. roofing material
   d. high protein food

4. Scrap glass is used in some communities for ________.
   a. roads
   b. beaches
   c. tires
   d. tabletops

5. Energy sources that do not leave harmful by-products are ________.
   a. hydrogen, coal, and petroleum
   b. geothermal heat, hydrogen, and solar heat
   c. petroleum, uranium, and natural gas
   d. uranium, tidal energy, and geothermal heat

6. Fuels for atomic energy are ________.
   a. hydrogen and uranium
   b. helium and uranium
   c. petroleum and helium
   d. natural gas and hydrogen

7. The greatest benefit of space exploration to the greatest number of people is ________.
   a. knowledge of rocket fuels
   b. technology
   c. knowledge of moon’s origin
   d. acquisition of moon rocks

8. Electronics has been advanced by the space program’s need for ________.
   a. vacuum radio tubes
   b. metals for antennas
   c. ultra small components
   d. long extension cords

9. Pharmacology refers to ________.
   a. agriculture
   b. medicines
   c. communication
   d. animal breeding

10. Continental shelves are a promising source of ________.
    a. coal
    b. uranium
    c. petroleum
    d. aluminum
1. Fusion is not yet a source of electric power because __________.
   a. fuel is not readily available
   b. waste disposal is a problem
   c. technology is not sufficiently advanced
   d. governmental regulations are too strict

2. The standard metric unit of mass is the __________.
   a. pound
   b. liter
   c. kilogram
   d. meter

3. A measure of the earth’s pull on an object is the object’s __________.
   a. mass
   b. weight
   c. density
   d. area

4. Evidence that rock under stress will break is __________.
   a. a fault
   b. a plain
   c. an anticline
   d. a valley

5. Examples of observational sciences are __________.
   a. physics and chemistry
   b. chemistry and astronomy
   c. astronomy and geology
   d. geology and biology

6. The pathogen of amoebic dysentery and malaria is a __________.
   a. virus
   b. rickettsia
   c. fungus
   d. protozoan

7. The first line of defense against disease is the __________.
   a. kidneys
   b. skin
   c. liver
   d. blood

8. Rat control is effective in preventing __________.
   a. typhus
   b. the common cold
   c. malaria
   d. meningitis

9. The Milky Way is a __________.
   a. universe
   b. galaxy
   c. star cluster
   d. solar system

10. The middle of the Atlantic Ocean is characterized by __________.
    a. a series of deep trenches
    b. a long mountain range
    c. deep depressions
    d. a featureless plain
1. The correct form for binomial nomenclature is ________.
   a. Passer domesticus
   b. Passer Domesticus
   c. Passer domesticus
   d. Passer domesticus

2. The language of taxonomy is usually ________.
   a. Greek
   b. Latin
   c. Italian
   d. French

3. The grouping of animals into phyla is based on ________.
   a. size
   b. appearance in the fossil record
   c. being extinct versus being extant
   d. complexity

4. Which characteristics would not be used in making animal classifications? ________
   a. segmented or nonsegmented
   b. presence or absence of conductive tissue
   c. presence or absence of appendages
   d. patterns of coloration

5. The distinction between unicellular or multicellular applies to ________.
   a. plants only
   b. animals only
   c. both plants and animals
   d. neither plants nor animals

6. A characteristic that distinguishes most plants from animals is ________.
   a. means of locomotion
   b. chloroplasts
   c. symmetry
   d. color

7. A taxon of plants, but not of animals, is the ________.
   a. Kingdom
   b. Class
   c. Division
   d. Family

8. Man belongs to Phylum ________.
   a. Arthropoda
   b. Bryozoa
   c. Protozoa
   d. Chordata

9. The creationist view of life requires ________.
   a. immense time
   b. probability
   c. directive force
   d. trial and error

10. Evolution portrays the diversity of life forms resulting from ________.
    a. the origin of species
    b. the survival of the weakest
    c. the will of a Creator
    d. natural selection
1. The parts of atoms that interact to form compounds are the __________.
   a. inner electrons  
   b. outer electrons  
   c. neutrons  
   d. protons
2. For elements to form molecules, the __________ of the elements must be high.
   a. concentration  
   b. dispersion  
   c. weight  
   d. sugar level
3. Organic compounds produced in the body require __________ during formation.
   a. proteins  
   b. fats  
   c. carbohydrates  
   d. energy
4. Activation energy is __________.
   a. produced by a chemical reaction  
   b. required for a chemical reaction  
   c. required for nuclear stability  
   d. produced by a nuclear reaction
5. A form of polymerization is __________.
   a. dehydration synthesis  
   b. hydrolysis  
   c. exchange  
   d. decomposition
6. Energy is stored in chemical bonds by the process of __________.
   a. dehydration synthesis  
   b. hydrolysis  
   c. exchange  
   d. decomposition
7. The function of DNA is to __________.
   a. contain genetic information  
   b. regulate metabolism  
   c. regulate growth  
   d. control hormones
8. The function of RNA is to __________.
   a. control hormonal output  
   b. carry out instructions of DNA  
   c. liberate energy  
   d. produce vitamins
9. A good descriptive term for an enzyme's function is __________.
   a. salt  
   b. catalyst  
   c. preserver  
   d. destroyer
10. Enzymes promote reactions by __________.
    a. producing heat  
    b. providing activation energy  
    c. lowering the level of activation energy required  
    d. producing uracil
1. The limitation of a light (optical) microscope is _________.
   a. magnification
   b. contrast
   c. resolution
   d. illumination

2. A compound microscope has a ten-power eyepiece and a ninety-power objective lens.
   The microscope is capable of magnification of _________.
   a. 10X
   b. 9X
   c. 90X
   d. 900X

3. The “slipper animal,” paramecium, moves around by means of _________.
   a. a flagellum (whip)
   b. cilia (hairs)
   c. water jets
   d. ameboid movement

4. A statement true of an amoeba is it _________.
   a. eats and moves with the same motion
   b. manufactures its own food
   c. has a restricted habitat
   d. has a flagellum

5. Disease-producing protozoa are _________.
   a. parasites
   b. free-living
   c. restricted to Texas
   d. transmitted by grasshoppers

6. A protozoan-caused disease is _________.
   a. the common cold
   b. pneumonia
   c. malaria
   d. chicken pox

7. The groups of algae are named on the basis of their _________.
   a. size
   b. color
   c. habitat
   d. structure

8. A protozoan that produces its own food is the _________.
   a. amoeba
   b. paramecium
   c. fungus
   d. algae

9. Rickettsias are most like _________.
   a. bacteria
   b. paramecia
   c. fungi
   d. amoebas

10. A pathogen that can function only in a living cell is the _________.
    a. protozoan
    b. virus
    c. fungus
    d. bacterium
Refer to the illustration of a cell for items 1 and 2.

