Name: _____ **Class:** _____ **Date:** _____ **ID: A**

APS Practice Final 2011

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. A scientific theory is an explanation that
a. has been published in a journal or book.
b. predicts what will happen.
c. has been tested by many observations.
d. a scientist has tested with an experiment.

____ 2. Scientific theories can be changed or replaced when
a. new technology is invented.
b. new discoveries are made.
c. scientists decide to work on different problems.
d. scientists make models of events or objects.

____ 3. A series of logical steps that is followed in order to solve a problem is called the
a. experimental process.
b. scientific theory.
c. scientific method.
d. model method.

____ 4. The first step in the scientific method is usually
a. making an observation.
b. forming a hypothesis.
c. collecting data.
d. testing a hypothesis.

____ 5. Scientists test a hypothesis by
a. formulating questions.
b. designing models.
c. doing experiments.
d. drawing conclusions.

____ 6. What does it mean to say that “no experiment is a failure”?
a. All experiments are observations of real events.
b. All experiments yield the desired results.
c. All experiments give scientists work to do.
d. All experiments involve manipulating variables.

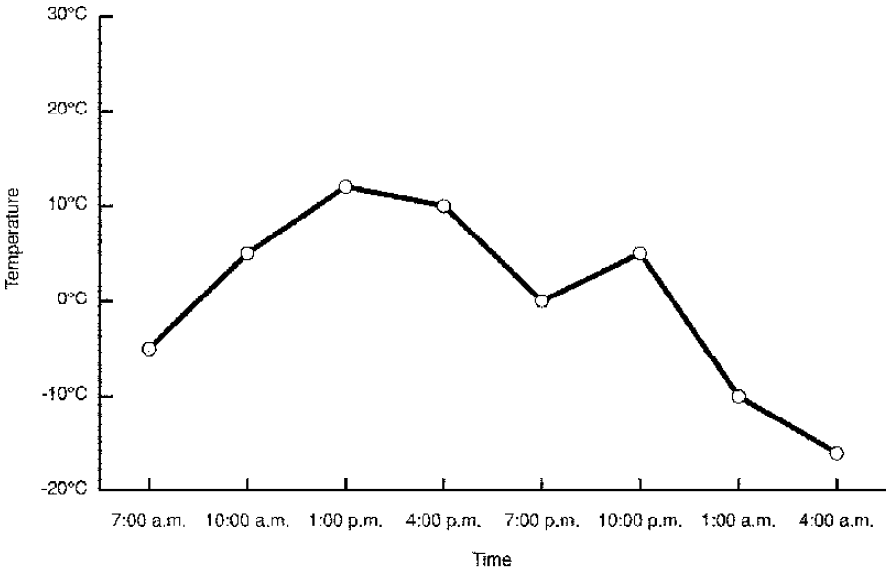
____ 7. The SI unit for measuring temperature is the
a. degree.
b. kelvin.
c. mole.
d. ampere.

____ 8. Which SI prefix means one million?
a. kilo-
b. mega-
c. giga-
d. milli-

____ 9. Which SI prefix means one one-hundredth $(1/100)$?
a. nano-
b. micro-
c. milli-
d. centi-

____ 10. Maria is 123 centimeters tall. Her height in meters is
a. 0123 m.
b. 0.123 m.
c. 1.23 m.
d. 12.3 m.

____ 11. The force with which gravity pulls on a quantity of matter is referred to as
a. mass.
b. length.
c. volume.
d. weight.



Temperature Measured Over Time

____ 12. At which time of day was the temperature approximately 5°C?
a. 9:00 A.M.
b. 10:00 A.M.
c. 11:00 A.M.
d. 12:00 P.M.

____ 13. The decimal equivalent of 10^{-2} is
a. 100.
b. 10.
c. 0.1.
d. 0.01.

____ 14. What is 78,900,000,000 expressed in scientific notation?
a. 789×10^9
b. 7.89×10^9
c. 7.89×10^{10}
d. 7.89×10^{11}

____ 15. You are asked to find the area of a room that is 4.56 m long and 5.668 m wide. How many significant figures should you show in your answer?
a. 3
b. 5
c. 6
d. 7

____ 16. You are asked to find the volume of a cube that is 2.5 cm high, 2.65 cm wide, and 3.456 cm long. How many significant figures should you show in your answer?
a. 1
b. 2
c. 3
d. 4

____ 17. Matter is defined as anything that
a. can be seen and touched.
b. has mass and takes up space.
c. can be weighed.
d. contains kinetic or potential energy.

