



SCIENCE

Placement Test

▶ **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



804 N. 2nd Ave. E., Rock Rapids, IA 51246-1759

© MCMXCIX by Alpha Omega Publications, Inc. All rights reserved.

LIFEPAC is a registered trademark of Alpha Omega Publications, Inc.

All trademarks and/or service marks referenced in this material are the property of their respective owners. Alpha Omega Publications, Inc. makes no claim of ownership to any trademarks and/or service marks other than their own and their affiliates', and makes no claim of affiliation to any companies whose trademarks may be listed in this material, other than their own.

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.

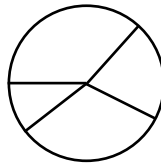
Test	Level	Test	Level
701 - 710	7	1001 - 1010	10
801 - 810	8	1101 - 1110	11
901 - 910	9	1201 - 1210	12

- 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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.

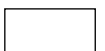
- 1. The metric system began in _____.
 - a. Germany
 - b. the United States
 - c. France
 - d. Great Britain
- 2. The United States began a formal shift toward use of the metric system under President _____.
 - a. Jackson
 - b. Lincoln
 - c. Wilson
 - d. Ford
- 3. Divisions of the metric system are 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-

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.



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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.



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. *Umbra* 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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.



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 _____ the air mass.
 - 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 _____ front.
 - 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

1a.
 b.
 c.
 d.

2a.
 b.
 c.
 d.

3a.
 b.
 c.
 d.

4a.
 b.
 c.
 d.

5a.
 b.
 c.
 d.

6a.
 b.
 c.
 d.

7a.
 b.
 c.
 d.

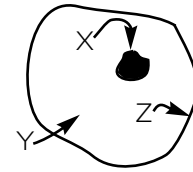
8a.
 b.
 c.
 d.

9a.
 b.
 c.
 d.

10a.
 b.
 c.
 d.

1. The weather that characterizes an area is the _____ of that area.
 - a. geography 1a.
 - b. barometric pressure b.
 - c. climate c.
 - d. latitude d.
2. A statement that might be part of a region's weather report is _____.
 - a. a yearly rainfall of 50 cm 2a.
 - b. a daily high of 35° C b.
 - c. an average seasonal temperature of 25° C c.
 - d. the Sunshine State d.
3. Primary control of a region's temperature results from _____.
 - a. radioactive decay 3a.
 - b. solar radiation b.
 - c. volcanic activity c.
 - d. geothermal heat d.
4. The coolest climates occur at _____.
 - a. high altitude and high latitude 4a.
 - b. low altitude and low latitude b.
 - c. high altitude and low latitude c.
 - d. low altitude and high latitude d.
5. Climate that has characteristics derived from being near water is called _____.
 - a. mesothermal 5a.
 - b. tropical b.
 - c. maritime c.
 - d. polar d.
6. The term *desert* is commonly a synonym for _____.
 - a. polar 6a.
 - b. tropical b.
 - c. maritime c.
 - d. arid d.
7. Communities within the Arctic Circle do not regulate their lives by _____.
 - a. the sun 7a.
 - b. laws b.
 - c. tradition c.
 - d. a clock d.
8. Rain forests provide adequate hunting and gathering for _____.
 - a. Pygmies 8a.
 - b. Bedouins b.
 - c. Eskimos c.
 - d. Mediterraneans d.
9. The continent whose entire interior is a desert is _____.
 - a. North America 9a.
 - b. Australia b.
 - c. Europe c.
 - d. South America d.
10. Tropical rain forests make up the interior of _____.
 - a. Australia 10a.
 - b. North America b.
 - c. Antarctica c.
 - d. South America d.

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 neutron
 - 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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.

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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.



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

1a.
b.
c.
d.

2a.
b.
c.
d.

3a.
b.
c.
d.

4a.
b.
c.
d.

5a.
b.
c.
d.

6a.
b.
c.
d.

7a.
b.
c.
d.

8a.
b.
c.
d.

9a.
b.
c.
d.

10a.
b.
c.
d.



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. 93×10^6
 - d. 9.3×10^7
6. A correct scientific notation is _____.
- a. 431×10^{-3}
 - b. 7×10^8
 - c. 16×10^5
 - d. 0.05×10^{-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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.

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.

2	19
8	K
8	
1	39

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 1a.
b. chemical b.
c. physical c.
d. phase d.
2. An extremely small amount of matter is converted to energy in a _____ reaction.
- a. nuclear 2a.
b. chemical b.
c. physical c.
d. phase d.
3. The fuel for a fusion reaction is _____.
- a. hydrogen 3a.
b. helium b.
c. radium c.
d. uranium d.
4. A common fuel for fission reactions is _____.
- a. hydrogen 4a.
b. helium b.
c. lead c.
d. uranium d.
5. Beta radiation consists of _____ emitted from an atomic nucleus.
- a. protons 5a.
b. neutrons b.
c. electrons c.
d. mesons d.
6. Gamma radiation is most similar to _____.
- a. alpha radiation 6a.
b. sound b.
c. light c.
d. electrons d.
7. Of the following choices the acid is _____.
- a. NaOH 7a.
b. KCl b.
c. HNO₃ c.
d. NaHCO₃ d.
8. An identifying characteristic of an acid in solution is _____.
- a. H⁺ 8a.
b. OH⁻ b.
c. K⁺ c.
d. O⁼ d.
9. All bases contain _____.
- a. oxygen and sodium 9a.
b. helium and potassium b.
c. oxygen and hydrogen c.
d. hydrogen and potassium d.
10. Of the following choices the base is _____.
- a. NaHCO₃ 10a.
b. HNO₃ b.
c. NaOH c.
d. KCl d.