1. Letter A designates the ________.
   a. cell membrane
   b. cytoplasm
   c. corpuscle
   d. nucleus

2. Letter B designates the ________.
   a. cell membrane
   b. cytoplasm
   c. corpuscle
   d. nucleus

3. The cell membrane is involved in all the following functions except ________.
   a. containment
   b. passive diffusion
   c. reproduction
   d. active transport

4. Parts of a cell in which energy is produced are called ________.
   a. glucose
   b. plastids
   c. mitochondria
   d. chloroplasts

5. Mitochondria use energy produced by oxidation to change ADP to ________.
   a. ATP
   b. PHD
   c. LHD
   d. MED

6. The breakdown of glucose into two molecules of pyruvic acid is called ________.
   a. fermentation
   b. lactation
   c. pyruvation
   d. glycolysis

7. A group of organs that perform a specific bodily process is ________.
   a. a tissue
   b. a cell
   c. an organelle
   d. a system

8. A structure in which body systems work together to sustain independent life is ________.
   a. an organelle
   b. an organism
   c. a system
   d. a tissue

9. A cell that transmits messages is a ________.
   a. tissue
   b. neuron
   c. synapase
   d. phagocyte

10. A cell that combats disease is ________.
    a. a neuron
    b. a hemoglobin
    c. a leukocyte
    d. an antibody
1. The part of a plant that serves to anchor the plant body is the _________.
   a. root
   b. stem
   c. leaf
   d. fruit

2. Food factories for plants are their _________.
   a. roots
   b. stems
   c. leaves
   d. fruits

3. Tap and fibrous are descriptive of a plant’s _________.
   a. roots
   b. stems
   c. leaves
   d. fruit

4. Dehiscent and indehiscent are descriptive of a plant’s _________.
   a. roots
   b. stems
   c. leaves
   d. fruit

5. Angiosperms (flowering plants) are _________.
   a. neither monocots nor dicots
   b. monocots
   c. dicots
   d. both monocots and dicots

6. Monocots are distinguished from dicots primarily by their _________.
   a. root structure
   b. seed leaf number
   c. leaf shape
   d. size

7. Food production in plants is called _________.
   a. respiration
   b. photosynthesis
   c. protein synthesis
   d. transpiration

8. The manufacture of plant building blocks is _________.
   a. respiration
   b. photosynthesis
   c. protein synthesis
   d. transpiration

9. The fundamental food supply is _________.
   a. beef
   b. fish
   c. herbivores
   d. plants

10. An example of selective breeding for better yield or other improved characteristics
    is the cross between _________.
    a. wheat and rye
    b. mule and horse
    c. crocodile and abalone
    d. sumac and grape
1. The common bile duct connects the liver, gall bladder, pancreas, and __________.
   a. stomach
   b. small intestine
   c. large intestine
   d. spleen

2. Extensions of neurons that transmit the nerve impulse from other neurons toward the cell body are __________.
   a. dendrites
   b. leukocytes
   c. cranial nerves
   d. axons

3. The softer material in a tooth is __________.
   a. gum
   b. enamel
   c. root
   d. dentin

4. Cartilage is found in all the following places except the __________.
   a. nose
   b. trachea
   c. fingernails
   d. ears

5. The digestive system includes all of these organs except __________.
   a. mouth
   b. stomach
   c. kidneys
   d. large intestines

6. The respiratory system includes the __________.
   a. mouth, trachea, and periosteum
   b. nose, bronchia, and lungs
   c. esophagus, nose, and lipia
   d. heart, lungs, and trachea

7. Myopia is an eye condition in which __________.
   a. the person is nearsighted
   b. the person is farsighted
   c. vision is both clear and clouded
   d. blindness results from pressure within the eye

8. An example of a hereditary disease is __________.
   a. poliomyelitis
   b. sickle cell anemia
   c. leukemia
   d. typhoid

9. In this illustration of the ear, the eustachian tube is represented by Letter __________.
   a. A
   b. B
   c. C
   d. D

10. In this illustration of the brain, the cerebellum is represented by Letter __________.
    a. A
    b. B
    c. C
    d. D
1. A family has seven sons. The chance that their eighth child will be a daughter is __________.
   a. one chance in seven
   b. one chance in eight
   c. one chance in two
   d. practically none

2. The probability that both of two tossed coins will come down heads is __________.
   a. one in one
   b. one in two
   c. one in four
   d. one in eight

3. A couple with blood types A and B may have children with the blood types __________.
   a. A only
   b. A and B only
   c. A, B, and AB
   d. AB only

4. If the parent genotypes are Aa and Aa, the offspring are expected to be __________.
   a. one-half AA and one-half aa
   b. all Aa
   c. one-quarter AA, and one-half Aa, and one-quarter aa
   d. three-quarters AA and one-quarter aa

5. The total of all genes carried by an organism is the __________.
   a. genotype
   b. phenotype
   c. prototype
   d. linotype

6. Genes that carry contrasting inheritance factors are __________.
   a. heterozygotes
   b. homozygotes
   c. alleles
   d. none of these

7. Meiosis occurs during __________.
   a. spermatogenesis only
   b. oogenesis only
   c. both spermatogenesis and oogenesis
   d. neither spermatogenesis nor oogenesis

8. Preceding the first division in meiosis, the DNA in the nucleus __________.
   a. is halved
   b. remains unaffected
   c. doubles
   d. atrophies

9. The internal environmental factor that may influence gene function is __________.
   a. blood type
   b. temperature
   c. digestion
   d. hormones

10. An external environmental factor that may temporarily influence gene function is __________.
    a. temperature
    b. radiation
    c. DDT
    d. food additives
1. A function of meiosis is __________.
   a. a production of gametes  
   b. growth  
   c. replacement of cells  
   d. repair of injured tissue

2. A product of meiosis is __________.
   a. a white blood cell  
   b. a plant stem cell  
   c. a sperm cell  
   d. an epithelial cell