____ 18. The science of what matter is made of and how it changes is called
a. chemistry.
b. physics.
c. kinetics.
d. engineering.

____ 19. A substance that cannot be broken down into simpler substances is
a. a compound.
b. a mixture.
c. an element.
d. an atom.

____ 20. A molecule of water (H_2O) is made from _____ combining two hydrogen atoms and one oxygen atom.
a. physically
b. ionically
c. thermally
d. chemically

____ 21. You put 1 gram of salt into 1 liter of water and stir. The resulting liquid is an example of
a. a pure substance.
b. a heterogeneous mixture.
c. a homogeneous mixture.
d. an immiscible mixture.

____ 22. The chemical symbol for sulfuric acid is H_2SO_4. How many atoms are contained in each molecule of sulfuric acid?
a. 3
b. 5
c. 6
d. 7

____ 23. Which of the following is an example of a gas-liquid mixture?
a. the air we breathe
b. a carbonated drink
c. a helium balloon
d. ice cubes

____ 24. Which state of matter will hold its shape without a container?
a. solid
b. liquid
c. gas
d. plasma

____ 25. A physical property of gold is its
a. density.
b. reactivity with powerful acids.
c. non-flammability.
d. None of the above

____ 26. Which of the following is *not* an example of a physical property?
a. freezing point
b. boiling point
c. reactivity
d. density

____ 27. Lead has a density of 11.3 g/cm^3 and a mass of 282.5 g. What is its volume?
a. 2.5 cm^3
b. 25 cm^3
c. 250 cm^3
d. 2500 cm^3

____ 28. Which of the following is an example of a physical change?
a. dissolving salt in water
b. burning wood into charcoal
c. cooking an egg
d. rusting iron

____ 29. The process of a liquid becoming a gas is called
a. sublimation.
b. condensation.
c. evaporation.
d. freezing.

____ 30. The process of a liquid becoming a solid is called
a. condensation.
b. freezing.
c. evaporation.
d. melting.

____ 31. The only state of matter that is *not* a fluid is
a. water.
b. gas.
c. liquid.
d. solid.

____ 32. Which state of matter has a definite volume, but not shape?
a. plasma
b. gas
c. liquid
d. solid

____ 33. What determines the speed of the atoms and molecules of a particular substance?
a. size of the atoms and molecules
b. temperature of the substance
c. Both (a) and (b)
d. None of the above

____ 34. Archimedes' principle states that the buoyant force on a(n) _____ is equal to the weight of the displaced volume of fluid.
a. object in the fluid
b. object floating on the fluid
c. fluid mixing with another liquid
d. substance dissolving into the fluid

____ 35. When ice melts to form water, energy
a. is created.
b. is destroyed.
c. is released.
d. is absorbed.

____ 36. The change of a substance from a solid directly to a gas is called
a. condensation.
b. evaporation.
c. melting.
d. sublimation.

____ 37. Which statement is true according to Dalton's theory?
a. Atoms of different elements can join to form larger atoms.
b. Atoms can be subdivided into smaller particles.
c. Atoms of the same element differ in electric charge.
d. Atoms of the same element are exactly alike.

____ 38. Which statement about the atomic nucleus is correct?
a. The nucleus is made of protons and neutrons and has a negative charge.
b. The nucleus is made of protons and neutrons and has a positive charge.
c. The nucleus is made of electrons and has a positive charge.
d. The nucleus is made of electrons and has a negative charge.

____ 39. The charge of an electron is
a. –2.
b. –1.
c. 0.
d. +1.

____ 40. According to Bohr's model of the atom, electrons behave like
a. planets orbiting the sun.
b. waves on a vibrating string.
c. light energy in a vacuum.
d. planets rotating on their axes.

____ 41. According to Bohr's theory, an electron's path around the nucleus defines its
a. electric charge.
b. atomic mass.
c. energy level.
d. speed.

____ 42. The order of elements in the periodic table is based on
a. the number of protons in the nucleus.
b. the electric charge of the nucleus.
c. the number of neutrons in the nucleus.
d. atomic mass.

____ 43. Atoms of elements that are in the same group have the same number of
a. protons.
b. neutrons.
c. valence electrons.
d. protons and neutrons.

____ 44. Valence electrons determine an atom's
a. mass.
b. chemical properties.
c. electric charge.
d. period.

____ 45. Ionization refers to the process of
a. changing from one period to another.
b. losing or gaining protons.
c. turning lithium into fluorine.
d. losing or gaining electrons.

