CHAPTER 1 -- MATTER, ENERGY, AND MEASUREMENT

Student: _____

1. Which of the following is matter?
A. the light of a flame
B. the sound of thunder
C. the air you are breathing
D. none of these is matter

2. Which of the following is not matter?
A. the air in your lungs
B. the blood in your arteries
C. the sunlight coming through the window
D. none, all of these are matter

3. Which of the following is a chemical property of water?
A. ice floats
B. water boils at 100°C
C. water reacts violently with sodium
D. all of these are chemical properties

4. Which of the following is a chemical property of gold?
A. its characteristic color
B. its electrical conductivity
C. its lack of reactivity
D. none, they are all physical properties

5. Which of the following is not a physical property of gold?
A. its characteristic color
B. its density
C. its electrical conductivity
D. none, they are all physical properties

6. Which of the following is not a chemical process?
A. rusting of a car body
B. ripening of fruit
C. souring of milk
D. none, all of these are chemical processes

7. Which of the following describe a physical change?
A. stretching a silver wire
B. tarnishing of silver
C. both a and b
D. neither a nor b

8. Which of the following describe a physical change?
A. boiling water
B. decomposition of a dead organism
C. both a and b
D. neither a nor b

9. Which of the following describe a physical change?
A. burning of fuel oil
B. melting of ice
C. both a and b
D. neither a nor b

10. Which of the following is synonymous with “fact”?
A. a hypothesis
B. an observation which is reproducible
C. an observation which is not reproducible
D. none of these

11. Which of the following is true of a hypothesis?
A. It is a tentative idea or explanation which can be disproven by an experiment.
B. It is a tentative idea or explanation which can be proven by an experiment.
C. It is a tentative idea which can either be proven or disproven by an experiment.
D. It is a belief which is asserted without proof.

12. Which of the following best describes a scientific theory?
A. It is just one of many ways of looking at things.
B. It is a point of view which cannot be challenged.
C. It is a widely accepted explanation of some phenomena supported by a large amount of experimental data and is therefore definitely correct.
D. It is a widely accepted explanation of some phenomena supported by a large amount of experimental data, but it can be shown to be incorrect by a single experiment which yields results which contradict it.

13. The quotation, "Chance favors the prepared mind," is attributed to the great French scientist Louis Pasteur. This most closely means which of the following?
A. A careful experimenter will obtain reliable results.
B. A careful experimenter will sometimes make an unexpected but significant observation.
C. Intense study is required to obtain good examination grades.
D. Nothing can be accomplished without appropriate preparation.

14. The area of Africa is approximately 11.7 million square miles. Which of the following is the correct way to express this number in scientific notation?
A. 1.17×10^5
B. 1.17×10^6
C. 1.17×10^7
D. none of these

15. During its orbit the earth's maximum distance from the sun is approximately 152 million kilometers. Which of the following is the correct way to express this number in scientific notation?
A. 1.52×10^5
B. 1.52×10^6
C. 1.52×10^7
D. 1.52×10^8

16. In one second light travels 2.998×10^8 meters. Which of the following is the correct way to write this in conventional notation?
A. 0.00000002998 meters/second
B. 2,998,000 meters/second
C. 299,800,000 meters/second
D. none of these

17. The population of the earth at the end of 2008 was approximately 6.7×10^9 people. Which of the following is correct way to represent this number?
A. 6,700,000,000
B. 67,000,000,000
C. 67,000,000,000,000
D. none of these

18. The land surface area of the earth is approximately 1.49×10^8 km^2. Which of the following is the correct way to write this in conventional notation?
A. 0.00000000149 km^2
B. 149,000,000 km^2
C. 14,900,000,000 km^2
D. none of these

19. Sometimes the same word can have different meanings. In the United States the word billion means "a thousand million" but in Britain the word billion means "a million million." Which of the following corresponds to the "British Billion"?
A. 1×10^{-9}
B. 1×10^{-6}
C. 1×10^9
D. 1×10^{12}

20. Nanoparticles which have a length of approximately 1×10^{-9} meters. Which of the following is the correct way to write this in conventional notation?
A. 0.0000000001 meters
B. 0.000000001 meters
C. 10,000,000 meters
D. 1,000,000,000 meters

21. Which of the following is the largest number?
A. 2×10^{-1}
B. 5×10^3
C. 3×10^4
D. 7×10^{-6}

22. Which of the following is the smallest number?
A. 5×10^{3}
B. 3×10^{4}
C. 2×10^{-5}
D. 7×10^{-6}

23. Given the calculation: 4.238 + 12.72 + 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 26.058
B. 26.06
C. 26.0
D. 26.1

24. Given the calculation: 4.877 + 12.87 + 9.19 = ? What is the answer reported to the correct number of significant figures?
A. 26.937
B. 26.93
C. 26.94
D. 26.9

25. Given the calculation: 4.238 + 12.72 - 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 7.858
B. 7.86
C. 7.8
D. 7.9

26. Given the calculation: 17.72 - 4.232 - 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 4.388
B. 4.38
C. 4.39
D. 4.4

27. Given the calculation: 4.238 x 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 38.5658
B. 38.57
C. 38.6
D. 39

28. Given the calculation: 1.987 x 6.02 = ? What is the answer reported to the correct number of significant figures?
A. 11.96174
B. 11.96
C. 12.0
D. 12

29. Given the calculation: 15.72/9.16 = ? What is the answer reported to the correct number of significant figures?
A. 1.71616
B. 1.7162
C. 1.716
D. 1.72

30. Given the calculation: 17.712/7.610 = ? What is the answer reported to the correct number of significant figures?
A. 2.32746
B. 2.3275
C. 2.327
D. 2.33

31. Given the calculation: $(6.49 \times 10^{7}) \times (7.1 \times 10^{5}) = ?$ What is the answer reported to the correct number of significant figures?
A. 4.6079×10^{13}
B. 4.6×10^{13}
C. 4.6×10^{2}
D. 4.6079×10^{2}

32. Given the calculation: $(7.22 \times 10^{-3}) \times (6.4 \times 10^{7}) = ?$ What is the answer reported to the correct number of significant figures?
A. 4.6×10^{5}
B. 4.62×10^{5}
C. 4.620×10^{5}
D. 4.6208×10^{5}