3. Compared to the parent, the daughter organisms produced by asexual reproduction __________.
   a. are genetically identical  
   b. have the same chromosomes  
   c. are sterile  
   d. are inferior

4. Of the following forms of asexual reproduction, one that cannot occur in unicellular organisms is __________.
   a. budding  
   b. binary fission  
   c. multiple fission  
   d. fragmentation

5. An advantage of sexual reproduction is __________.
   a. genetic variability  
   b. predictable phenotypes  
   c. rapid reproduction  
   d. territorial domination

6. In sexual reproduction the genetic possibilities in offspring are __________.
   a. very small  
   b. zero  
   c. doubled  
   d. very great

7. Technique of placing a desired plant stem into another, more adequate root system is __________.
   a. cutting  
   b. layering  
   c. grafting  
   d. budding

8. A commercial crop available only through grafting is __________.
   a. navel oranges  
   b. purple plums  
   c. Winesap apples  
   d. tangelos

9. A life cycle spent primarily as gametes is the __________ cycle.
   a. diplontic  
   b. haplontic  
   c. larval  
   d. embryonic

10. A life cycle spent primarily as diploids is the __________ cycle.
    a. diplontic  
    b. haplontic  
    c. larval  
    d. embryonic
1. The term ecology comes from a Greek word that means __________.
   a. litter  
   b. pollution  
   c. house  
   d. concern

2. The term that relates an organism to every aspect of its environment is __________.
   a. biomass  
   b. biosphere  
   c. ecosystem  
   d. environmental factor

3. The region occupied by a community is __________.
   a. a biosphere  
   b. a habitat  
   c. an ecosystem  
   d. a biome

4. A nonliving condition in a habitat is __________.
   a. an environment  
   b. a biosphere  
   c. an environmental factor  
   d. a fauna

5. The habitats most vulnerable to destruction by man are __________.
   a. rainforest and steppes  
   b. antarctic and rainforest  
   c. desert and tundra  
   d. antarctic and desert

6. A population restricted to a single habitat is the __________.
   a. rat  
   b. koala  
   c. opossum  
   d. pigweed

7. The foremost preventive method for pollution is __________.
   a. recycling  
   b. landfills  
   c. combustion  
   d. decreased consumption

8. A reasonable view of pollution is it __________.
   a. must be eliminated  
   b. should be tolerated  
   c. must be reduced to 50 percent of its present level  
   d. must be reduced to the level that continues to provide our needs

9. The primary advantage of nuclear energy is that it __________.
   a. uses little water  
   b. does not pollute the air  
   c. produces no waste  
   d. produces no heat

10. Tidal power is a good energy solution in coastal areas that __________.
    a. border on the Pacific Ocean  
    b. have a neap tide  
    c. have high tides and a return river  
    d. have high tides and a bay that can be closed
1. Taxonomy is the study of __________.
   a. taxes
   b. classification
   c. government
   d. fossils

2. DNA and RNA are molecules involved in __________.
   a. transmitting nerve signals
   b. transmitting genetic code
   c. transferring energy
   d. transporting nutrients

3. Bacteria are named primarily on the basis of their __________.
   a. size
   b. color
   c. shape
   d. effects

4. The collective name given to parts of a cell that perform separate functions is __________.
   a. membrane
   b. organelle
   c. nucleus
   d. corpuscle

5. A group of similar cells that perform a similar activity is __________.
   a. a tissue
   b. an organ
   c. an organelle
   d. a system

6. A change in genetic code is __________.
   a. meiosis
   b. a mutation
   c. mitosis
   d. gametogenesis

7. Sexual reproduction requires __________.
   a. one parent
   b. two parents
   c. four parents
   d. eight parents

8. The layer at the earth’s surface occupied by living things is __________.
   a. biomass
   b. biosphere
   c. ecosystem
   d. environmental

9. A group of living things that occupies the same location is __________.
   a. a biomass
   b. a habitat
   c. an ecosystem
   d. a community

10. The item least likely to be considered a community is __________.
    a. a drop of drinking water
    b. a drop of pond water
    c. an apple tree
    d. a fallen log
1. If you entered a career in chemistry and were assigned to discover new products and processes, you would be in the area of __________.
   a. corporate management  
   b. chemical technician  
   c. research and development  
   d. marketing and distribution

2. A career in chemistry that would enable you to set goals and determine the direction the company will take is in the area of __________.
   a. corporate management  
   b. chemical technician  
   c. research and development  
   d. marketing and distribution

3. The fundamental metric unit of length is the __________.
   a. furlong  
   b. kilometer  
   c. meter  
   d. foot

4. The metric unit of time is the __________.
   a. hour  
   b. minute  
   c. second  
   d. nanosecond

5. The term that best describes precision is __________.
   a. a finer line  
   b. standard  
   c. correctness  
   d. error

6. Assuming that none of these choices is in error, the one with the highest precision is __________.
   a. 200  
   b. 186.4  
   c. $2 \times 10^2$  
   d. $1.8642 \times 10^2$

7. In a plot of the direct relationship $y = kx$, $k$ is the __________.
   a. $y$ intercept  
   b. $y$ coordinate  
   c. $x$ coordinate  
   d. constant

8. The best display of a bit of data is __________.
   a. •  
   b. 0  
   c. ✗  
   d. ⬤

9. The metric unit equivalent of a liter is __________.
   a. 1 cm$^3$  
   b. 1000 cm$^3$  
   c. 100 ml  
   d. 100 ml$^3$

10. In a scientific notation 186,000 becomes __________.
    a. 186 thousand  
    b. $186 \times 10^3$  
    c. $1.86 \times 10^4$  
    d. $1.86 \times 10^5$
1. The pseudoscience of alchemy became important around the year __________.
   a. 5,000 B.C.
   b. 1,300 B.C.
   c. 300 B.C.
   d. A.D. 1700

2. Alchemy dealt primarily with __________.
   a. symbols
   b. metals
   c. organic compounds
   d. utensils

3. An example of an element is __________.
   a. H₂O
   b. H₂
   c. H₂CO₃
   d. NH₃

4. The fundamental unit of an element is __________.
   a. a group
   b. a proton
   c. a molecule
   d. an atom

5. A chemical change always involves __________.
   a. a separation of molecules
   b. a breakdown of molecules
   c. a loss of energy
   d. a change in properties