____ 46. Oxygen's atomic number is 8. This means that an oxygen atom has
a. eight neutrons in its nucleus.
b. a total of eight protons and neutrons.
c. eight protons in its nucleus.
d. a total of eight neutrons and electrons.

____ 47. Which of the following elements is an alkali metal?
a. calcium
b. magnesium
c. mercury
d. sodium

____ 48. Alkali metals are extremely reactive because they
a. have very small atomic masses.
b. are not solids at room temperature.
c. have one valence electron that is easily removed to form a positive ion.
d. have two valence electrons that form compounds with calcium and magnesium.

____ 49. Which statement about noble gases is correct?
a. They form compounds with very bright colors.
b. They exist as single atoms rather than as molecules.
c. They are highly reactive with both metals and nonmetals.
d. They are extremely rare in nature.

____ 50. Most halogens form compounds by
a. gaining an electron to form a negative ion.
b. losing an electron to form a positive ion.
c. losing protons.
d. joining with both calcium and carbon.

____ 51. A mole is an SI base unit that describes the
a. mass of a substance.
b. amount of a substance.
c. volume of a substance.
d. electric charge of a substance.

____ 52. Avogadro's constant is defined as the number of particles in
a. one mole of a pure substance.
b. one liter of a pure substance.
c. one gram of a pure substance.
d. one kilogram of a pure substance.

____ 53. Molar mass is defined as
a. the number of particles in 1 mole of a substance.
b. the SI base unit that describes the amount of a substance.
c. the amount of a substance necessary to have a positive charge.
d. the mass in grams of 1 mole of a substance.

____ 54. What is the mass in grams of 0.75 mol of sulfur, which has a molar mass of approximately 32 g/mol?
a. 16 g
b. 24 g
c. 32 g
d. 240 g

____ 55. You have 85.5 g of fluorine, which has a molar mass of approximately 19 g/mol. How many moles of fluorine do you have?
a. 4.5 mol
b. 19 mol
c. 45 mol
d. 85 mol

____ 56. The forces that hold different atoms or ions together are
a. electric currents.
b. chemical bonds.
c. physical bonds.
d. nuclear forces.

____ 57. A compound differs from a mixture because it
a. always remains frozen even at high temperatures.
b. is formed from two cations.
c. always contains the same elements in the same proportion.
d. can form only in the presence of heat energy.

____ 58. Each molecule of hydrochloric acid, HCl, contains one atom of hydrogen and
a. one atom of chlorine.
b. one atom of oxygen.
c. two atoms of chlorine.
d. two atoms of oxygen.

____ 59. Each molecule of table sugar, $C_{12}H_{22}O_{11}$, contains
a. 0 atoms of carbon.
b. 1 atom of carbon.
c. 6 atoms of carbon.
d. 12 atoms of carbon.

____ 60. In which substance do the molecules have the strongest attractions to one another?
a. sugar, a solid
b. hydrogen, a gas
c. sulfuric acid, a liquid
d. water, a liquid

____ 61. Gases take up a lot of space because
a. they have weak chemical bonds.
b. their molecules have very little attraction for one another.
c. they contain very few atoms.
d. they have a small molar mass.

____ 62. When two hydrogen atoms bond, the positive nucleus of one atom attracts the
a. negative nucleus of the other atom.
b. positive electron of the other atom.
c. negative electron of the other atom.
d. positive nucleus of the other atom.

____ 63. An ionic bond is a bond that forms between
a. ions with opposite charges.
b. atoms with neutral charges.
c. one atom’s nucleus and another atom’s electrons.
d. the electrons of two different atoms.

____ 64. Covalent bonds are formed between
a. ions.
b. metal atoms.
c. nonmetal atoms.
d. compounds.

____ 65. In which type of bond do atoms share electrons?
a. covalent bonds
b. metallic bonds
c. ionic bonds
d. polyatomic bonds

____ 66. The name *dinitrogen tetroxide* tells you that this compound contains
a. two nitrogen atoms and two oxygen atoms.
b. four nitrogen atoms and two oxygen atoms.
c. two nitrogen atoms and four oxygen atoms.
d. four nitrogen atoms and four oxygen atoms.

____ 67. Fe_2O_3 is named *iron (III) oxide* because it contains
a. three oxygen atoms.
b. Fe^{3+} ions.
c. three iron atoms.
d. O^{3+} ions.

____ 68. When copper combines with oxygen to form copper (II) oxide, the charge of the copper ion is
a. Cu^{1+}.
b. Cu^{2+}.
c. Cu^{3+}.
d. Cu^{4+}.