33. Given the calculation: $(6.02 \times 10^{23})/12.00 = ?$ What is the answer reported to the correct number of significant figures?
A. 1.993×10^{-23}
B. 1.99×10^{-23}
C. 5.017×10^{22}
D. 5.02×10^{22}

34. Given the calculation: $(6.626 \times 10^{-34})/(9.63 \times 10^{7}) = ?$ What is the answer reported to the correct number of significant figures?
A. 1.453×10^{41}
B. 1.45×10^{41}
C. 6.88×10^{-42}
D. 6.882×10^{-42}

35. Which metric prefix is commonly abbreviated using a Greek letter?
A. mega
B. micro
C. milli
D. nano

36. In which of the following are the lengths given in the correct order?
A. cm > mm > m > km
B. cm > m > km > mm
C. km > m > cm > mm
D. mm > cm > m > km

37. In which of the following are the lengths given in the correct order?
A. cm < mm < m < ìm
B. cm < m < ìm < mm
C. ìm < mm < cm < m
D. ìm < m < cm < mm

38. How many millimeters (mm) are there in 1 kilometer (km)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

39. How many kilometers (km) are there in 1 millimeter (mm)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

40. How many microliters (ìL) are there in 1 liter (L)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

41. How many liters (L) are there in 1 microliter (ìL)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{1}

42. How many microliters (ìL) are there in 1 milliliter (mL)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

43. How many milliliters (mL) are there in 1 microliter (ìL)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

44. In the SI system of units the basic unit of volume is the cubic meter (m^3). A volume of 1 m^3 is equal to which of the following?
A. 1 liter
B. 10 liters
C. 100 liters
D. 1000 liters

45. The decimeter (dm) is 0.1 m. Sometimes the volume of a liquid is specified in units of cubic decimeters. Which of the following volumes equals 1 cubic decimeter?
A. 10ìL
B. 10 mL
C. 100 mL
D. 1000 mL

46. In the SI system of units the basic unit of volume is the cubic meter (m^3). The cubic meter is equal to which of the following?
A. 10^{3} mL
B. 10^{6} mL
C. 10^{9} mL
D. 10^{12} mL

47. The standard metric unit of volume, the liter, is equal to which of the following?
A. 1 cm^3
B. 10 cm^3
C. 100 cm^3
D. 1000 cm^3

48. In which of the following are the masses given in the correct order?
A. cg > mg > g >kg
B. cg > g > kg > mg
C. kg > g > cg > mg
D. mg > cg > g > kg

49. In which of the following are the masses given in the correct order?
A. cg < mg < g <ìg
B. cg < g < ìg < mg
C. ìg < mg < cg < g
D. ìg < g < cg < mg

50. How many kilograms (kg) are there in 1 milligram (mg)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

51. How many milligrams (mg) are there is 1 kilogram (kg)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{1}

52. How many millgrams (mg) are there in 1 microgram (ìg)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

53. How many micrograms (ìg) are there in 1 milligram (mg)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

54. An intern made an error and gave a patient a dose of 500 mg rather than 500 ìg of a drug. Which of the following is true?
A. the patient received an overdose by a factor of 1000
B. the patient received an overdose by a factor of 100
C. the patient received an underdose by a factor of 1000
D. the patient received an underdose by a factor of 100

55. An intern made an error and gave a patient a dose of 500 ìg rather than 500 mg of a drug. Which of the following is true?
A. The patient received an overdose by a factor of 1000.
B. The patient received an overdose by a factor of 100.
C. The patient received an underdose by a factor of 1000.
D. The patient received an underdose by a factor of 100.

56. How many seconds are in a 24 hour day? [Assume exactly 24 hours in a day]
A. 60
B. 1.44×10^{3}
C. 3.60×10^{3}
D. 8.64×10^{4}

57. How many minutes are in a 30 day month? [Assume exactly 24 hours in a day]
A. 7.20×10^{2}
B. 4.32×10^{4}
C. 2.59×10^{6}
D. 3.11×10^{7}

58. How many minutes are in a 365 day year? [Assume exactly 24 hours in a day]
A. 8.760×10^{3}
B. 2.190×10^{4}
C. 5.256×10^{5}
D. 3.154×10^{7}

59. What temperature on the Celsius is the same as normal body temperature 98.6°F?
A. 34.3°C
B. 37.0°C
C. 119.9°C
D. none of these

60. Daytime temperatures in the desert can reach 45.0°C. What is this temperature on the Fahrenheit temperature scale?
A. 90.0°F
B. 113°F
C. 121°F
D. none of these

61. The lowest temperature ever recorded on earth was -128.6°F. What is this temperature on the Celsius temperature scale?
A. -57.3°C
B. -89.2°C
C. -174°C
D. -289°C

62. At what temperature do the temperatures on the Celsius and Fahrenheit scales have the same numerical value?
A. - 40
B. 0
C. 32
D. at no value

63. At what temperature do the temperatures on the Celsius and Kelvin scales have the same numerical value?
A. - 40
B. 0
C. 32
D. at no value

64. What centigrade temperature is the same as 77.0°F?
A. 25.0°C
B. 74.8°C
C. 106.6°C
D. none of these

65. The boiling point of octane is 126°C. What is this temperature on the Fahrenheit scale?
A. 52.2°F
B. 102°F
C. 259°F
D. 284°F

66. The boiling point of liquid nitrogen is 77K. What is this temperature on the centigrade scale?
A. 350°C
B. 171°C
C. 25°C
D. -196°C

67. What is the metric length of the 100 yard dash? [1 inch = 2.54 cm (exactly)]
A. 9.14 cm
B. 25.4 cm
C. 91.4 m
D. 254 m

68. One long distance Olympic race is the 10,000 meter run. Which of the following is most nearly the length of this run in feet? [1 meter is slightly longer than 39 inches]
A. 6.09×10^3 feet
B. 6.22×10^3 feet
C. 1.00×10^4 feet
D. 3.28×10^4 feet

69. The length of an American football field is 100 yards. Which of the following is most nearly this distance expressed in meters? [1 meter is slightly longer than 39 inches]
A. 9.14 meters
B. 10.9 meters
C. 91.4 meters
D. 109 meters