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

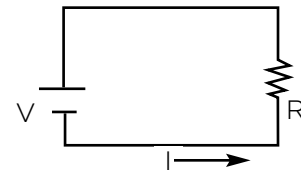
- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.



1. Any push or pull is the definition of _____.
 - a. force 1a.
 - b. mass b.
 - c. energy c.
 - d. work d.
2. Every object in the universe is always _____.
 - a. at rest 2a.
 - b. doing work b.
 - c. exerting force c.
 - d. curving d.
3. An example of an object with potential energy is _____.
 - a. an airplane at 35,000 feet 3a.
 - b. a car traveling 80 km/hr b.
 - c. an engine on a siding c.
 - d. a pendulum at the bottom of its swing d.
4. The total energy an object possesses equals _____.
 - a. kinetic energy minus potential energy 4a.
 - b. potential energy minus kinetic energy b.
 - c. one-half kinetic energy plus potential energy c.
 - d. kinetic energy plus potential energy d.
5. The handle of a spoon in a soup bowl feels hot because of _____.
 - a. conduction 5a.
 - b. convection b.
 - c. radiation c.
 - d. both a and c d.
6. Heat is distributed throughout the water in a teakettle because of _____.
 - a. conduction 6a.
 - b. convection b.
 - c. radiation c.
 - d. none of these d.
7. Ten percent of the energy needed for the United States is supplied by the energy of falling water converted to _____ energy.
 - a. electrical 7a.
 - b. chemical b.
 - c. atomic c.
 - d. geothermal d.
8. The most frequent energy conversion is that of mechanical energy to _____.
 - a. chemical energy 8a.
 - b. radiant energy b.
 - c. heat energy c.
 - d. electrical energy d.
9. The disorder of creation in general is _____.
 - a. increasing 9a.
 - b. decreasing b.
 - c. remaining constant c.
 - d. increasing and decreasing d.
10. The Second Law of Thermodynamics states that the amount of available energy in the universe is _____.
 - a. decreasing 10a.
 - b. increasing b.
 - c. constant c.
 - d. radiant d.



1. A magnet has _____ pole(s).
 - a. one 1a.
 - b. two b.
 - c. three c.
 - d. four d.
2. A substance commonly used to show a magnet's lines of force is _____.
 - a. sawdust 2a.
 - b. iron filings b.
 - c. water c.
 - d. salt d.
3. Electrical charges are different from magnetic poles in that _____.
 - a. unlikes attract 3a.
 - b. likes repel b.
 - c. charged objects attract all uncharged objects c.
 - d. magnetic poles attract all nonmagnetic objects d.
4. The statement that is *not* a law of electrostatics is _____.
 - a. objects with unlike charges attract each other 4a.
 - b. objects with like charges repel each other b.
 - c. charged objects repel neutral objects c.
 - d. charged objects attract neutral objects d.
5. An electric circuit that has only one path is a _____ circuit.
 - a. complex 5a.
 - b. series b.
 - c. perpendicular c.
 - d. parallel d.
6. If in Item 5 V equals 6 volts and R equals 2 ohms, the current, I , is _____ amperes.
 - a. 4 6a.
 - b. 12 b.
 - c. 3 c.
 - d. 8 d.
7. The first battery of silver and zinc was constructed by _____.
 - a. Fred E. Eveready 7a.
 - b. Al Volta b.
 - c. Ray O'Vac c.
 - d. Thomas Edison d.
8. The first working light bulb was developed in the laboratory of _____.
 - a. Franklin 8a.
 - b. Coulomb b.
 - c. Edison c.
 - d. Morse d.
9. The most abundant fuel in the United States is _____.
 - a. petroleum 9a.
 - b. coal b.
 - c. natural gas c.
 - d. uranium d.
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 10a.
 - b. no means exist to conduct sunlight to cities b.
 - c. the technology is expensive c.
 - d. the Federal government has imposed a moratorium d.



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

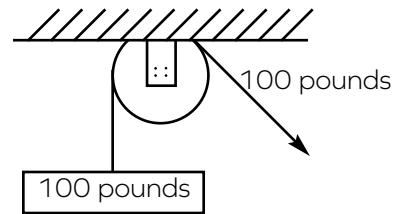
- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.

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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.

Answer Items 5 through 7 from the illustration.

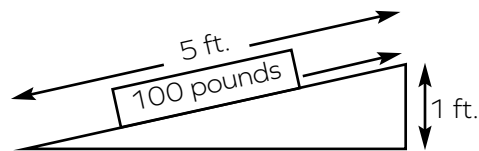
5. The ideal mechanical advantage of the single fixed pulley is _____.
 - a. 0
 - b. 1
 - c. 100
 - d. 200
6. The actual mechanical advantage of the pulley is _____.
 - a. 0
 - b. 1
 - c. 100
 - d. 200
7. The efficiency of the pulley is _____ percent.
 - a. 0
 - b. 1
 - c. 100
 - d. 200



- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.

Answer Items 8 through 10 from the illustration.

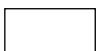
8. The work input on the inclined plane is _____ foot-pounds.
 - a. 100
 - b. 25
 - c. 125
 - d. 2,500
9. The work output is _____ foot-pounds.
 - a. 100
 - b. 25
 - c. 125
 - d. 2,500
10. The efficiency of the inclined plane is _____ percent.
 - a. 80
 - b. 100
 - c. 50
 - d. 25



- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.