____ 69. When nickel combines with fluorine to form nickel (III) fluoride, the charge of the nickel ion is
a. Ni^{1+}.
b. Ni^{2+}.
c. Ni^{3+}.
d. Ni^{4+}.

____ 70. The name for the compound with the formula $CuBr_2$ would be written as
a. copper(II) bromide.
b. copper(I) bromide.
c. copper bromine.
d. copper(III) bromide.

____ 71. The name for the compound with the formula Cr_2O_3 would be written as
a. chromium(I) oxide.
b. chromium(II) oxide.
c. chromium oxygen.
d. chromium(III) oxide.

____ 72. A carbon atom can bond to four other atoms because it has
a. four different cations.
b. four valence electrons.
c. two inner energy levels.
d. no protons in its nucleus.

____ 73. A change in the color of a solution is a sign that
a. a chemical change is taking place.
b. a physical change has just occurred.
c. oxygen is present.
d. organic chemicals are present.

____ 74. What happens in a chemical reaction?
a. Atoms are destroyed.
b. Atoms are created.
c. Molecules are created.
d. Atoms are rearranged.

____ 75. In an exothermic reaction, energy is transferred from
a. the reactants to the surroundings.
b. the surroundings to the reactants.
c. one reactant to another.
d. the container to the chemicals.

____ 76. Which statement about endothermic reactions is correct?
a. Energy is always created in the form of heat.
b. Energy is transferred from the surroundings to the reactants.
c. Energy is used to force electrons to move to higher energy levels.
d. Energy is transferred from the reactants to the surroundings.

____ 77. A synthesis reaction is a reaction between at least two compounds in which
a. one breaks down into at least two products.
b. a compound is decomposed by an electric current.
c. a compound burns in the presence of oxygen.
d. a new, more complex compound is formed.

____ 78. Which of the following is an example of a decomposition reaction?
a. photosynthesis
b. digestion
c. polymerization
d. exchange of ions between two compounds

____ 79. The product of the synthesis reaction between sodium and chlorine gas is
a. polyethylene.
b. carbon dioxide.
c. sodium chloride.
d. copper (II) chloride.

____ 80. A chemical equation is balanced by changing or adding
a. chemical symbols.
b. subscripts.
c. coefficients.
d. reactants.

____ 81. In the reaction $2H_2O \rightarrow 2H_2 + O_2$, if you start with 2 mol of water, how many moles of hydrogen gas are produced?
a. 1 mol
b. 2 mol
c. 3 mol
d. 4 mol

____ 82. In the reaction $2H_2O_2 \rightarrow 2H_2O + O_2$, if you start with 4 mol of H_2O_2, how many moles of O_2 will you end up with?
a. 4 mol
b. 3 mol
c. 2 mol
d. 1 mol

____ 83. If you start with 5 mol of O_2 in the reaction $2Mg + O_2 \rightarrow 2MgO$, how many moles of Mg will you need?
a. 4 mol
b. 5 mol
c. 8 mol
d. 10 mol

____ 84. In the reaction $H_2S + 2O_2 \rightarrow H_2SO_4$, the law of definite proportions predicts that for every mole of H_2S you will need how many moles of O_2?
a. 1 mol
b. 2 mol
c. 3 mol
d. 4 mol

____ 85. In a balanced chemical reaction, the total mass of the products always equals the
a. molar mass of the reactants.
b. atomic mass of the reactants.
c. total mass of the reactants.
d. proportional masses of the reactants.

____ 86. In order to determine speed, you must know
a. time.
b. distance.
c. Both (a) and (b)
d. None of the above

____ 87. What is the speed of an object at rest?
a. 15 km/h
b. 0 km/h
c. 1 km/h
d. This cannot be determined without further information.

____ 88. The difference between speed and velocity is that velocity includes
a. direction.
b. distance.
c. time.
d. weight.

____ 89. Acceleration is defined as the change in velocity divided by
a. speed.
b. final velocity.
c. time.
d. distance.

____ 90. The SI unit for acceleration is
a. mph.
b. ft/s^2.
c. m/s^2.
d. $\Delta v / t$.

____ 91. On a velocity-time graph, a line with a negative slope indicates that the object is
a. speeding up.
b. slowing down.
c. not moving.
d. traveling at a constant speed.

____ 92. When the velocity of an object changes, it is acted upon by a(n)
a. force.
b. inertia.
c. momentum.
d. deceleration.

____ 93. The combination of all of the forces acting on an object is called the
a. total force.
b. union of forces.
c. super force.
d. net force.