70. A common piece of laboratory glassware is a 125 mL beaker. What is this volume in the English system of units? [1 quart = 0.946 liter = 32 fl oz]
A. 0.423 fl oz
B. 0.423 quarts
C. 4.23 fl oz
D. 4.23 quarts

71. A certain automobile has an 18 gallon gas tank. What is the volume of this tank in liters? [1 gallon = 4 quarts, 1 quart = 0.946 liter]
A. 4.3 liters
B. 4.8 liters
C. 68 liters
D. 76 liters

72. If you went into a cheese shop in Edam, Holland and wanted to buy approximately 1 pound of Edam cheese which of the following would you ask for?
A. 0.25 kg
B. 0.5 kg
C. 2 kg
D. 4 kg

73. A Frenchman in New York wants to buy approximately a kilo of cheese. How much cheese should he ask for?
A. 1/4 lb.
B. 1/2 lb.
C. 2 lb.
D. 4 lb

74. What is the mass of a quarter pound hamburger, expressed in the metric system? [1 pound = 453.6 grams]
A. 113 mg
B. 113 g
C. 1814 g
D. 0.1814 kg

75. An object weighs 75.7 kg. What is the weight of this object expressed in the English system? [1 pound = 453.6 grams]
A. 16.7 pounds
B. 167 pounds
C. 343 pounds
D. 34.3 pounds

76. If gasoline costs $1.95 per gallon is its cost per liter? [1 quart = 0.946 liter]
A. 5.15 cents
B. 51.5 cents
C. 73.9 cents
D. 7.39 cents

77. A particular model of hybrid car can travel 53.0 miles/gallon of gas. What is this fuel efficiency expressed in the metric system? [1 quart = 0.946 liter; 1 mile = 1.609 km]
A. 8.71 km/liter
B. 20.2 km/liter
C. 22.5 km/liter
D. 90 km/liter

78. A studio apartment in Paris has an area of 75 square meters. A New York apartment with which of the following areas most closely has the same area as the Paris apartment? [1 meter = 1.094 yards]
A. 90 square feet
B. 270 square feet
C. 675 square feet
D. 810 square feet

79. If a 1.0 L bottle of champagne cost 134 Euros and the exchange rate is 1 Euro = $1.33 (US), what is the cost in dollars for 8.0 fluid ounces of this champagne? [1 fluid ounce = 29.57 mL]
A. $5.26
B. $42.15
C. $47.09
D. $81.31

80. In Europe the area of apartments are typically given in square meters (m^2). If the area of an American apartment is 900 square feet, a Paris apartment with which of the following areas most closely has the same area as the New York apartment? [1 meter = 1.094 yards]
A. 27 m^2
B. 30 m^2
C. 84 m^2
D. 90 m^2

81. The area of Europe is 1.05×10^7 km^2. Which of the following shapes has an area most nearly equal to the area of Europe? [1 mile = 1.609 km]
A. a rectangle 2000 miles by 1000 miles
B. a rectangle 2000 miles by 1500 miles
C. a square 2000 miles on a side
D. none of these

82. The unit of weight used for precious stones is the carat (1 carat = 200 mg, exactly). If a particular 1.25 carat diamond cost $7000, what is the cost of a collection of identical diamonds which weighs 1.00 ounce? [1 ounce = 28.35 grams]
A. $28,000
B. $35,000
C. $15,876
D. $793,800

83. At the 2008 Olympics the Jamaican runner Usain Bolt ran the 100 meter dash in world record time of 9.69 seconds. What is this speed in miles per hour?
[1 mile = 1.609 km]
A. 2.31 mph
B. 4.33 mph
C. 23.1 mph
D. 43.3 mph

84. At the 2008 Olympics the Jamaican runner Usain Bolt ran the 200 meter dash in world record time of 19.30 seconds. What is this speed in miles per hour? [1 mile = 1.609 km]
A. 43.1 mph
B. 23.2 mph
C. 4.31 mph
D. 2.32 mph

85. At the 2008 Olympics the Jamaican runner Shelly Ann Fraser ran the 100 meter dash in world record time of 10.78 seconds. What is this speed in miles per hour?
[1 mile = 1.609 km]
A. 2.08 mph
B. 4.81 mph
C. 20.8 mph
D. 48.1 mph

86. At the 2008 Olympics the Ethiopian runner Kenisa Bekele won 1×10^4 meter run in 27 minutes, 1.17 seconds. What is this speed in miles per hour?
[1 mile = 1.609 km]
A. 1.38 mph
B. 2.30 mph
C. 12.3 mph
D. 13.8 mph

87. The dimensions of a room are typically given in feet, but carpeting is sold by the square yard. How many square yards of carpet are required to cover the floor of a room which is 12 feet by 18 feet?
A. 12 square yards
B. 18 square yards
C. 24 square yards
D. 216 square yards

88. A can of soda has a volume of 355 mL. The area of a circle is given as $A = \pi r^2$, where r is the radius of the circle, so the volume of the can is given by $V = (\pi r^2)h$, where h is the height of the can. If a particular can has a height of 12.2 cm what is the radius of the can?
A. 3.04 mm
B. 3.04 cm
C. 9.26 mm
D. 9.26 cm

89. The dimensions of a piece of wood are 2.8 meters x 14 cm x 120 mm. What is the volume of this piece of wood?
A. 4.7×10^3 mm^3
B. 4.7×10^3 cm^3
C. 4.7×10^4 cm^3
D. 4.7×10^3 m^3

90. Which state of matter is highly compressible?
A. solid
B. liquid
C. gas
D. none of them

91. Which state of matter retains its volume but adapts its shape to that of its container?
A. solid
B. liquid
C. gas
D. none of these

92. Which state of matter is essentially incompressible?
A. solid
B. liquid
C. gas
D. none of them

93. Which of the following describes the compressibility of liquids?
A. they are highly compressible
B. they are slightly compressible
C. they are virtually incompressible
D. any of these, depending on the liquid

94. Dry ice is called dry ice because it passes directly from the solid state to the gaseous state. Which of the following occurs during this transformation?
A. the chemical composition of dry ice changes
B. the volume of the sample decreases
C. the volume of the sample remains the same
D. the volume of the sample increases