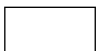
1. About five people could be fed by one United States farmer in 1910, and by 1970 more than _____ people could be fed.
- a. 40
b. 80
c. 120
d. 160
2. The forerunner of the wheat grown today for bread and cereal was most like _____.
- a. wild grass
b. bulrushes
c. corn cobs
d. green beans
3. The result 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

- 1a.
b.
c.
d.
- 2a.
b.
c.
d.
- 3a.
b.
c.
d.
- 4a.
b.
c.
d.
- 5a.
b.
c.
d.
- 6a.
b.
c.
d.
- 7a.
b.
c.
d.
- 8a.
b.
c.
d.
- 9a.
b.
c.
d.
- 10a.
b.
c.
d.



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. $F = G \frac{mm}{d^2}$
 - 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 1a.
b. liquid b.
c. gas c.
2. A phase of matter that has neither definite shape nor definite volume is _____.
- a. solid 2a.
b. liquid b.
c. gas c.
3. The mass of an atom is _____.
- a. distributed uniformly throughout the atomic sphere 3a.
b. concentrated in the electrons b.
c. divided equally between the nucleus and the electrons c.
d. concentrated in the nucleus d.
4. An atom's positive charge is balanced by negative charges on its _____.
- a. nucleus 4a.
b. neutrons b.
c. electrons c.
d. protons d.
5. Fuel for a fusion reaction is _____.
- a. oxygen 5a.
b. uranium b.
c. helium c.
d. hydrogen d.
6. Radiation was first detected by a _____.
- a. photographic plate 6a.
b. Geiger counter b.
c. microscope c.
d. X-ray machine d.
7. The rate at which reaction occurs in a nuclear reactor is regulated by _____.
- a. control rods 7a.
b. the moderator b.
c. the core c.
d. water d.
8. In an atomic reactor, atomic energy is converted directly to _____ energy.
- a. electrical 8a.
b. heat b.
c. light c.
d. nuclear d.
9. A disadvantage of atomic energy is the _____.
- a. unavailability of fuel 9a.
b. limited number of good plant sites b.
c. heating of water c.
d. problem of waste disposal d.
10. Compared to the energy produced, the amount of atomic fuel is _____ the amount of coal.
- a. greater than 10a.
b. about the same as b.
c. slightly less than c.
d. much less than d.

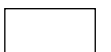


1. The measure of the amount of matter an object is made of is _____.
 - a. mass 1a.
 - b. weight b.
 - c. density c.
 - d. volume d.
2. A gram is the amount of matter contained in one cubic centimeter of _____.
 - a. air 2a.
 - b. gold b.
 - c. water c.
 - d. helium d.
3. A helium-filled balloon breaks. The volume of the helium _____.
 - a. remains the same as the balloon's volume 3a.
 - b. decreases to zero b.
 - c. depends on temperature c.
 - d. expands without limit d.
4. The easiest method of measuring the volume of a rock is to _____.
 - a. multiply length by width by height 4a.
 - b. substitute for it an even piece of wood and to measure the wood b.
 - c. measure the volume of water displaced when the rock is lowered into a full container c.
 - d. measure the shadow of the rock d.
5. The quotient of mass and volume is _____.
 - a. weight 5a.
 - b. density b.
 - c. length c.
 - d. area d.
6. Density multiplied by volume equals _____.
 - a. area 6a.
 - b. weight b.
 - c. density c.
 - d. mass d.
7. The specific gravity of water is _____.
 - a. 0 7a.
 - b. 1 b.
 - c. 2 c.
 - d. 8 d.
8. Specific gravity is a ratio of the density of a substance to the density of _____.
 - a. air 8a.
 - b. water b.
 - c. ice c.
 - d. silver d.
9. A one-half kilogram piece of cork, lowered into a brimful container of water, will displace _____ of water.
 - a. one-half kilogram 9a.
 - b. slightly less than one-half kilogram b.
 - c. slightly more than one-half kilogram c.
 - d. much more than one-half kilogram d.
10. An object that weighs three pounds when submerged will weigh _____ out of water.
 - a. one pound 10a.
 - b. two pounds b.
 - c. three pounds c.
 - d. four pounds d.

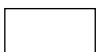


1. The rock of which the entire earth was originally composed was _____.
 - a. sedimentary 1a.
 - b. metamorphic b.
 - c. igneous c.
 - d. schistose d.
2. Examples of sedimentary rocks are _____.
 - a. sandstone, mudstone, and conglomerate 2a.
 - b. granite, sandstone, and gneiss b.
 - c. granite, basalt, and rhyolite c.
 - d. gneiss, phyllite, and pegmatite d.
3. The layer of the earth believed to be the source of the earth's magnetic field is the _____.
 - a. core 3a.
 - b. mantle b.
 - c. asthenosphere c.
 - d. crust d.
4. The earth's layer presumed to be liquid is the _____.
 - a. outer core 4a.
 - b. crust b.
 - c. inner core c.
 - d. mantle d.
5. Perhaps the most effective agent of erosion is _____.
 - a. running water 5a.
 - b. glaciers b.
 - c. wind c.
 - d. ocean currents d.
6. Most sediment is finally deposited _____.
 - a. on mountain slopes 6a.
 - b. on continental slopes b.
 - c. in river beds c.
 - d. as deltas d.
7. Evidence that rock is able to flow under pressure is a _____.
 - a. fault 7a.
 - b. plateau b.
 - c. fold c.
 - d. canyon d.
8. A thick vertical sequence of alternating marine and continental rocks probably indicates _____.
 - a. a series of seasonal floods 8a.
 - b. several mountain-building episodes b.
 - c. variations in sea level c.
 - d. a reversal of magnetic polarity d.
9. The "ring of fire" surrounding the Pacific Ocean marks the coincidence of volcanic activity and _____.
 - a. earthquakes 9a.
 - b. deep-sea trenches b.
 - c. deserts c.
 - d. mid-ocean ridges d.
10. If the present movement at the mid-Atlantic ridge continues, North America and Europe will eventually _____.
 - a. coincide 10a.
 - b. collide b.
 - c. be in a north-south line c.
 - d. be farther apart d.