____ 94. If the net force on an object is zero then the object has
a. reaction forces.
b. action forces.
c. balanced forces.
d. unbalanced forces.

____ 95. A tug-of-war that results in one team pulling the other across the line is an example of
a. action forces.
b. reaction forces.
c. balanced forces.
d. unbalanced forces.

____ 96. Friction is defined as
a. force that opposes motion between two surfaces that are touching.
b. rate at which velocity changes.
c. resistance of an object to a change in its velocity.
d. speed of an object in a particular direction.

____ 97. Which of the following situations best demonstrates the effects of friction?
a. a parachutist descending to the ground
b. a loaded slingshot
c. an apple falling from a tree
d. two trucks colliding

____ 98. An object is in motion when
a. you observe the object move.
b. the object's speed increases.
c. the object's displacement is greater than the distance traveled.
d. the object changes position relative to a stationary reference point.

____ 99. If you divide momentum by velocity, the result is the value of the object's
a. mass.
b. direction.
c. energy.
d. speed.

____ 100. Whenever an object is standing still, the value(s) that is/are always zero is/are
a. speed.
b. velocity.
c. momentum.
d. All of the above

____ 101. A 10.0 kg dog chasing a rabbit north at 6.0 m/s has a momentum of
a. 0.6 kg • m/s.
b. 60.0 kg • m/s north.
c. 60.0 m/s.
d. 60.0 kg/s.

____ 102. If you are given the mass of an object in pounds, the time in seconds, and the distance in feet, what must you do before you can calculate the momentum in SI units?
a. convert the mass to kilograms
b. convert the distance to meters
c. Both (a) and (b)
d. None of the above

____ 103. Weight is best described as
a. an object's resistance to acceleration.
b. what causes an object to fall.
c. the downward force exerted on objects due to gravity.
d. a force solely dependent on an object's mass.

____ 104. Of the following, the greatest gravitational force would occur between
a. a marble and a baseball 5 meters apart.
b. a loaded freighter on the high seas and Earth.
c. the moon and an astronaut standing on the moon.
d. the moon and Earth.

____ 105. The law that states that the unbalanced force acting on an object equals the object's mass times its acceleration is
a. Newton's first law of motion.
b. Newton's second law of motion.
c. Newton's third law of motion.
d. the law of conservation of momentum.

____ 106. The SI unit of force, named for the scientist who described the relationship between motion and force, is called the
a. newton.
b. einstein.
c. curie.
d. pasteur.

____ 107. One pound is equal to how many newtons?
a. 4.448 N
b. 2.2 N
c. 0.225 N
d. 12.5 N

____ 108. Which of the following units is used to measure acceleration in free fall?
a. m/s
b. m • s
c. m/s^2
d. m^2/s^2

____ 109. What is the reaction force when you place a cup on a table?
a. the force of the cup on the table
b. the force of the table on the cup
c. the force of gravity on the table
d. the force of gravity on the cup

____ 110. A boy pushes on a parked car with a force of 200 N. The car does not move. How much work does the boy do on the car?
a. 200 N
b. 200 J
c. zero
d. can't be determined

____ 111. What are the units of work?
a. J
b. N•m
c. $kg•m^2/s^2$
d. All of the above

____ 112. Which of the following processes requires the most work?
a. A 10 kg weight rests on a table.
b. A person holds a 1 kg weight still with outstretched arms.
c. A person lifts a 1 kg weight 1 m off the floor.
d. A 10 kg ball is rolled across the floor at a constant speed for a distance of 10 m.

____ 113. A man pushes a crate along a factory floor by exerting a force of 55 N. If the crate moves a distance of 4.0 m, how much work does the man perform?
a. 165 N
b. 220 N
c. zero
d. 145 J

____ 114. What are the units of power?
a. watts
b. horsepower
c. joules per second
d. All of the above

____ 115. A weightlifter presses a 400 N weight 0.5 m over his head in 2 seconds. What is the power of the weightlifter?
a. 100 N
b. 25 watts
c. 400 watts
d. 100 watts

____ 116. A machine is a device that
a. requires less work to do a given task.
b. decreases the amount of work done by a given force.
c. increases energy.
d. can multiply and change the direction of an input force.

____ 117. Which of the following statements about work and energy is not true?
a. When work is done, energy is transferred or transformed.
b. Energy may be defined as the ability to do work.
c. Work and energy are always equal.
d. Work and energy have the same units.