6. The basic unit of a compound is __________.
   a. an atom
   b. a nucleus
   c. a molecule
   d. a radical

7. An example of a compound is __________.
   a. H₃O⁺
   b. H₂
   c. H₃
   d. H₂O

8. An example of a mixture is __________.
   a. salt water
   b. sodium bicarbonate
   c. hot water
   d. sodium chloride

9. In these choices the inorganic compound is __________.
   a. C₂H₆
   b. C₆H₅OH
   c. CO₂
   d. C₆H₁₂O₆

10. Organic compounds are produced by the __________.
    a. lithosphere
    b. biosphere
    c. hydrosphere
    d. asthenosphere
1. As the temperature of a phase increases, so does the ________ of its molecules.
   a. kinetic energy
   b. potential energy
   c. mass
   d. density

2. Evidence of the kinetic molecular nature of matter is ________.
   a. a chemical reaction
   b. a nuclear reaction
   c. a phase change
   d. diffusion

3. A graph of Boyle’s law relationship is ________.
   a. ![Graph A]
   b. ![Graph B]
   c. ![Graph C]
   d. ![Graph D]

4. A mathematical statement of Boyle’s law is ________.
   a. \( P = kV \)
   b. \( V = kP \)
   c. \( P + V = k \)
   d. \( P \cdot V = k \)

5. Charles’s law describes the relationship between ________ in a gas.
   a. pressure and volume
   b. pressure and temperature
   c. volume and temperature
   d. pressure, volume, and temperature

6. A mathematical statement of Charles’s law is ________.
   a. \( VT = k \)
   b. \( V = kT \)
   c. \( V + T = k \)
   d. \( V + k = T \)

7. A correct statement of the combined gas law is ________.
   a. \( \frac{P_1V_1T_1}{V_1T_1} = \frac{P_2V_2T_2}{V_2T_2} \)
   b. \( \frac{P_1}{V_1T_1} = \frac{P_2}{V_2T_2} \)
   c. \( \frac{V_1}{P_1T_1} = \frac{V_2}{P_2T_2} \)
   d. \( \frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \)

8. In Boyle’s law, Charles’s law, and combined gas law, temperatures are given in degrees ________.
   a. Fahrenheit
   b. Celsius
   c. centigrade
   d. Kelvin

9. Avogadro’s hypothesis deals with the ________ in equal volumes of gas.
   a. energy
   b. number of particles
   c. masses
   d. molecular weights

10. If the atomic mass of oxygen is 15.9994, one mole of \( O_2 \) is ________.
    a. 15.9994 amu
    b. 15.9994 grams
    c. 7.9997 grams
    d. 31.9988 grams
1. Until late in the nineteenth century, the atomic model resembled __________.
   a. a marble  
   b. a raisin pudding  
   c. a solar system  
   d. a cloud  
2. Experiments by Geiger, Mardsen, and Rutherford yielded the __________ atomic model.
   a. plum pudding  
   b. quantum  
   c. planetary  
   d. wave-particle  
3. Discovery of the atomic nucleus is credited (somewhat generously) to __________.
   a. Dalton  
   b. Thomson  
   c. Rutherford  
   d. Bohr  
4. The planetary atom with quantized energy levels is attributed to __________.
   a. Dalton  
   b. Thomson  
   c. Rutherford  
   d. Bohr  
5. Bohr explained the emission spectrum of the element __________.
   a. hydrogen  
   b. helium  
   c. uranium  
   d. gold  
6. An atom emits energy when __________.
   a. electrons move in circular orbit  
   b. electrons move to higher energy levels  
   c. electrons move to lower energy levels  
   d. electrons leave the atom  
7. Periodicity is best characterized by __________.
   a. the fact that elements increase in atomic mass in a regular way  
   b. the cyclical nature of physical and chemical properties  
   c. the regular growth of atomic size with atomic mass  
   d. the repeating nature of nuclear structure  
8. The scientist credited with developing the Periodic Table was __________.
   a. Dalton  
   b. Nobel  
   c. Mendeleev  
   d. de Broglie  
9. The final result of a nuclear fission reaction is __________.
   a. lead  
   b. radioactive nuclides  
   c. energy  
   d. an inert gas  
10. In the reaction, $^{76}_{33}$As $\rightarrow ^{0}_{-1}$e + X, the atomic mass of X is __________.
    a. 76  
    b. 77  
    c. 33  
    d. 34
1. The Al$^{3+}$ ion will combine with ________ Cl$^{-}$ ion (s).
   a. one  
   b. two  
   c. three 
   d. four
2. Three NO$_3^-$ ions will combine with ________ Al$^{3+}$ ion (s).
   a. one  
   b. two  
   c. three 
   d. four
3. The term that best describes electronegativity is ________.
   a. atomic charge  
   b. nuclear mass  
   c. attracting ability  
   d. electron cloud
4. A hybrid bond is a mixture of different types of ________.
   a. compounds  
   b. isotopes  
   c. elements  
   d. orbitals
5. If atoms with similar electronegativities form a bond, the bond would most likely be ________.
   a. a polar bond  
   b. a covalent bond  
   c. an ionic bond  
   d. a metallic bond
6. Electron transfer occurs with ________ bonds.
   a. ionic  
   b. covalent  
   c. metallic  
   d. hydrogen
7. Compounds whose components have a high difference in electronegativity have a high percent ________ character.
   a. ionic  
   b. covalent  
   c. metallic  
   d. hydrogen
8. Bonding electrons that are free to wander are characteristic of ________ bonds.
   a. ionic  
   b. covalent  
   c. metallic  
   d. hydrogen
9. A molecule that is electrically lopsided is ________.
   a. polar  
   b. elongated  
   c. symmetrical  
   d. nonpolar
10. The polar compound is ________.
    a. AlCl$_3$  
    b. H$_2$  
    c. CCl$_4$  
    d. H$_2$O
1. These occurrences are manifestations of chemical reactions except __________.
   a. the change in color of leaves in autumn
   b. the rusting of iron
   c. the freezing of water
   d. the burning of wood

2. The phenomenon that accompanies every chemical reaction is __________.
   a. a change in temperature
   b. a change in color
   c. the evolution of gas
   d. the formation of a solid