95. Which of the following is true of ice, water and steam?
A. they are three different chemical substances
B. they are the same substance in different chemical states
C. they are the same substance in different physical states
D. they are the same substance in different chemical and physical states

96. Mercury is the only metal which is a liquid at room temperature. The density of mercury is 13.6 g/cm^3. What is the mass, in pounds, of 1.00 quart of mercury? [1 liter = 1.057 quart; 1 pound = 453.6 grams]
A. 0.0284 lb
B. 28.4 lb
C. 31.7 lb
D. 35.3 lb

97. Xenon is a gas found in some automobile headlights. The density of xenon at room temperature and pressure is 5.37 g/L. What is the mass, in pounds of 1.00 quart of xenon? [1 liter = 1.057 quart; 1 pound = 453.6 grams]
A. 0.0112 lb
B. 0.0125 lb
C. 79.9 lb
D. 89.3 lb

98. Which of the following is true of the relationship between density and specific gravity?
A. they have different numerical values and different units
B. they have the same numerical value and the same units
C. they have the same numerical value but specific gravity is dimensionless
D. they have the same units but different numerical values

99. The densities of the coinage metals (copper, silver and gold) are as follows:
copper = 8.95 g/cm^3
silver = 12.59 g/cm^3
gold = 19.32 g/cm^3
A sample of material is found to weigh 14.03 grams, and have a volume of 1.20 cm^3. This is a sample of which of the coinage metals?
A. copper
B. silver
C. gold
D. it is not one of the coinage metals

100. An unknown substance has a mass of 56.8 g and a volume of 23.4 mL. What is the density of this unknown substance?
A. 0.411 g/mL
B. 2.34 g/mL
C. 2.43 g/mL
D. 2.50 g/mL

101. Aluminum has a density of 2.70 g/ cm^3. What volume is occupied by a block of aluminum which weighs 4.32 kg?
A. 0.000625 cm^3
B. 0.625 cm^3
C. 1.60 cm^3
D. 1.60 L

102. Titanium has a density of 4.54 g/mL. What is the mass of 17.3 mL of titanium?
A. 3.81 g
B. 38.1 g
C. 78.5 g
D. 785 g

103. Iron has a density of 7.874 g/cm^3. What is the mass of a rectangular block of iron with dimensions of 3.000 cm by 4.000 cm by 5.000 cm?
A. 7.629 g
B. 60.00 g
C. 94.48 g
D. 472.4 g

104. Iron has a density of 7.874 g/cm^3. What is the volume of a block of iron which weighs 15.321 g?
A. 0.008289 cm^3
B. 0.5139 cm^3
C. 1.946 cm^3
D. 120.6 cm^3

105. Which of the following is true about specific gravity of a material?
A. it has units of g/mL
B. it is defined as the density of the material divided by the density of water
C. both a and b
D. neither a nor b

106. If specific gravities were defined by reference to oil (density = 0.89 g/mL) rather than water (density = 1.0 g/mL) which of the following would be true?
A. the specific densities of all materials would be larger than those given in tables in handbooks
B. the specific densities of all materials would be smaller than those given in tables in handbooks
C. the specific densities of some objects would be larger and of other objects would be smaller than those given in tables in handbooks
D. the question is meaningless since water is the only permissible reference material

107. A particular material has a specific gravity of 1.04 at 20°C. As this material is heated from 20°C to 30°C its volume increases faster than does the volume of water. Which of the following statements is true of the specific gravity of this material as it is heated to 30°C?
A. its specific gravity decreases
B. its specific gravity increases
C. its specific gravity remains the same
D. there is insufficient information to answer the question

108. What is the name of the instrument used to measure specific gravity?
A. densitometer
B. gravameter
C. hydrometer
D. spectrometer

109. Which of the following is the formula used to calculate the kinetic energy of a moving object?
A. K.E. = $1/2$ mv
B. K.E. = $1/2 mv^2$
C. K.E. = mv
D. K.E. = mv^2

110. Chemical energy is an example of which of the following?
A. kinetic energy
B. mechanical energy
C. potential energy
D. radiant energy

111. Nuclear energy is an example of which for the following?
A. kinetic energy
B. mechanical energy
C. potential energy
D. radiant energy

112. Which of the following is not a form of kinetic energy?
A. chemical energy
B. electrical energy
C. light energy
D. mechanical energy

113. Which of the following is a form of potential energy?
A. chemical energy
B. nuclear energy
C. both a and b
D. neither a nor b

114. Which of the following is true as a student slides down a waterslide?
A. her kinetic energy decreases
B. her potential energy increases
C. her total energy increases
D. none of the above

115. Which of the following is true as a student slides down a waterslide?
A. her kinetic energy increases
B. her potential energy decreases
C. her total energy remains constant
D. all of the above

116. The Law of Conservation of Energy states which of the following?
A. energy cannot be converted from one form to another
B. kinetic energy is conserved
C. potential energy is conserved
D. none of the above

117. The Law of Conservation of Energy states which of the following?
A. kinetic energy is conserved
B. potential energy is conserved
C. the sum of kinetic energy and potential energy is conserved
D. all of the above

118. Which of the following statements is true about a swinging pendulum?
A. its kinetic energy is greatest when it is vertical (at the midpoint of its swing)
B. its potential energy is greatest when it is vertical (at the midpoint of its swing)
C. its kinetic energy does not change as it swings
D. its potential energy does not change as it swings

119. Which of the following statements is true about a swinging pendulum?
A. its kinetic energy is greatest when it is at the extreme (the highest point) of its swing
B. its potential energy is greatest when it is at the extreme (the highest point) of its swing
C. its kinetic energy does not change as it swings
D. its potential energy does not change as it swings

120. Which of the following objects has the largest kinetic energy?
A. a 1.00 gram object moving at 1.0 cm/sec
B. a 0.25 gram object moving at 2.0 cm/sec
C. a 16.00 gram object moving at 0.25 cm/sec
D. they all have the same kinetic energy

121. Which of the following statements is true?
A. Both heat and temperature are forms of energy.
B. Neither heat nor temperature is a form of energy.
C. Heat is a form of energy, but temperature is not.
D. Temperature is a form of energy, but heat is not.