____ 118. What is the gravitational potential energy of a 55 kg box that is 8.0 m above the ground?
a. 5500 J
b. 3400 J
c. 4300 J
d. 550 J

____ 119. Gravitational potential energy depends on the
a. the mass of the object.
b. the height of the object.
c. the acceleration due to gravity.
d. All of the above

____ 120. A medicine ball has a mass of 5 kg and is thrown with a speed of 2 m/s. What is its kinetic energy?
a. 100 J
b. 10 J
c. 2000 J
d. 500 J

____ 121. Which of the following is an example of mechanical energy?
a. nuclear energy
b. chemical energy
c. potential energy
d. light energy

____ 122. The kind of energy associated with atomic bonds is
a. nuclear energy.
b. light energy.
c. chemical energy.
d. kinetic energy.

____ 123. A pendulum is swinging back and forth and has a kinetic energy of 400 J at a particular point in its path. Which of the following statements is *not* true?
a. Both the kinetic and potential energy are decreasing.
b. The minimum kinetic energy is zero.
c. When the kinetic energy is zero, the potential energy will be 400 J greater.
d. The potential energy increases when the kinetic energy decreases.

____ 124. An object weighing 75 N is dropped from the top of a building and falls a distance of 28 m to the ground. How much work does gravity do on the object from the time it is dropped to the time it hits the ground?
a. zero
b. 75 J
c. 2100 J
d. 4625 J

____ 125. Batteries typically have
a. two positive terminals.
b. two negative terminals.
c. one positive and one negative terminal.
d. no terminals.

____ 126. Current is the rate at which charges move through a(n)
a. conductor.
b. insulator.
c. voltage.
d. joule.

____ 127. The brightness of a light bulb is determined by its filament's
a. voltage.
b. amperes.
c. watts.
d. resistance.

____ 128. The SI unit of resistance is the
a. volt.
b. ampere.
c. ohm.
d. joule.

____ 129. A flashlight bulb with a potential difference of 4.5 V across its filament has a power output of 8.0 W. How much current is in the bulb filament?
a. 3.7 A
b. 1.8 A
c. 0.23 A
d. 0.56 A

____ 130. What is the potential difference across a resistor that dissipates 5.00 W of power and has a current of 5.0 A?
a. 1.0 V
b. 125 V
c. 4.00 V
d. 0.20 V

____ 131. There is a potential difference of 12 V across a resistor with 0.25 A of current in it. The resistance of the resistor is
a. 48 Ω.
b. 24 Ω.
c. 12 Ω.
d. 0.021 Ω.

____ 132. A 13 Ω resistor has 0.050 A of current in it. What is the potential difference across the resistor?
a. 6.5 V
b. 0.65 V
c. 0.065 V
d. 0.0065 V

____ 133. A resistor has a resistance of 280 Ω. How much current is in the resistor if there is a potential difference of 120 V across the resistor?

a. 160 A
c. 0.12 A
b. 0.43 A
d. 2.3 A

____ 134. A set of electric trains are powered by a 9V battery. What is the resistance of the trains if they draw 3.0 A of current?

a. 3 Ω
c. 27 Ω
b. 0.03 Ω
d. 2.7 Ω

Completion

Complete each statement.

135. The results of Rutherford's gold foil experiment demonstrated that the _____ occupies a very small amount of the total space inside an atom.

136. Protons and _____ are found in the nucleus of an atom.

137. Neutrons and _____ have almost the same mass.

138. The nuclei of isotopes contain different numbers of _____.

139. The _____ of an isotope is the sum of the number of protons and neutrons in its nucleus.

140. When an atom gains or loses energy, some of its _____ may move between energy levels.

141. The region in which an electron is most likely to be found is called a(an) _____.

142. The atomic mass unit (amu) is defined as one twelfth the mass of a(an) _____–12 atom.

143. Hydrogen does not have the typical properties of a metal. However, hydrogen is located above Group 1A because it has one _____.

144. In an electron dot diagram, each dot represents a(an) _____.

145. The chemical formula for calcium chloride, $CaCl_2$, shows that the compound contains two _____ ions for every _____ ion.

146. KBr is the formula for an ionic compound. The fact that neither symbol is followed by a subscript means that there is a(an) _____ ratio of ions in the compound.

147. The general formula for a synthesis reaction is _____.

148. In a(n) _____ reaction, the reactants are broken down into other substances.

149. In a combustion reaction, _____ is used to make reactants burn.

150. Balance the following chemical equation by filling in the correct coefficient on the right-hand side. $H_2 + Cl_2 \rightarrow$ _____ HCl

151. Balance the following chemical equation by filling in the correct coefficients. _____ KI + $Br_2 \rightarrow$ _____ KBr + I_2

152. Single-replacement reactions can take place with nonmetals. In the following equation, assume that A and C are nonmetals and B is a metal. Complete the following general equation for the replacement of a nonmetal in a compound by another nonmetal: A + BC → _____.