3. Energy tied up in chemical bonds are called __________.
   a. momentum
   b. entropy
   c. enthalpy
   d. kinesis

4. In the enthalpy diagram the heat of reaction is designated by __________.
   a. A
   b. B
   c. C
   d. D

5. If additional reactant is added to a reversible reaction, the result would be __________.
   a. the reaction goes to completion
   b. the amount of products equals the amount of reactants
   c. the reaction reaches equilibrium
   d. more reactants are produced

6. The reaction $4 \text{NH}_3 + 5 \text{O}_2 \rightarrow 4 \text{NO} + 6 \text{H}_2\text{O}$ will go to completion if __________.
   a. $\text{H}_2\text{O}$ is removed
   b. $\text{NH}_3$ is removed
   c. $\text{NO}$ is added
   d. $\text{O}_2$ is removed

7. Equilibrium in a reversible reaction requires that __________.
   a. the reaction equation must be balanced
   b. concentrations on both sides must be equal
   c. rate of the reverse reaction
   d. the moles of products must be equal the moles of reactants

8. A factor that will decrease the rate of an exothermic reaction is __________.
   a. the addition of a catalyst
   b. an increase of reactants
   c. addition of heat
   d. a decrease of products

9. Raising the temperature of a reaction increases the rate of reaction, but does not increase the __________.
   a. activation energy requirements
   b. number of collisions
   c. vibrational motions within the molecules
   d. average velocity of the reacting particles

10. A correct statement about collision geometry, concentration, and catalyst is __________.
    a. increasing the concentration of reactants increases the collisions
    b. a catalyst raises the activation energy requirements
    c. the fastest reaction in a reaction mechanism determines the overall rate of reaction
    d. optimum collision geometry raises the activation energy requirement
1. The gram-formula weight is the combined mass of __________ of a substance.
   a. one mole  
   b. 22.4 moles  
   c. one gram  
   d. one molecule

2. A one molar solution is made up of __________.
   a. one gram solute plus one liter solvent  
   b. one mole solute plus one liter solvent  
   c. one liter solute plus one liter solvent  
   d. one mole solute in one liter solution

3. The factor that causes a solution to be a good electrical conductor is __________.
   a. presence of ions  
   b. presence of metal  
   c. presence of electrons  
   d. presence of protons

4. A solution of 0.1 M NaCl conducts more electricity than a 0.1 NaI solution primarily because __________.
   a. NaCl has a higher number of potential ions  
   b. NaI is less ionic in bond character  
   c. the electronegativity of Na changes from NaCl to NaI  
   d. one mole of NaI requires more water to dissolve

5. As the concentration of a given solution increases, the conductivity of the solution __________.
   a. increases  
   b. decreases  
   c. remains constant  
   d. may increase or may decrease

6. When one mole of sodium chloride dissociates in water, the result is __________.
   a. one mole of ions  
   b. two moles of ions  
   c. one-half mole of chloride ions  
   d. one-half mole of sodium ions

7. An acid is __________.
   a. a proton acceptor  
   b. a proton donor  
   c. any compound containing hydrogen  
   d. any compound that is a hydroxide

8. A solution that is neutral has a pH of __________.
   a. 0  
   b. 1  
   c. 7  
   d. 14

9. A correct statement about cations is that they __________.
   a. are attracted to the anode  
   b. undergo oxidation at the appropriate electrode  
   c. undergo reduction at the appropriate electrode  
   d. are negatively charged

10. In the reaction Cu + Cl₂ → CuCl₂, __________.
    a. copper is oxidized  
    b. chlorine is oxidized  
    c. oxidation occurs without reduction  
    d. neither oxidation nor reduction occurs
1. The element that characterizes organic compounds is __________.
   a. hydrogen
   b. carbon
   c. oxygen
   d. nitrogen

2. The combustion of methane (CH\textsubscript{4}) yields __________.
   a. CH\textsubscript{4}OH
   b. COOH
   c. H\textsubscript{2}O\textsubscript{2} and CO
   d. H\textsubscript{2}O and CO\textsubscript{2}

3. Carbon is __________.
   a. a metal
   b. a nonmetal
   c. an inert gas
   d. a rare earth metal

4. Carbon has valences of __________.
   a. +1, -3
   b. -1, +3
   c. +4, -4
   d. +4, -2

5. The geometry of the CH\textsubscript{4} molecule is __________.
   a. rectangular
   b. linear
   c. ring-shaped
   d. tetrahedral

6. Covalent bonds result from __________ electrons.
   a. shared
   b. donated
   c. accepted
   d. free

7. Pentane contains __________ carbon atoms.
   a. five
   b. four
   c. three
   d. two

8. An important characteristic of alkanes is their ability to __________.
   a. combust
   b. combine
   c. react
   d. reduce

9. The alkene series has at least one __________ band.
   a. single
   b. double
   c. three-fold
   d. four-fold

10. Members of the alkyne series have the general composition __________.
    a. C\textsubscript{n}H\textsubscript{2n}
    b. C\textsubscript{n}H\textsubscript{n}
    c. C\textsubscript{n}H\textsubscript{2n-2}
    d. C\textsubscript{n}H\textsubscript{2n+2}
1. In the reaction, \( \text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + X \), X is ________.
   a. \( \text{CH}_3\text{Cl} \)
   b. \( \text{CCl}_4 \)
   c. \( \text{CCl}_2 \)
   d. \( \text{HCl} \)
2. The type of reaction shown in Item 1 is ________.
   a. a substitution
   b. an addition
   c. a transformation
   d. a hydrogenation
3. In the reaction, \( \text{C}_6\text{H}_6 + 2\text{Cl}_2 \rightarrow 2\text{HCl} + X \), X is ________.
   a. \( \text{H}_2\text{Cl}_2 \)
   b. \( \text{C}_6\text{Cl}_4 \)
   c. \( \text{C}_6\text{H}_4\text{Cl}_2 \)
   d. \( \text{CH}_2 \)
4. The ring structure of unsaturated hydrocarbons is called the ________ ring.
   a. ethane
   b. pentane
   c. phosgene
   d. benzene
5. Organic compounds with the \( \text{OH}^- \) group are ________.
   a. ketones
   b. alcohols
   c. alkanes
   d. esters
6. In the reaction, \( m\text{CO} + n\text{H}_2 \rightarrow p\text{CH}_3\text{OH} \) (where \( m, n, \) and \( p \) are integers), the value of \( n \) is ________.
   a. 1
   b. 2
   c. 3
   d. 4
7. Amides are the basic structural element in the long-chain molecules that make up ________.
   a. proteins
   b. fats
   c. alcohols
   d. water
8. The general structural formula for an amine is ________.
   a. 
   b. 
   c. 
   d. 
9. Proteins are composed of ________.
   a. aldehyde acids
   b. amides
   c. benzenes
   d. amino acids
10. Amino acids are to proteins as ________.
    a. raisins are to puddings
    b. links are to chains
    c. gas is to balloons
    d. bricks are to walls
1. In expanded form, $13 \cdot 10^{-3}$ becomes ________.
   a. 133
   b. 13,000
   c. $\frac{3}{13}$
   d. .013