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

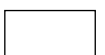
1a. b. c. d. 2a. b. c. d. 3a. b. c. d. 4a. b. c. d. 5a. b. c. d. 6a. b. c. d. 7a. b. c. d. 8a. b. c. d. 9a. b. c. d. 10a. b. c. d. 

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 athlete's foot is a _____.
- a. virus
 - b. rickettsia
 - c. fungus
 - d. protozoan

1a. b. c. d. 2a. b. c. d. 3a. b. c. d. 4a. b. c. d. 5a. b. c. d. 6a. b. c. d. 7a. b. c. d. 8a. b. c. d. 9a. b. c. d. 10a. b. c. d. 

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. amphotericin 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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.



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

1a. b. c. d. 2a. b. c. d. 3a. b. c. d. 4a. b. c. d. 5a. b. c. d. 6a. b. c. d. 7a. b. c. d. 8a. b. c. d. 9a. b. c. d. 10a. b. c. d. 

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

1a. b. c. d. 2a. b. c. d. 3a. b. c. d. 4a. b. c. d. 5a. b. c. d. 6a. b. c. d. 7a. b. c. d. 8a. b. c. d. 9a. b. c. d. 10a. b. c. d. 

1. The primary use man has made of the biosphere is for _____.
 - a. transportation 1a.
 - b. communication b.
 - c. food supply c.
 - d. disease prevention d.
2. The term that best defines *ecology* is _____.
 - a. food 2a.
 - b. plant b.
 - c. home c.
 - d. animal d.
3. Cellulose from corn stalks and wood chips has been treated to make a _____.
 - a. pancake batter 3a.
 - b. durable tennis shoe b.
 - c. roofing material c.
 - d. high protein food d.
4. Scrap glass is used in some communities for _____.
 - a. roads 4a.
 - b. beaches b.
 - c. tires c.
 - d. tabletops d.
5. Energy sources that do not leave harmful by-products are _____.
 - a. hydrogen, coal, and petroleum 5a.
 - b. geothermal heat, hydrogen, and solar heat b.
 - c. petroleum, uranium, and natural gas c.
 - d. uranium, tidal energy, and geothermal heat d.
6. Fuels for atomic energy are _____.
 - a. hydrogen and uranium 6a.
 - b. helium and uranium b.
 - c. petroleum and helium c.
 - d. natural gas and hydrogen d.
7. The greatest benefit of space exploration to the greatest number of people is _____.
 - a. knowledge of rocket fuels 7a.
 - b. technology b.
 - c. knowledge of moon's origin c.
 - d. acquisition of moon rocks d.
8. Electronics has been advanced by the space program's need for _____.
 - a. vacuum radio tubes 8a.
 - b. metals for antennas b.
 - c. ultra small components c.
 - d. long extension cords d.
9. Pharmacology refers to _____.
 - a. agriculture 9a.
 - b. medicines b.
 - c. communication c.
 - d. animal breeding d.
10. Continental shelves are a promising source of _____.
 - a. coal 10a.
 - b. uranium b.
 - c. petroleum c.
 - d. aluminum d.



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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.

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



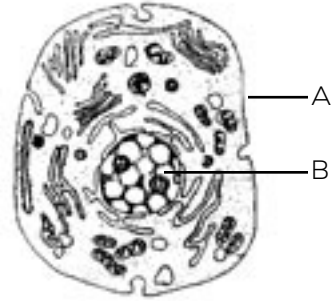
1. The limitation of a light (optical) microscope is _____.
- a. magnification
 - b. contrast
 - c. resolution
 - d. illumination
2. A compound microscope has a ten-power eyepiece and a ninety-power objective lens. The microscope is capable of magnification of _____.
- a. 10X
 - b. 9X
 - c. 90X
 - d. 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.

1004

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. synapse
 - d. phagocyte

10. A cell that combats disease is _____.
- a. a neuron
 - b. a hemoglobin
 - c. a leukocyte
 - d. an antibody

- 1a.
- b.
- c.
- d.

- 2a.
- b.
- c.
- d.

- 3a.
- b.
- c.
- d.

- 4a.
- b.
- c.
- d.

- 5a.
- b.
- c.
- d.

- 6a.
- b.
- c.
- d.

- 7a.
- b.
- c.
- d.

- 8a.
- b.
- c.
- d.

- 9a.
- b.
- c.
- d.

- 10a.
- b.
- c.
- d.

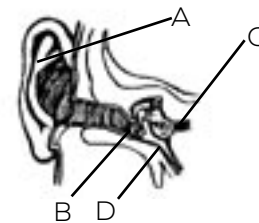
1. The part of a plant that serves to anchor the plant body is the _____.
- a. root
 - b. stem
 - c. leaf
 - d. fruit
2. Food factories for plants are their _____.
- a. roots
 - b. stems
 - c. leaves
 - d. fruits
3. *Tap* and *fibrous* are descriptive of a plant's _____.
- a. roots
 - b. stems
 - c. 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

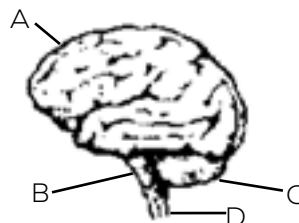
- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.