153. Velocity describes both speed and _____.

154. Acceleration is the rate at which _____ changes.

155. Acceleration can be determined from a velocity-time graph by calculating the _____.

156. The tendency of an object at rest to remain at rest, or if moving, to continue moving at a constant velocity is _____.

157. The total momentum of objects before a collision _____ the total momentum of the objects after a collision.

158. The _____ of an object remains constant while its _____ varies according to the gravitational force it experiences.

159. The stored energy resulting from the relative positions of objects in a system is called _____.

160. The energy of a moving object due to its motion is called _____.

161. The sum of the kinetic and potential energy of large-scale objects in a system is called _____.

162. “Energy cannot be created or destroyed” is a statement of the law of _____.

Short Answer

163. How do molecules in a solid differ from those in a liquid or gas?

164. How is the density of an object calculated?

165. Compare the shape and volume of solids, liquids, and gases.

166. If a gas has a volume of 1 L at a pressure of 270 kPa, what volume will it have when the pressure is increased to 540 kPa? Assume the temperature and number of particles are constant.

167. If an atom has 34 protons and 40 neutrons, what is its mass number?

168. If an atom of an element has a mass number of 32 and 20 neutrons in its nucleus, what is the atomic number of the element?

169. If an atom of tin has a mass number of 118 and an atomic number of 50, how many neutrons are in its nucleus?

170. What determines an element's chemical properties?

171. Are covalent bonds more likely to be found in compounds containing both metals and nonmetals or compounds containing only nonmetals?

172. In potassium bromide, KBr, which element forms anions?

173. How do you know that magnesium is the more metallic element in the compound magnesium oxide, MgO?

174. A student balanced the chemical equation $Mg + O_2 \rightarrow MgO$ by writing $Mg + O_2 \rightarrow MgO_2$. Was the equation balanced correctly? Explain your answer. If the equation was not balanced correctly, write the correctly balanced equation.

175. How many moles of nitrogen are contained in 4.20×10^{24} atoms of nitrogen?

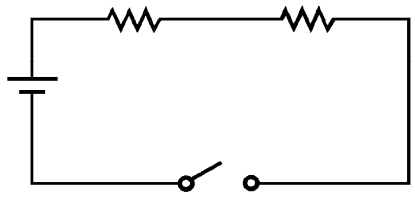
176. How many grams of O_2 are in 5.0 mol of the element?

177. What are the products of the double-replacement reaction between potassium chloride and silver acetate?

178. Explain why a cyclist accelerates when turning a corner even if her speed doesn't change.

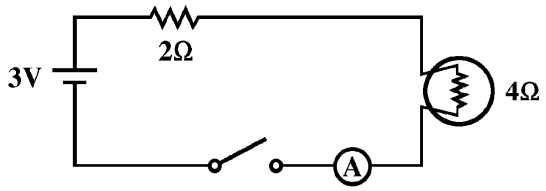
179. You are pushing a heavy crate across a cement floor when you hit a section of flooring covered with smooth steel plates. Suddenly it is somewhat easier to push the crate. Why?

180. Which has greater momentum, a small pick-up truck traveling at 55 km/h or a full-sized bus traveling at the same speed?

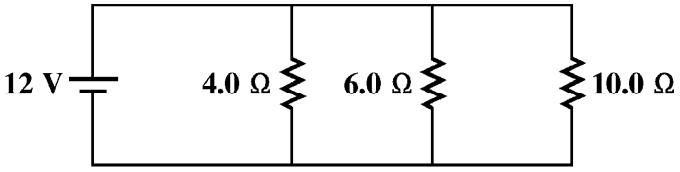


181. Identify the types of elements in the schematic diagram above and the number of each type.

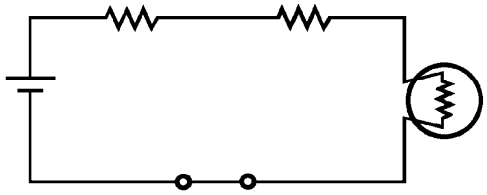
182. Draw a schematic diagram that contains three identical resistors and one battery in a series circuit.