2. An example of a phase change is ________.
   a. water boiling
   b. a bomb exploding
   c. iron rusting
   d. leaves turning

3. The rotting of meat is ________.
   a. a phase change
   b. a chemical change only
   c. a physical change
   d. both a physical and a chemical change

4. Boyle’s law describes the relationship between ________ in a gas.
   a. pressure and volume
   b. pressure and temperature
   c. volume and temperature
   d. pressure, volume, and temperature

5. As a result of J. J. Thomson’s work, the atomic model came to resemble ________.
   a. a marble
   b. a raisin pudding
   c. a solar system
   d. a cloud

6. When two atoms react that have similar electronegativities, ________ bond is formed.
   a. an ionic
   b. a covalent
   c. metallic
   d. hydrogen

7. Sharing of electrons is a characteristic of ________ bonds.
   a. ionic
   b. covalent
   c. metallic
   d. hydrogen

8. Substances produced in a chemical reaction are called ________.
   a. reagents
   b. reactants
   c. aliquots
   d. products

9. A reaction that releases energy is ________.
   a. entropic
   b. exalthic
   c. exothermic
   d. endothermic

10. Amino acids are connected by ________.
    a. peptide bonds
    b. carbon atoms
    c. water molecules
    d. alcohols
1. A quantity that has magnitude only is __________.
   a. vector
   b. scalar
   c. tensor
   d. visor

2. Of the following quantities the only scalar is __________.
   a. momentum
   b. velocity
   c. acceleration
   d. distance

3. The vector sum of 3 newtons and 4 newtons __________.
   a. is 1 newton
   b. is 7 newtons
   c. is 5 newtons
   d. cannot be determined from the given information

4. The scalar sum of 3 newtons and 4 newtons __________.
   a. is 1 newton
   b. is 7 newtons
   c. is 5 newtons
   d. cannot be determined from the given information

5. Traveling 30 kilometers per hour, a train travels 10 kilometers in __________.
   a. 3 hours
   b. 10 hours
   c. 20 minutes
   d. 30 minutes

6. A point on the earth's equator (25,000 miles in circumference) travels approximately __________ in three hours.
   a. 0 miles
   b. 3,000 miles
   c. 25,000 miles
   d. 186,000 miles

7. Units of acceleration are __________.
   a. \( \text{km} \quad \text{sec} \)
   b. \( \text{miles} \quad \text{hour} \)
   c. \( \frac{\text{kg} \cdot \text{m}}{\text{sec}^2} \)
   d. \( \frac{\text{feet} \cdot \text{hour}}{\text{sec}} \)

8. Acceleration is defined as a time rate of change of __________.
   a. displacement
   b. distance
   c. velocity
   d. speed

9. An early atomic model was __________.
   a. the solar system
   b. a water wave
   c. a magnet
   d. a tree

10. A word that best describes field is __________.
    a. value
    b. class
    c. line
    d. pole
1. Acceleration is produced by __________.
   a. velocity  
   b. momentum  
   c. impulse  
   d. inertia

2. Momentum is expressed as __________.
   a. \( m \cdot v \)  
   b. \( m \cdot a \)  
   c. \( f \cdot t \)  
   d. \( mgh \)

3. Inertia is a good term to summarize __________.
   a. Newton’s first law of motion  
   b. Newton’s second law of motion  
   c. Newton’s third law of motion  
   d. Newton’s law of gravitation

4. A planet stays in orbit primarily because of __________.
   a. centrifugal force  
   b. magnetic and electrostatic forces  
   c. centripetal force and Newton’s first law  
   d. Newton’s third law

5. An unalterable property of an object is its __________.
   a. momentum  
   b. mass  
   c. weight  
   d. velocity

6. A measure of a planet’s gravitational field on a nearby object is its __________.
   a. mass  
   b. distance from the planet  
   c. weight  
   d. density

7. If a pitched baseball has a momentum of 10 units, its momentum when hit back to the pitcher might be __________ units.
   a. 10  
   b. 20  
   c. -10  
   d. 0

8. Two boxcars have a momenta of \( A \) units and \( B \) units, respectively. After coupling the momentum of the two boxcars will be __________.
   a. \( A + B \)  
   b. 0  
   c. \( A - B \)  
   d. \( \frac{A + B}{2} \)

9. Kepler’s concept of the universe was most like that of __________.
   a. Galileo  
   b. Aristotle  
   c. Brahe  
   d. Ptolemy

10. An advantage Galileo had over Copernicus and Brahe was __________.
    a. superior intelligence  
    b. the telescope  
    c. painstaking technique  
    d. financial support
1. The ability to do work is __________.
   a. momentum  
   b. inertia  
   c. force  
   d. energy
2. The form of energy in falling water is __________.
   a. electrical  
   b. mechanical  
   c. chemical  
   d. solar
3. At the bottom of its swing, a pendulum has 10 units of kinetic energy. At each of the high points of its swing, the pendulum will have __________ units of energy.
   a. 5  
   b. 0  
   c. 10  
   d. 20
4. A spring that stores 80 joules of potential energy will propel a ten-kilogram mass at __________ meters per second.
   a. 80  
   b. 10  
   c. 16  
   d. 4
5. The potential energy of a ten-kilogram mass 5 meters above the ground is approximately __________ joules.
   a. 10  
   b. 50  
   c. 100  
   d. 500
6. A 75-watt bulb consumes the equivalent of 150 joules of energy in __________ seconds.
   a. one  
   b. two  
   c. 75  
   d. 100
7. A heat engine is a practical application of the principles of __________.
   a. Newtonian physics  
   b. thermodynamics  
   c. atomic physics  
   d. wave motion
8. A heat engine operates at 400° K and exhausts waste gas at 200° K. The efficiency of the engine is __________ percent.
   a. 400  
   b. 200  
   c. 100  
   d. 50
9. Fifty calories of heat are added to a gram of ice at 0° C. The water will experience a change in temperature of __________ degrees.
   a. 0  
   b. 1  
   c. 2  
   d. 50
10. Fifty calories of heat are added to a gram of liquid water at 0° C. The water will experience a change in temperature of __________ degrees.
    a. 0  
    b. 1  
    c. 2  
    d. 50
1. A nonrepetitive disturbance in a medium is __________.
   a. a period
   b. a pulse
   c. an epoch
   d. a splash