122. Which of the following is the smallest unit of heat?
A. calorie
B. Calorie
C. joule
D. kilojoule

123. Which of the following is the definition of the calorie?
A. the amount of heat required to heat 1.0 oz of water by 1.0°F
B. the amount of heat required to heat 1.0 oz of water by 1.0°C
C. the amount of heat required to heat 1.0 g of water by 1.0°F
D. the amount of heat required to heat 1.0 g of water by 1.0°C

124. Which of the following is true of the specific heat of water?
A. it is similar to that of other liquids
B. it is the same as that of ice and steam
C. it is unusually high
D. it is unusually low

125. How many calories of are required to heat 731 grams of water from 35°C to 83°C?
A. 15 cal
B. 731 cal
C. 2.6×10^4 cal
D. 3.5×10^4 cal

126. How many calories of are required to heat 139 grams of water from 15°C to 88°C?
A. 73 cal
B. 2.1×10^4 cal
C. 1.0×10^4 cal
D. 1.2×10^4 cal

127. The specific heat of ethanol is 0.58 cal /g·°C. How much energy is required to heat 60.0 g of ethanol from 25°C to 45°C?
A. 348 cal
B. 696 cal
C. 870 cal
D. 1566 cal

128. The specific heat of copper is 0.092 cal/g·°C. How much energy is required to heat 40.0 grams of copper from 25.0°C to 75.0°C?
A. 92 calories
B. 184 calories
C. 200 calories
D. 276 calories

129. The specific heat of lead is 0.0380 cal/g·°C. If 47.0 calories of energy raised the temperature of a lead sample from 28.3°C to 30.1°C what is the mass of the sample?
A. 26.1 g
B. 687 g
C. 1.24×10^3 g
D. 2.27×10^3 g

130. The specific heat of iron is 0.11 cal /g·°C. What will be the final temperature if 275 calories are added to a 75.0 piece of iron initially at 25°C?
A. 33°C
B. 36°C
C. 58°C
D. none of these

131. It required 88.2 calories to heat 14.3 g of an unknown substance from 24°C to 175°C. What is the specific heat of the unknown?
A. 0.245 cal /g·°C
B. 0.317 cal /g·°C
C. 0.408 cal /g·°C
D. none of these

132. The specific heat of iron is 0.11 cal /g·°C Assuming that no heat is lost during the experiment, what will be the final temperature if 30.0 grams of iron at 95°C are added to 100 grams of water at 25°C?
A. 23°C
B. 27°C
C. 52°C
D. 60°C

133. The specific heat of aluminum is 0.22 cal /g·°C Assuming that no heat is lost during the experiment, what will be the final temperature if 30.0 grams of aluminum at 95°C are added to 100 grams of water at 25°C?
A. 29°C
B. 33°C
C. 54°C
D. 60°C

134. On a stove we have two pots of boiling water. Pot 1 contains 1 liter of water and pot 2 contains 2 liters of water. Which of the following statements is true?
A. pot 2 is hotter than pot 1
B. pot 2 has a larger heat content than pot 1
C. both a and b
D. neither a nor b

135. If a certain amount of heat is added to a 30.0 gram sample of water the temperature of the sample increases from 27.0°C to 57.0°C. If this same amount of heat is added to a 90.0 gram sample of water initially at 40.0°C what will be the final temperature of the water?
A. 30°C
B. 50°C
C. 70°C
D. 90°C

136. A 10.0 gram sample of aluminum initially at 30.0°C is brought into contact with a 10.0 gram sample of iron originally at 60.0°C. Assuming that the heat is transferred from one metal to the other without any loss to the environment, what will be the final temperature of the metals? [the specific heat of aluminum = 0.22 cal/g·°C] [the specific heat of iron = 0.11 cal/g·°C]
A. 30.0°C
B. 40.0°C
C. 45.0°C
D. 60.0°C

CHAPTER 1 -- MATTER, ENERGY, AND MEASUREMENT
Key

1. Which of the following is matter?
A. the light of a flame
B. the sound of thunder
C. the air you are breathing
D. none of these is matter

2. Which of the following is not matter?
A. the air in your lungs
B. the blood in your arteries
C. the sunlight coming through the window
D. none, all of these are matter

3. Which of the following is a chemical property of water?
A. ice floats
B. water boils at 100°C
C. water reacts violently with sodium
D. all of these are chemical properties

4. Which of the following is a chemical property of gold?
A. its characteristic color
B. its electrical conductivity
C. its lack of reactivity
D. none, they are all physical properties

5. Which of the following is not a physical property of gold?
A. its characteristic color
B. its density
C. its electrical conductivity
D. none, they are all physical properties

6. Which of the following is not a chemical process?
A. rusting of a car body
B. ripening of fruit
C. souring of milk
D. none, all of these are chemical processes

7. Which of the following describe a physical change?
A. stretching a silver wire
B. tarnishing of silver
C. both a and b
D. neither a nor b

8. Which of the following describe a physical change?
A. boiling water
B. decomposition of a dead organism
C. both a and b
D. neither a nor b

9. Which of the following describe a physical change?
A. burning of fuel oil
B. melting of ice
C. both a and b
D. neither a nor b

10. Which of the following is synonymous with “fact”?
A. a hypothesis
B. an observation which is reproducible
C. an observation which is not reproducible
D. none of these

11. Which of the following is true of a hypothesis?
A. It is a tentative idea or explanation which can be disproven by an experiment.
B. It is a tentative idea or explanation which can be proven by an experiment.
C. It is a tentative idea which can either be proven or disproven by an experiment.
D. It is a belief which is asserted without proof.

12. Which of the following best describes a scientific theory?
A. It is just one of many ways of looking at things.
B. It is a point of view which cannot be challenged.
C. It is a widely accepted explanation of some phenomena supported by a large amount of experimental data and is therefore definitely correct.
D. It is a widely accepted explanation of some phenomena supported by a large amount of experimental data, but it can be shown to be incorrect by a single experiment which yields results which contradict it.