183. Is a current flowing in the schematic diagram above? Explain your answer.



184. Does the schematic diagram above represent a series or parallel circuit?



185. Does the schematic diagram above represent a series or parallel circuit?

186. What effect does decreased resistance have on a circuit?

Problem

187. 375 cm equals _____ m.

188. 5675 g equals _____ kg.

189. In scientific notation, the number 46,500,000 would be written _____.

190. Calculate the density of a sample of gas with a mass of 30 g and volume of 7500 cm^3.

191. Calculate the mass of a solid with a density of 14.2 g/cm^3 and volume of 350 cm^3.

192. Calculate the volume of a liquid with a density of 1.7 g/ml and a mass of 144.5 g.

193. Use the periodic table to determine the molar mass of the element listed. Round the molar mass to two places to the right of the decimal. scandium _____ g/mol

194. Use the periodic table to determine the molar mass of the element listed. Round the molar mass to two places to the right of the decimal. zinc _____ g/mol

195. The molar mass of nitrogen is 14.01 g/mol. The mass of 0.20 mol of nitrogen is _____ g.

196. The molar mass of palladium is 106.42 g/mol. Therefore, 53.2 g of palladium contains _____ mol.

197. Balance the following chemical equation.
$Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2 + H_2O$

198. During a race, a sprinter increases from 5.0 m/s to 7.5 m/s over a period of 1.25 s. What is the sprinter's average acceleration during this period?

199. During a race, a runner runs at a speed of 6 m/s. 2 seconds later, she is running at a speed of 10 m/s. What is the runner's acceleration? Show your work.

200. If you ride your bike at an average speed of 4 km/h and need to travel a total distance of 28 km, how long will it take you to reach your destination? Show your work.

201. A large truck loaded with scrap steel weighs 14 metric tons and is traveling north on the interstate heading for Chicago. It has been averaging 48 km/h for the journey and has traveled over 1450 km so far. It has just stopped to refuel. What is its current momentum?

202. A 2.5 kg box is sliding along a level floor. It is slowing down at a rate of 0.45 m/s^2. What is the force of friction the floor is exerting on the box?

203. Calculate the horizontal force that must be applied to a 1300 kg vehicle to give it an acceleration of 2.6 m/s^2 on a level road.

204. A tow truck exerts a net horizontal force of 1050 N on an 760-kilogram car. What is the acceleration of the car during this time? Show your work.

205. The mass of a newborn baby is 3.5 kilograms. What is the baby's weight? (The acceleration due to gravity at Earth's surface is 9.8 m/s^2.) Show your work.

206. A 38-kilogram canoe broke free of its dock and is now floating downriver at a speed of 2.2 m/s. What is the canoe's momentum? Show your work.

207. A small engine causes a 0.3-kg model airplane to accelerate at a rate of 11 m/s^2. What is the net force on the model airplane? Show your work.

208. A worker uses a cart to move a load of bricks weighing 680 N a distance of 10 m across a parking lot. If he pushes the cart with a constant force of 209 N, what amount of work does he do? Show your work.

209. A girl lifts a 160-N load a height of 1 m in a time of 0.5 s. What power does the girl produce? Show your work.

210. A force of 11 N is applied to the handle of a screwdriver being used to pry off the lid of a paint can. As the input force moves through a distance 0.3 m, the screwdriver does 3 J of work on the lid. What is the efficiency of the screwdriver? Show your work.

211. What is the kinetic energy of a 72.0-kg sky diver falling at a terminal velocity of 79.0 m/s? Show your work.

212. A 0.47-kg squirrel jumps from a tree branch that is 3.5 m high to the top of a bird feeder that is 1.2 m high. What is the change in gravitational potential energy of the squirrel? (The acceleration due to gravity is 9.8 m/s^2.) Show your work.

213. There is a potential difference of 13 V across a resistor with 1.4 A of current in it. What is the resistance of the resistor?

214. A 180 Ω resistor has 0.10 A of current in it. What is the potential difference across the resistor?

215. A resistor has a resistance of 1.8 Ω. How much current is in the resistor if there is a potential difference of 3.0 V across the resistor?

216. If a 75 W light bulb operates at a voltage of 120 V, what is the current in the bulb?

Essay

217. A sample of calcium contains calcium-40, calcium-44, calcium-42, calcium-48, calcium-43, and calcium-46 atoms. Explain why these atoms can have different mass numbers but must have the same atomic number.

218. What does it mean to say that some elements are reactive and form ions easily whereas others do not?

219. What is the difference between the compounds Fe_2O_3 and FeO? Why are they not both called simply iron oxide?

220. How is an electron dot diagram a useful model for focusing on the chemical properties of an element?