2. Longitudinal waves cannot be __________.
   a. reflected
   b. refracted
   c. diffracted
   d. polarized

3. The period of a wave is the reciprocal of its __________.
   a. velocity
   b. amplitude
   c. frequency
   d. wave length

4. An equation relating velocity, frequency, and wave length is __________.
   a. \( v = \frac{f}{w} \)
   b. \( V = fw \)
   c. \( v = \frac{w}{f} \)
   d. \( f = vw \)

5. When a wave meets a barrier, the angle of incidence equals the angle of __________.
   a. reflection
   b. refraction
   c. diffraction
   d. polarization

6. The bending of waves as they pass through a hole in a barrier is __________.
   a. reflection
   b. refraction
   c. diffraction
   d. polarization

7. Standing waves result from __________.
   a. interference of identical waves
   b. interference of unequal wave lengths
   c. refraction of a wave front
   d. polarization of dissimilar waves

8. During resonance, a vibrating object sets up in a second object vibrations that __________.
   a. destroy the second object
   b. are of higher frequency than those in the first object
   c. are of lower frequency
   d. are equal in frequency

9. The Doppler effect occurs __________.
   a. when the wave generator is moving
   b. for sound waves only
   c. for transverse waves only
   d. for very high frequencies only

10. When electrons travel faster than light, __________.
    a. a red light occurs
    b. a blue light occurs
    c. no light occurs
    d. they evaporate

\[ \text{\underline{1204}} \]
1. The indices of refraction for material substances is _________ the index of refraction for a vacuum.
   a. less than  
   b. equal to  
   c. greater than  
   d. proportional to
2. The incident angle that produces total internal reflection is called the _________ angle.
   a. reflection  
   b. index  
   c. polarization  
   d. critical
3. Polarization commonly occurs when light is _________.
   a. diffracted  
   b. reflected  
   c. refracted  
   d. dispersed
4. The spreading of light into colors of the spectrum is termed _________.
   a. dispersion  
   b. diffusion  
   c. scattering  
   d. refracting
5. Rays parallel to the principal axis (p. a.) will _________.
   a. never converge  
   b. converge on the left side of the lens  
   c. converge on the right side of the lens  
   d. only seem to converge
6. A virtual image is always _________.
   a. erect  
   b. inverted  
   c. reduced  
   d. blurred
7. Common interference patterns of light are due to _________.
   a. refraction  
   b. dispersion  
   c. diffraction  
   d. reflection
8. Diffraction occurs when _________.
   a. the wave length is significantly smaller than the opening  
   b. the wave length approximates the size of the opening  
   c. the index of refraction approximates the wave length  
   d. the medium is dispersive
9. Both water waves and marbles can demonstrate _________.
   a. refraction  
   b. interference  
   c. polarization  
   d. diffraction
10. The strongest evidence for the photon model of light is _________.
    a. interference  
    b. the photoelectric effect  
    c. the Doppler effect  
    d. refraction
1. The contribution of William Gilbert was the __________.
   a. measurement of the electron charge  
   b. discovery of the atomic nucleus  
   c. invention of the cathode ray tube  
   d. discovery of electrical charges

2. A positive charge on an object is caused by __________.
   a. an excess of protons  
   b. an excess of electrons  
   c. a deficiency of protons  
   d. a deficiency of electrons

3. The law of attraction can be stated as __________.
   a. $Q = cv$  
   b. $E = \frac{F}{q}$  
   c. $E = mc^2$  
   d. $F = K \frac{Q_1 Q_2}{r^2}$

4. If the force between two point charges is four units at three units of separation, the force at six units of separation is __________ units.
   a. six  
   b. four  
   c. three  
   d. two

5. The space around a charge or a pole in which a force is experienced is called a __________.
   a. force line  
   b. domain  
   c. test charge  
   d. field

6. Electric fields normally present in the air are generally __________.
   a. dangerous  
   b. oblique in direction  
   c. horizontal in direction  
   d. vertical in direction

7. The formula that relates voltage, distance, and electric field is __________.
   a. $V = \frac{E}{d}$  
   b. $d = \frac{E}{V}$  
   c. $E = \frac{V}{d}$  
   d. $V = \frac{d}{E}$

8. A charge accelerating in an electric field is losing __________.
   a. momentum  
   b. velocity  
   c. potential energy  
   d. kinetic energy

9. The electric field strength $E$ is measured as __________.
   a. force per unit mass  
   b. force times mass  
   c. charge per unit force  
   d. force per unit charge

10. The __________ way to measure the strength and direction of an electric field is to place in the field a __________.
    a. neutral object with an unknown mass  
    b. charged object with an unknown mass  
    c. neutral object of no mass  
    d. charged object of no mass
1. The driving influence for an electric current is called _________.
   a. ammeter
   b. electromotive force
   c. resistance
   d. chargenpuscher

2. The unit of electromotive force is the _________.
   a. newton
   b. coulomb
   c. volt
   d. newton per coulomb

3. A device in electricity that is analogous to a water pump is _________.
   a. a resistance
   b. a conductor
   c. a generator
   d. an ammeter

4. In a series circuit current is _________.
   a. diffused
   b. unknown
   c. constant
   d. variable

5. If the length of a conductor increases, its resistance _________.
   a. increases
   b. decreases
   c. remains unchanged

6. If the diameter of a conductor increases, its resistance _________.
   a. increases
   b. decreases
   c. remains unchanged

7. If a resistance is added in series to a circuit, the circuit resistance is then _________.
   a. greater
   b. less
   c. the same
   d. redirected

8. The fact that the total current delivered by a source to a parallel circuit must equal the sum of
   the currents delivered to the branches is an application of the principle of _________.
   a. Newton’s second law
   b. conservation of energy
   c. conservation of charge
   d. Coulomb’s law