13. The quotation, "Chance favors the prepared mind," is attributed to the great French scientist Louis Pasteur. This most closely means which of the following?
A. A careful experimenter will obtain reliable results.
B. A careful experimenter will sometimes make an unexpected but significant observation.
C. Intense study is required to obtain good examination grades.
D. Nothing can be accomplished without appropriate preparation.

14. The area of Africa is approximately 11.7 million square miles. Which of the following is the correct way to express this number in scientific notation?
A. 1.17×10^5
B. 1.17×10^6
C. 1.17×10^7
D. none of these

15. During its orbit the earth's maximum distance from the sun is approximately 152 million kilometers. Which of the following is the correct way to express this number in scientific notation?
A. 1.52×10^5
B. 1.52×10^6
C. 1.52×10^7
D. 1.52×10^8

16. In one second light travels 2.998×10^8 meters. Which of the following is the correct way to write this in conventional notation?
A. 0.00000002998 meters/second
B. 2,998,000 meters/second
C. 299,800,000 meters/second
D. none of these

17. The population of the earth at the end of 2008 was approximately 6.7×10^9 people. Which of the following is correct way to represent this number?

A. 6,700,000,000
B. 67,000,000,000
C. 67,000,000,000,000
D. none of these

18. The land surface area of the earth is approximately 1.49×10^8 km^2. Which of the following is the correct way to write this in conventional notation?

A. 0.00000000149 km^2
B. 149,000,000 km^2
C. 14,900,000,000 km^2
D. none of these

19. Sometimes the same word can have different meanings. In the United States the word billion means "a thousand million" but in Britain the word billion means "a million million." Which of the following corresponds to the "British Billion"?

A. 1×10^{-9}
B. 1×10^{-6}
C. 1×10^9
D. 1×10^{12}

20. Nanoparticles which have a length of approximately 1×10^{-9} meters. Which of the following is the correct way to write this in conventional notation?

A. 0.0000000001 meters
B. 0.000000001 meters
C. 10,000,000 meters
D. 1,000,000,000 meters

21. Which of the following is the largest number?

A. 2×10^{-1}
B. 5×10^3
C. 3×10^4
D. 7×10^{-6}

22. Which of the following is the smallest number?
A. 5×10^{3}
B. 3×10^{4}
C. 2×10^{-5}
D. 7×10^{-6}

23. Given the calculation: 4.238 + 12.72 + 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 26.058
B. 26.06
C. 26.0
D. 26.1

24. Given the calculation: 4.877 + 12.87 + 9.19 = ? What is the answer reported to the correct number of significant figures?
A. 26.937
B. 26.93
C. 26.94
D. 26.9

25. Given the calculation: 4.238 + 12.72 - 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 7.858
B. 7.86
C. 7.8
D. 7.9

26. Given the calculation: 17.72 - 4.232 - 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 4.388
B. 4.38
C. 4.39
D. 4.4

27. Given the calculation: 4.238 x 9.1 = ? What is the answer reported to the correct number of significant figures?
A. 38.5658
B. 38.57
C. 38.6
D. 39

28. Given the calculation: 1.987 x 6.02 = ? What is the answer reported to the correct number of significant figures?
A. 11.96174
B. 11.96
C. 12.0
D. 12

29. Given the calculation: 15.72/9.16 = ? What is the answer reported to the correct number of significant figures?
A. 1.71616
B. 1.7162
C. 1.716
D. 1.72

30. Given the calculation: 17.712/7.610 = ? What is the answer reported to the correct number of significant figures?
A. 2.32746
B. 2.3275
C. 2.327
D. 2.33

31. Given the calculation: $(6.49 \times 10^{7}) \times (7.1 \times 10^{5}) = ?$ What is the answer reported to the correct number of significant figures?
A. 4.6079×10^{13}
B. 4.6×10^{13}
C. 4.6×10^{2}
D. 4.6079×10^{2}

32. Given the calculation: $(7.22 \times 10^{-3}) \times (6.4 \times 10^{7}) = ?$ What is the answer reported to the correct number of significant figures?
A. 4.6×10^{5}
B. 4.62×10^{5}
C. 4.620×10^{5}
D. 4.6208×10^{5}

33. Given the calculation: $(6.02 \times 10^{23})/12.00 = ?$ What is the answer reported to the correct number of significant figures?
A. 1.993×10^{-23}
B. 1.99×10^{-23}
C. 5.017×10^{22}
D. 5.02×10^{22}

34. Given the calculation: $(6.626 \times 10^{-34})/(9.63 \times 10^{7}) = ?$ What is the answer reported to the correct number of significant figures?
A. 1.453×10^{41}
B. 1.45×10^{41}
C. 6.88×10^{-42}
D. 6.882×10^{-42}

35. Which metric prefix is commonly abbreviated using a Greek letter?
A. mega
B. micro
C. milli
D. nano

36. In which of the following are the lengths given in the correct order?
A. cm > mm > m > km
B. cm > m > km > mm
C. km > m > cm > mm
D. mm > cm > m > km

37. In which of the following are the lengths given in the correct order?
A. cm < mm < m < ìm
B. cm < m < ìm < mm
C. ìm < mm < cm < m
D. ìm < m < cm < mm

38. How many millimeters (mm) are there in 1 kilometer (km)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

39. How many kilometers (km) are there in 1 millimeter (mm)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

40. How many microliters (ìL) are there in 1 liter (L)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

41. How many liters (L) are there in 1 microliter (ìL)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{1}

42. How many microliters (ìL) are there in 1 milliliter (mL)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

43. How many milliliters (mL) are there in 1 microliter (ìL)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

44. In the SI system of units the basic unit of volume is the cubic meter (m^3). A volume of 1 m^3 is equal to which of the following?
A. 1 liter
B. 10 liters
C. 100 liters
D. 1000 liters

45. The decimeter (dm) is 0.1 m. Sometimes the volume of a liquid is specified in units of cubic decimeters. Which of the following volumes equals 1 cubic decimeter?
A. 10ìL
B. 10 mL
C. 100 mL
D. 1000 mL

46. In the SI system of units the basic unit of volume is the cubic meter (m^3). The cubic meter is equal to which of the following?
A. 10^{3} mL
B. 10^{6} mL
C. 10^{9} mL
D. 10^{12} mL