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



- 9a.
- b.
- c.
- d.

10. In this illustration of the brain, the cerebellum is represented by Letter _____.
 - a. A
 - b. B
 - c. C
 - d. D



- 10a.
- b.
- c.
- 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

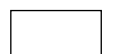


1. A function of meiosis is _____.
 - a. a production of gametes 1a.
 - b. growth b.
 - c. replacement of cells c.
 - d. repair of injured tissue d.
2. A product of meiosis is _____.
 - a. a white blood cell 2a.
 - b. a plant stem cell b.
 - c. a sperm cell c.
 - d. an epithelial cell d.
3. Compared to the parent, the daughter organisms produced by asexual reproduction _____.
 - a. are genetically identical 3a.
 - b. have the same chromosomes b.
 - c. are sterile c.
 - d. are inferior d.
4. Of the following forms of asexual reproduction, one that *cannot* occur in unicellular organisms is _____.
 - a. budding 4a.
 - b. binary fission b.
 - c. multiple fission c.
 - d. fragmentation d.
5. An advantage of sexual reproduction is _____.
 - a. genetic variability 5a.
 - b. predictable phenotypes b.
 - c. rapid reproduction c.
 - d. territorial domination d.
6. In sexual reproduction the genetic possibilities in offspring are _____.
 - a. very small 6a.
 - b. zero b.
 - c. doubled c.
 - d. very great d.
7. Technique of placing a desired plant stem into another, more adequate root system is _____.
 - a. cutting 7a.
 - b. layering b.
 - c. grafting c.
 - d. budding d.
8. A commercial crop available only through grafting is _____.
 - a. navel oranges 8a.
 - b. purple plums b.
 - c. Winesap apples c.
 - d. tangelos d.
9. A life cycle spent primarily as gametes is the _____ cycle.
 - a. diplontic 9a.
 - b. haplontic b.
 - c. larval c.
 - d. embryonic d.
10. A life cycle spent primarily as diploids is the _____ cycle.
 - a. diplontic 10a.
 - b. haplontic b.
 - c. larval c.
 - d. embryonic d.



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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.



- 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

- 1a.
- b.
- c.
- d.
- 2a.
- b.
- c.
- d.
- 3a.
- b.
- c.
- d.
- 4a.
- b.
- c.
- d.
- 5a.
- b.
- c.
- d.
- 6a.
- b.
- c.
- d.
- 7a.
- b.
- c.
- d.
- 8a.
- b.
- c.
- d.
- 9a.
- b.
- c.
- d.
- 10a.
- b.
- c.
- d.

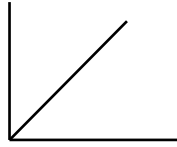
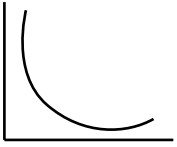
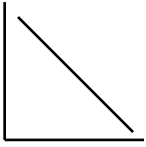
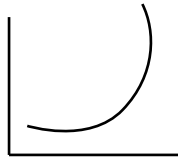


1. If you entered a career in chemistry and were assigned to discover new products and processes, you would be in the area of _____.
- a. corporate management
 - b. chemical technician
 - c. research and development
 - d. marketing and distribution
2. A career in chemistry that would enable you to set 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. $2 \cdot 10^2$
 - d. $1.8642 \cdot 10^2$
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. $186 \cdot 10^3$
 - c. $1.86 \cdot 10^4$
 - d. $1.86 \cdot 10^5$



1. The pseudoscience of alchemy became important around the year _____.
- a. 5,000 B.C. 1a.
b. 1,300 B.C. b.
c. 300 B.C. c.
d. A.D. 1700 d.
2. Alchemy dealt primarily with _____.
- a. symbols 2a.
b. metals b.
c. organic compounds c.
d. utensils d.
3. An example of an element is _____.
- a. H_2O 3a.
b. H_2 b.
c. H_2CO_3 c.
d. NH_3 d.
4. The fundamental unit of an element is _____.
- a. a group 4a.
b. a proton b.
c. a molecule c.
d. an atom d.
5. A chemical change always involves _____.
- a. a separation of molecules 5a.
b. a breakdown of molecules b.
c. a loss of energy c.
d. a change in properties d.
6. The basic unit of a compound is _____.
- a. an atom 6a.
b. a nucleus b.
c. a molecule c.
d. a radical d.
7. An example of a compound is _____.
- a. H_3O^+ 7a.
b. H_2 b.
c. H_3 c.
d. H_2O d.
8. An example of a mixture is _____.
- a. salt water 8a.
b. sodium bicarbonate b.
c. hot water c.
d. sodium chloride d.
9. In these choices the *inorganic* compound is _____.
- a. C_2H_6 9a.
b. C_6H_5OH b.
c. CO_2 c.
d. $C_6H_{12}O_6$ d.
10. Organic compounds are produced by the _____.
- a. lithosphere 10a.
b. biosphere b.
c. hydrosphere c.
d. asthenosphere d.