9. A series circuit has an emf of 120 volts and 0.5 amps. The resistance in the circuit is _________.
   a. 0.004
   b. 0.15
   c. 60
   d. 240

10. A circuit has an emf of 120 volts and a circuit of 0.5 amperes through one resistance. The power
    developed in that resistance is _________. watts.
    a. 0.004
    b. 0.15
    c. 60
    d. 240
1. The phrase that best describes the space around a magnetic pole is __________.
   a. a line of force
   b. an area of impulse
   c. a sphere of influence
   d. a point of focus

2. The magnetic field of a solenoid (coil) is similar to the field of __________.
   a. a horseshoe magnet
   b. a bar magnet
   c. a moving charge
   d. a long, straight wire

3. If the force is eight units between two poles separated by two units of distance, the force will be two units when the poles are separated by __________ units of distance.
   a. two
   b. four
   c. six
   d. eight

4. The formula for the force of attraction or repulsion between two magnetic poles is __________.
   a. \( F_m = K \frac{r}{M_1 M_2} \)
   b. \( F_m = r^2 \frac{K}{M_1 M_2} \)
   c. \( F_m = K \frac{M_1 + M_2}{r} \)
   d. \( F_m = K \frac{M_1 M_2}{r^2} \)

5. The Biot-Savart force law is shown as __________.
   a. \( F = qB \sin \theta \)
   b. \( F = Bq \)
   c. \( F_{max} = qvB \)
   d. \( F_{max} = \sin \theta v \)

6. If a magnetic field is to exert a force on a current-carrying wire, the field must have some vector component __________ the current.
   a. parallel with
   b. concentric with
   c. tangential to
   d. perpendicular to

7. Induction occurs when __________.
   a. a conductor is in an electric field
   b. a conductor moves through an electric field
   c. a conductor is in a magnetic field
   d. a conductor moves through a magnetic field

8. In practice a transformer is composed of __________.
   a. a coil
   b. a rotor
   c. two coils
   d. a rotor and a coil

9. A beam of charged particles can be deflected by __________.
   a. an electric field
   b. a magnetic field
   c. both an electric field and a magnetic field
   d. neither magnetic nor electric field

10. A cathode ray is __________.
    a. a beam of electrons
    b. a beam of alpha particles
    c. electromagnetic radiation
    d. an evacuated glass tube
1. The Bohr atomic model is an expansion of the planetary model of __________.
   a. Dalton
   b. Thomson
   c. Rutherford
   d. Millikan

2. One of Bohr’s postulates is __________.
   a. the hydrogen nucleus is negatively charged
   b. electrons orbit the hydrogen nucleus in a cloud
   c. electrons orbit the hydrogen nucleus in definite, discrete levels
   d. the centripetal force on the electron must be greater than the electrostatic attraction

3. Line emission spectra always come from __________.
   a. a low temperature solid
   b. an incandescent bulb
   c. a high temperature solid
   d. an incandescent gas

4. An absorption spectrum has __________ in the positions of the missing wave lengths.
   a. bright lines
   b. dark lines
   c. holes
   d. radiant energy

5. The phenomenon of light energy being absorbed by electrons allowing them to escape from a metal surface is known as __________.
   a. the photoelectric effect
   b. the quantum effect
   c. escape theory
   d. electron transference

6. Evidence for the particle nature of radiation is __________.
   a. the photoelectric effect
   b. reflection
   c. absorption
   d. interference

7. The de Broglie wave associated with an automobile on the highway has a wavelength __________.
   a. considerably smaller than can be detected
   b. considerably larger than can be detected
   c. within the range of X rays
   d. the mass of a “Newtonian” object

8. The uncertainty principle applies to determining __________.
   a. the charge on an electron
   b. the charge on an atomic nucleus
   c. the position of an electron
   d. the mass of an electron

9. The mass of a deuterium nucleus is __________ the sum of its components masses.
   a. greater than
   b. less than
   c. equal to
   d. independent of

10. Alpha radiation is made up of __________.
    a. hydrogen nuclei
    b. helium nuclei
    c. electrons
    d. neutrons
1. Kepler believed planetary orbits to be __________.
   a. epicycles
   b. circles
   c. ellipses
   d. parabolas

2. *Power* is defined as the *time rate of change of* __________.
   a. work
   b. force
   c. momentum
   d. impulse

3. The unit of power is the __________.
   a. joule
   b. newton
   c. foot-pound
   d. watt

4. The unit of frequency is the __________.
   a. hertz
   b. joule
   c. newton
   d. faraday

5. The strongest evidence for the wave model of light is __________.
   a. interference
   b. the photoelectric effect
   c. the Doppler effect
   d. refraction

6. The inverse square law that describes electrostatic force was named for __________.
   a. Hans Oersted
   b. William Gilbert
   c. Charles Coulomb
   d. Isaac Newton

7. The unit of electric field strength is the __________.
   a. newton
   b. coulomb
   c. volt
   d. newton per coulomb

8. A device in electricity that is analogous to a water mill is __________.
   a. a resistance
   b. a conductor
   c. a generator
   d. an ammeter

9. If resistance is added in parallel to a circuit, the circuit resistance is then __________.
   a. greater
   b. less
   c. the same
   d. redirected

10. Induction is the principle applied in __________.
    a. generators and transformers
    b. generators and motors
    c. resistors and motors
    d. motors and transformers
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SCIENCE
Placement Test Answer Keys

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63
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Science 700 – 1200 Placement Worksheet

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TOTAL SCORE: __ [ ____ ] [ ____ ] [ ____ ] [ ____ ] [ ____ ]

GRADE LEVEL PLACEMENT: A student can be placed academically using the rule that he/she has successfully passed the test for any given level if he/she achieves a Total Score of 70 points or more.

This student places at grade level ____________________.

LEARNING GAPS: Learning gaps can be easily identified with the placement test. If a student receives points of 6 or less on any individual test, he/she has not shown mastery of the skills in that particular LIFEPAC. If desired, these LIFEPACs may be ordered and completed before the student begins his assigned grade level curriculum.

Learning gap LIFEPACs for this student are _______ _______ _______ _______ _______

It is not unusual for a student to place at more than one level in various subjects when beginning the LIFEPAC curriculum. For example, a student may be placed at 5th level in Bible, math, science and social studies but 4th level in language arts. The majority of school time should be concentrated on the areas of lower achievement with the ultimate goal of equal skill mastery in all subjects at the same grade level.