47. The standard metric unit of volume, the liter, is equal to which of the following?
A. 1 cm^3
B. 10 cm^3
C. 100 cm^3
D. 1000 cm^3

48. In which of the following are the masses given in the correct order?
A. cg > mg > g >kg
B. cg > g > kg > mg
C. kg > g > cg > mg
D. mg > cg > g > kg

49. In which of the following are the masses given in the correct order?
A. cg < mg < g <ìg
B. cg < g < ìg < mg
C. ìg < mg < cg < g
D. ìg < g < cg < mg

50. How many kilograms (kg) are there in 1 milligram (mg)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{12}

51. How many milligrams (mg) are there is 1 kilogram (kg)?
A. 1×10^{-12}
B. 1×10^{-6}
C. 1×10^{6}
D. 1×10^{1}

52. How many millgrams (mg) are there in 1 microgram (ìg)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

53. How many micrograms (ìg) are there in 1 milligram (mg)?
A. 1×10^{-6}
B. 1×10^{-3}
C. 1×10^{3}
D. 1×10^{6}

54. An intern made an error and gave a patient a dose of 500 mg rather than 500 ìg of a drug. Which of the following is true?
A. the patient received an overdose by a factor of 1000
B. the patient received an overdose by a factor of 100
C. the patient received an underdose by a factor of 1000
D. the patient received an underdose by a factor of 100

55. An intern made an error and gave a patient a dose of 500 ìg rather than 500 mg of a drug. Which of the following is true?
A. The patient received an overdose by a factor of 1000.
B. The patient received an overdose by a factor of 100.
C. The patient received an underdose by a factor of 1000.
D. The patient received an underdose by a factor of 100.

56. How many seconds are in a 24 hour day? [Assume exactly 24 hours in a day]
A. 60
B. 1.44×10^{3}
C. 3.60×10^{3}
D. 8.64×10^{4}

57. How many minutes are in a 30 day month? [Assume exactly 24 hours in a day]
A. 7.20×10^{2}
B. 4.32×10^{4}
C. 2.59×10^{6}
D. 3.11×10^{7}

58. How many minutes are in a 365 day year? [Assume exactly 24 hours in a day]
A. 8.760×10^{3}
B. 2.190×10^{4}
C. 5.256×10^{5}
D. 3.154×10^{7}

59. What temperature on the Celsius is the same as normal body temperature 98.6°F?
A. 34.3°C
B. 37.0°C
C. 119.9°C
D. none of these

60. Daytime temperatures in the desert can reach 45.0°C. What is this temperature on the Fahrenheit temperature scale?
A. 90.0°F
B. 113°F
C. 121°F
D. none of these

61. The lowest temperature ever recorded on earth was -128.6°F. What is this temperature on the Celsius temperature scale?
A. -57.3°C
B. -89.2°C
C. -174°C
D. -289°C

62. At what temperature do the temperatures on the Celsius and Fahrenheit scales have the same numerical value?
A. - 40
B. 0
C. 32
D. at no value

63. At what temperature do the temperatures on the Celsius and Kelvin scales have the same numerical value?
A. - 40
B. 0
C. 32
D. at no value

64. What centigrade temperature is the same as 77.0°F?
A. 25.0°C
B. 74.8°C
C. 106.6°C
D. none of these

65. The boiling point of octane is 126°C. What is this temperature on the Fahrenheit scale?
A. 52.2°F
B. 102°F
C. 259°F
D. 284°F

66. The boiling point of liquid nitrogen is 77K. What is this temperature on the centigrade scale?
A. 350°C
B. 171°C
C. 25°C
D. -196°C

67. What is the metric length of the 100 yard dash? [1 inch = 2.54 cm (exactly)]
A. 9.14 cm
B. 25.4 cm
C. 91.4 m
D. 254 m

68. One long distance Olympic race is the 10,000 meter run. Which of the following is most nearly the length of this run in feet? [1 meter is slightly longer than 39 inches]
A. 6.09×10^3 feet
B. 6.22×10^3 feet
C. 1.00×10^4 feet
D. 3.28×10^4 feet

69. The length of an American football field is 100 yards. Which of the following is most nearly this distance expressed in meters? [1 meter is slightly longer than 39 inches]
A. 9.14 meters
B. 10.9 meters
C. 91.4 meters
D. 109 meters

70. A common piece of laboratory glassware is a 125 mL beaker. What is this volume in the English system of units? [1 quart = 0.946 liter = 32 fl oz]
A. 0.423 fl oz
B. 0.423 quarts
C. 4.23 fl oz
D. 4.23 quarts

71. A certain automobile has an 18 gallon gas tank. What is the volume of this tank in liters? [1 gallon = 4 quarts, 1 quart = 0.946 liter]
A. 4.3 liters
B. 4.8 liters
C. 68 liters
D. 76 liters

72. If you went into a cheese shop in Edam, Holland and wanted to buy approximately 1 pound of Edam cheese which of the following would you ask for?
A. 0.25 kg
B. 0.5 kg
C. 2 kg
D. 4 kg

73. A Frenchman in New York wants to buy approximately a kilo of cheese. How much cheese should he ask for?
A. 1/4 lb.
B. 1/2 lb.
C. 2 lb.
D. 4 lb

74. What is the mass of a quarter pound hamburger, expressed in the metric system? [1 pound = 453.6 grams]
A. 113 mg
B. 113 g
C. 1814 g
D. 0.1814 kg

75. An object weighs 75.7 kg. What is the weight of this object expressed in the English system? [1 pound = 453.6 grams]
A. 16.7 pounds
B. 167 pounds
C. 343 pounds
D. 34.3 pounds

76. If gasoline costs $1.95 per gallon is its cost per liter? [1 quart = 0.946 liter]
A. 5.15 cents
B. 51.5 cents
C. 73.9 cents
D. 7.39 cents

77. A particular model of hybrid car can travel 53.0 miles/gallon of gas. What is this fuel efficiency expressed in the metric system? [1 quart = 0.946 liter; 1 mile = 1.609 km]
A. 8.71 km/liter
B. 20.2 km/liter
C. 22.5 km/liter
D. 90 km/liter