1. As the temperature of a phase increases, so does the _____ of its molecules.
- kinetic energy
 - potential energy
 - mass
 - density
2. Evidence of the kinetic molecular nature of matter is _____.
- a chemical reaction
 - a nuclear reaction
 - a phase change
 - diffusion
3. A graph of Boyle's law relationship is _____.
- 
 - 
 - 
 - 
4. A mathematical statement of Boyle's law is _____.
- $P = kV$
 - $V = kP$
 - $P + V = k$
 - $P \cdot V = k$
5. Charles's law describes the relationship between _____ in a gas.
- pressure and volume
 - pressure and temperature
 - volume and temperature
 - pressure, volume, and temperature
6. A mathematical statement of Charles's law is _____.
- $VT = k$
 - $V = kT$
 - $V + T = k$
 - $V + k = T$
7. A correct statement of the combined gas law is _____.
- $P_1V_1T_1 = P_2V_2T_2$
 - $\frac{P_1}{V_1T_1} = \frac{P_2}{V_2T_2}$
 - $\frac{V_1}{P_1T_1} = \frac{V_2}{P_2T_2}$
 - $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
8. In Boyle's law, Charles's law, and combined gas law, temperatures are given in degrees _____.
- Fahrenheit
 - Celsius
 - centigrade
 - Kelvin
9. Avogadro's hypothesis deals with the _____ in equal volumes of gas.
- energy
 - number of particles
 - masses
 - molecular weights
10. If the atomic mass of oxygen is 15.9994, one mole of O_2 is _____.
- 15.9994 amu
 - 15.9994 grams
 - 7.9997 grams
 - 31.9988 grams

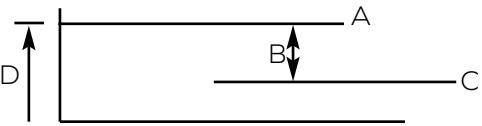


1. Until late in the nineteenth century, the atomic model resembled _____.
 - a. a marble
 - b. a raisin pudding
 - c. a solar system
 - d. a cloud
2. Experiments by Geiger, Mardsen, and Rutherford yielded the _____ atomic model.
 - a. plum pudding
 - b. quantum
 - c. planetary
 - d. wave-particle
3. 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, ${}_{33}^{76}\text{As} \longrightarrow {}_{-1}^0\text{e} + \text{X}$, 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). 1a.
a. one b.
b. two c.
c. three d.
d. four
2. Three NO_3^- ions will combine with _____ Al^{+3} ion (s). 2a.
a. one b.
b. two c.
c. three d.
d. four
3. The term that best describes electronegativity is _____. 3a.
a. atomic charge b.
b. nuclear mass c.
c. attracting ability d.
d. electron cloud
4. A hybrid bond is a mixture of different types of _____. 4a.
a. compounds b.
b. isotopes c.
c. elements d.
d. orbitals
5. If atoms with similar electronegativities form a bond, the bond would most likely be _____. 5a.
a. a polar bond b.
b. a covalent bond c.
c. an ionic bond d.
d. a metallic bond
6. Electron transfer occurs with _____ bonds. 6a.
a. ionic b.
b. covalent c.
c. metallic d.
d. hydrogen
7. Compounds whose components have a high difference in electronegativity have a high percent _____ character. 7a.
a. ionic b.
b. covalent c.
c. metallic d.
d. hydrogen
8. Bonding electrons that are free to wander are characteristic of _____ bonds. 8a.
a. ionic b.
b. covalent c.
c. metallic d.
d. hydrogen
9. A molecule that is electrically lopsided is _____. 9a.
a. polar b.
b. elongated c.
c. symmetrical d.
d. nonpolar
10. The polar compound is _____. 10a.
a. AlCl_3 b.
b. H_2 c.
c. CCl_4 d.
d. H_2O



1. These occurrences are manifestations of chemical reactions *except* _____.
- the change in color of leaves in autumn
 - the rusting of iron
 - the freezing of water
 - the burning of wood
2. The phenomenon that accompanies every chemical reaction is _____.
- a change in temperature
 - a change in color
 - the evolution of gas
 - the formation of a solid
3. Energy tied up in chemical bonds are called _____.
- momentum
 - entropy
 - enthalpy
 - kinesis
4. In the enthalpy diagram the heat of reaction is designated by _____.
- A
 - B
 - C
 - D
- 
5. If additional reactant is added to a reversible reaction, the result would be _____.
- the reaction goes to completion
 - the amount of products equals the amount of reactants
 - the reaction reaches equilibrium
 - 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 _____.
- H_2O is removed
 - NH_3 is removed
 - NO is added
 - O_2 is removed
7. Equilibrium in a reversible reaction requires that _____.
- the reaction equation must be balanced
 - concentrations on both sides must be equal
 - rate of the reverse reaction
 - the moles of products must be equal the moles of reactants
8. A factor that will decrease the rate of an exothermic reaction is _____.
- the addition of a catalyst
 - an increase of reactants
 - addition of heat
 - a decrease of products
9. Raising the temperature of a reaction increases the rate of reaction, but does *not* increase the _____.
- activation energy requirements
 - number of collisions
 - vibrational motions within the molecules
 - average velocity of the reacting particles
10. A correct statement about collision geometry, concentration, and catalyst is _____.
- increasing the concentration of reactants increases the collisions
 - a catalyst raises the activation energy requirements
 - the fastest reaction in a reaction mechanism determines the overall rate of reaction
 - 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 M 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 $\text{Cu} + \text{Cl}_2 \longrightarrow \text{CuCl}_2$, _____.
- a. copper is oxidized
 - b. chlorine is oxidized
 - c. oxidation occurs without reduction
 - d. neither oxidation nor reduction occurs



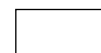
1. The element that characterizes organic compounds is _____.
- a. hydrogen
 - b. carbon
 - c. oxygen
 - d. nitrogen
2. The combustion of methane (CH_4) yields _____.
- a. CH_4OH
 - b. COOH
 - c. H_2O_2 and CO
 - d. H_2O and CO_2
3. Carbon is _____.
- a. a metal
 - b. a nonmetal
 - c. an inert gas
 - 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_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_nH_{2n}
 - b. C_nH_n
 - c. $\text{C}_n\text{H}_{2n-2}$
 - d. $\text{C}_n\text{H}_{2n+2}$

1. In the reaction, $\text{CH}_4 + \text{Cl}_2 \longrightarrow \text{CH}_3\text{Cl} + \text{X}$, X is _____.
- CH_3Cl
 - CCl_4
 - CCl_2
 - HCl
2. The type of reaction shown in Item 1 is _____.
- a substitution
 - an addition
 - a transformation
 - a hydrogenation
3. In the reaction, $\text{C}_6\text{H}_6 + 2\text{Cl}_2 \longrightarrow 2\text{HCl} + \text{X}$, X is _____.
- H_2Cl_2
 - C_6Cl_4
 - $\text{C}_6\text{H}_4\text{Cl}_2$
 - CH_2
4. The ring structure of unsaturated hydrocarbons is called the _____ ring.
- ethane
 - pentane
 - phosgene
 - benzene
5. Organic compounds with the OH^- group are _____.
- ketones
 - alcohols
 - alkanes
 - esters
6. In the reaction, $m\text{CO} + n\text{H}_2 \longrightarrow p\text{CH}_3\text{OH}$ (where m , n , and p are integers), the value of n is _____.
- 1
 - 2
 - 3
 - 4
7. Amides are the basic structural element in the long-chain molecules that make up _____.
- proteins
 - fats
 - alcohols
 - water
8. The general structural formula for an amine is _____.
- $$\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{H} \\ | \\ \text{H} \end{array}$$
 - $$\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C}=\text{C} \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$$
 - $$\begin{array}{c} \text{R} \\ \diagdown \\ \text{N}-\text{H} \\ / \\ \text{R} \end{array}$$
 - $$\begin{array}{c} \text{H} \\ \diagdown \\ \text{N}-\text{H} \\ / \\ \text{H} \end{array}$$
9. Proteins are composed of _____.
- aldehyde acids
 - amides
 - benzenes
 - amino acids
10. Amino acids are to proteins as _____.
- raisins are to puddings
 - links are to chains
 - gas is to balloons
 - 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

- 1a.
b.
c.
d.
- 2a.
b.
c.
d.
- 3a.
b.
c.
d.
- 4a.
b.
c.
d.
- 5a.
b.
c.
d.
- 6a.
b.
c.
d.
- 7a.
b.
c.
d.
- 8a.
b.
c.
d.
- 9a.
b.
c.
d.
- 10a.
b.
c.
d.



1. A quantity that has magnitude only is _____.
- a. vector 1a.
 b. scalar b.
 c. tensor c.
 d. visor d.
2. Of the following quantities the only scalar is _____.
- a. momentum 2a.
 b. velocity b.
 c. acceleration c.
 d. distance d.
3. The vector sum of 3 newtons and 4 newtons _____.
- a. is 1 newton 3a.
 b. is 7 newtons b.
 c. is 5 newtons c.
 d. cannot be determined from the given information d.
4. The scalar sum of 3 newtons and 4 newtons _____.
- a. is 1 newton 4a.
 b. is 7 newtons b.
 c. is 5 newtons c.
 d. cannot be determined from the given information d.
5. Traveling 30 kilometers per hour, a train travels 10 kilometers in _____.
- a. 3 hours 5a.
 b. 10 hours b.
 c. 20 minutes c.
 d. 30 minutes d.
6. A point on the earth's equator (25,000 miles in circumference) travels approximately _____ in three hours.
- a. 0 miles 6a.
 b. 3,000 miles b.
 c. 25,000 miles c.
 d. 186,000 miles d.
7. Units of acceleration are _____.
- a. $\frac{\text{km}}{\text{sec}}$ 7a.
 b. $\frac{\text{miles}}{\text{hour}}$ b.
 c. $\frac{\text{kg} \cdot \text{m}}{\text{sec}^2}$ c.
 d. $\frac{\text{feet/hour}}{\text{sec}}$ d.
8. Acceleration is defined as a time rate of change of _____.
- a. displacement 8a.
 b. distance b.
 c. velocity c.
 d. speed d.
9. An early atomic model was _____.
- a. the solar system 9a.
 b. a water wave b.
 c. a magnet c.
 d. a tree d.
10. A word that best describes *field* is _____.
- a. value 10a.
 b. class b.
 c. line c.
 d. pole d.



1. Acceleration is produced by _____.
- a. velocity 1a.
 b. momentum b.
 c. impulse c.
 d. inertia d.
2. Momentum is expressed as _____.
- a. $m \cdot v$ 2a.
 b. $m \cdot a$ b.
 c. $f \cdot t$ c.
 d. mgh d.
3. Inertia is a good term to summarize _____.
- a. Newton's first law of motion 3a.
 b. Newton's second law of motion b.
 c. Newton's third law of motion c.
 d. Newton's law of gravitation d.
4. A planet stays in orbit primarily because of _____.
- a. centrifugal force 4a.
 b. magnetic and electrostatic forces b.
 c. centripetal force and Newton's first law c.
 d. Newton's third law d.
5. An unalterable property of an object is its _____.
- a. momentum 5a.
 b. mass b.
 c. weight c.
 d. velocity d.
6. A measure of a planet's gravitational field on a nearby object is its _____.
- a. mass 6a.
 b. distance from the planet b.
 c. weight c.
 d. density d.
7. If a pitched baseball has a momentum of 10 units, its momentum when hit back to the pitcher might be _____ units.
- a. 10 7a.
 b. 20 b.
 c. -10 c.
 d. 0 d.
8. Two boxcars have a momenta of A units and B units, respectively. After coupling the momentum of the two boxcars will be _____.
- a. $A + B$ 8a.
 b. 0 b.
 c. $A - B$ c.
 d. $\frac{A+B}{2}$ d.
9. Kepler's concept of the universe was most like that of _____.
- a. Galileo 9a.
 b. Aristotle b.
 c. Brahe c.
 d. Ptolemy d.
10. An advantage Galileo had over Copernicus and Brahe was _____.
- a. superior intelligence 10a.
 b. the telescope b.
 c. painstaking technique c.
 d. financial support d.

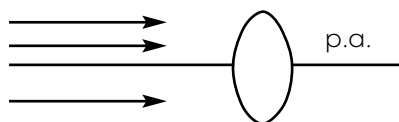


1. The ability to do work is _____.
- a. momentum
 - b. inertia
 - c. force
 - d. energy
2. The form of energy in falling water is _____.
- a. electrical
 - b. mechanical
 - c. chemical
 - d. solar
3. At the bottom of its swing, a pendulum has 10 units of kinetic energy. At each of the high points of 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 1a.
b. a pulse 1b.
c. an epoch 1c.
d. a splash 1d.
2. Longitudinal waves cannot be _____.
- a. reflected 2a.
b. refracted 2b.
c. diffracted 2c.
d. polarized 2d.
3. The period of a wave is the reciprocal of its _____.
- a. velocity 3a.
b. amplitude 3b.
c. frequency 3c.
d. wave length 3d.
4. An equation relating velocity, frequency, and wave length is _____.
- a. $v = \frac{f}{w}$ 4a.
b. $V = fw$ 4b.
c. $v = \frac{w}{f}$ 4c.
d. $f = vw$ 4d.
5. When a wave meets a barrier, the angle of incidence equals the angle of _____.
- a. reflection 5a.
b. refraction 5b.
c. diffraction 5c.
d. polarization 5d.
6. The bending of waves as they pass through a hole in a barrier is _____.
- a. reflection 6a.
b. refraction 6b.
c. diffraction 6c.
d. polarization 6d.
7. Standing waves result from _____.
- a. interference of identical waves 7a.
b. interference of unequal wave lengths 7b.
c. refraction of a wave front 7c.
d. polarization of dissimilar waves 7d.
8. During resonance, a vibrating object sets up in a second object vibrations that _____.
- a. destroy the second object 8a.
b. are of higher frequency than those in the first object 8b.
c. are of lower frequency 8c.
d. are equal in frequency 8d.
9. The Doppler effect occurs _____.
- a. when the wave generator is moving 9a.
b. for sound waves only 9b.
c. for transverse waves only 9c.
d. for very high frequencies only 9d.
10. When electrons travel faster than light, _____.
- a. a red light occurs 10a.
b. a blue light occurs 10b.
c. no light occurs 10c.
d. they evaporate 10d.

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

1a. b. c. d. 2a. b. c. d. 3a. b. c. d. 4a. b. c. d. 5a. b. c. d. 6a. b. c. d. 7a. b. c. d. 8a. b. c. d. 9a. b. c. d. 10a. b. c. d.

1. The contribution of William Gilbert was the _____.
- a. measurement of the electron charge 1a.
 b. discovery of the atomic nucleus b.
 c. invention of the cathode ray tube c.
 d. discovery of electrical charges d.
2. A positive charge on an object is caused by _____.
- a. an excess of protons 2a.
 b. an excess of electrons b.
 c. a deficiency of protons c.
 d. a deficiency of electrons d.
3. The law of attraction can be stated as _____.
- a. $Q = cv$ 3a.
 b. $E = \frac{F}{q}$ b.
 c. $E = mc^2$ c.
 d. $F = K \frac{Q_1 Q_2}{r^2}$ d.
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 4a.
 b. four b.
 c. three c.
 d. two d.
5. The space around a charge or a pole in which a force is experienced is called a _____.
- a. force line 5a.
 b. domain b.
 c. test charge c.
 d. field d.
6. Electric fields normally present in the air are generally _____.
- a. dangerous 6a.
 b. oblique in direction b.
 c. horizontal in direction c.
 d. vertical in direction d.
7. The formula that relates voltage, distance, and electric field is _____.
- a. $V = \frac{E}{d}$ 7a.
 b. $d = \frac{E}{V}$ b.
 c. $E = \frac{V}{d}$ c.
 d. $V = \frac{d}{E}$ d.
8. A charge accelerating in an electric field is losing _____.
- a. momentum 8a.
 b. velocity b.
 c. potential energy c.
 d. kinetic energy d.
9. The electric field strength E is measured as _____.
- a. force per unit mass 9a.
 b. force times mass b.
 c. charge per unit force c.
 d. force per unit charge d.
10. The *ideal* 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 10a.
 b. charged object with an unknown mass b.
 c. neutral object of no mass c.
 d. charged object of no mass d.



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 _____ ohms.
- 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. $F_m = K \frac{r^2}{M_1 M_2}$
 - 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. $F_m = Bq$
 - 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





Alpha Omega
PUBLICATIONS

804 N. 2nd Ave. E.
Rock Rapids, IA 51246-1759

800-622-3070
www.aop.com

SD002 – Sep '19 Printing

ISBN 978-0-7403-0046-2



9 780740 300462