78. A studio apartment in Paris has an area of 75 square meters. A New York apartment with which of the following areas most closely has the same area as the Paris apartment? [1 meter = 1.094 yards]
A. 90 square feet
B. 270 square feet
C. 675 square feet
D. 810 square feet

79. If a 1.0 L bottle of champagne cost 134 Euros and the exchange rate is 1 Euro = $1.33 (US), what is the cost in dollars for 8.0 fluid ounces of this champagne? [1 fluid ounce = 29.57 mL]
A. $5.26
B. $42.15
C. $47.09
D. $81.31

80. In Europe the area of apartments are typically given in square meters (m^2). If the area of an American apartment is 900 square feet, a Paris apartment with which of the following areas most closely has the same area as the New York apartment? [1 meter = 1.094 yards]
A. 27 m^2
B. 30 m^2
C. 84 m^2
D. 90 m^2

81. The area of Europe is 1.05×10^7 km^2. Which of the following shapes has an area most nearly equal to the area of Europe? [1 mile = 1.609 km]
A. a rectangle 2000 miles by 1000 miles
B. a rectangle 2000 miles by 1500 miles
C. a square 2000 miles on a side
D. none of these

82. The unit of weight used for precious stones is the carat (1 carat = 200 mg, exactly). If a particular 1.25 carat diamond cost $7000, what is the cost of a collection of identical diamonds which weighs 1.00 ounce? [1 ounce = 28.35 grams]
A. $28,000
B. $35,000
C. $15,876
D. $793,800

83. At the 2008 Olympics the Jamaican runner Usain Bolt ran the 100 meter dash in world record time of 9.69 seconds. What is this speed in miles per hour?
[1 mile = 1.609 km]
A. 2.31 mph
B. 4.33 mph
C. 23.1 mph
D. 43.3 mph

84. At the 2008 Olympics the Jamaican runner Usain Bolt ran the 200 meter dash in world record time of 19.30 seconds. What is this speed in miles per hour? [1 mile = 1.609 km]
A. 43.1 mph
B. 23.2 mph
C. 4.31 mph
D. 2.32 mph

85. At the 2008 Olympics the Jamaican runner Shelly Ann Fraser ran the 100 meter dash in world record time of 10.78 seconds. What is this speed in miles per hour?
[1 mile = 1.609 km]
A. 2.08 mph
B. 4.81 mph
C. 20.8 mph
D. 48.1 mph

86. At the 2008 Olympics the Ethiopian runner Kenisa Bekele won 1×10^4 meter run in 27 minutes, 1.17 seconds. What is this speed in miles per hour?
[1 mile = 1.609 km]
A. 1.38 mph
B. 2.30 mph
C. 12.3 mph
D. 13.8 mph

87. The dimensions of a room are typically given in feet, but carpeting is sold by the square yard. How many square yards of carpet are required to cover the floor of a room which is 12 feet by 18 feet?
A. 12 square yards
B. 18 square yards
C. 24 square yards
D. 216 square yards

88. A can of soda has a volume of 355 mL. The area of a circle is given as $A = \pi r^2$, where r is the radius of the circle, so the volume of the can is given by $V = (\pi r^2)h$, where h is the height of the can. If a particular can has a height of 12.2 cm what is the radius of the can?
A. 3.04 mm
B. 3.04 cm
C. 9.26 mm
D. 9.26 cm

89. The dimensions of a piece of wood are 2.8 meters x 14 cm x 120 mm. What is the volume of this piece of wood?
A. 4.7×10^3 mm^3
B. 4.7×10^3 cm^3
C. 4.7×10^4 cm^3
D. 4.7×10^3 m^3

90. Which state of matter is highly compressible?
A. solid
B. liquid
C. gas
D. none of them

91. Which state of matter retains its volume but adapts its shape to that of its container?
A. solid
B. liquid
C. gas
D. none of these

92. Which state of matter is essentially incompressible?
A. solid
B. liquid
C. gas
D. none of them

93. Which of the following describes the compressibility of liquids?
A. they are highly compressible
B. they are slightly compressible
C. they are virtually incompressible
D. any of these, depending on the liquid

94. Dry ice is called dry ice because it passes directly from the solid state to the gaseous state. Which of the following occurs during this transformation?
A. the chemical composition of dry ice changes
B. the volume of the sample decreases
C. the volume of the sample remains the same
D. the volume of the sample increases

95. Which of the following is true of ice, water and steam?
A. they are three different chemical substances
B. they are the same substance in different chemical states
C. they are the same substance in different physical states
D. they are the same substance in different chemical and physical states

96. Mercury is the only metal which is a liquid at room temperature. The density of mercury is 13.6 g/cm^3. What is the mass, in pounds, of 1.00 quart of mercury? [1 liter = 1.057 quart; 1 pound = 453.6 grams]
A. 0.0284 lb
B. 28.4 lb
C. 31.7 lb
D. 35.3 lb

97. Xenon is a gas found in some automobile headlights. The density of xenon at room temperature and pressure is 5.37 g/L. What is the mass, in pounds of 1.00 quart of xenon? [1 liter = 1.057 quart; 1 pound = 453.6 grams]
A. 0.0112 lb
B. 0.0125 lb
C. 79.9 lb
D. 89.3 lb

98. Which of the following is true of the relationship between density and specific gravity?
A. they have different numerical values and different units
B. they have the same numerical value and the same units
C. they have the same numerical value but specific gravity is dimensionless
D. they have the same units but different numerical values

99. The densities of the coinage metals (copper, silver and gold) are as follows:
copper = 8.95 g/cm^3
silver = 12.59 g/cm^3
gold = 19.32 g/cm^3
A sample of material is found to weigh 14.03 grams, and have a volume of 1.20 cm^3. This is a sample of which of the coinage metals?
A. copper
B. silver
C. gold
D. it is not one of the coinage metals

100. An unknown substance has a mass of 56.8 g and a volume of 23.4 mL. What is the density of this unknown substance?
A. 0.411 g/mL
B. 2.34 g/mL
C. 2.43 g/mL
D. 2.50 g/mL

101. Aluminum has a density of 2.70 g/ cm^3. What volume is occupied by a block of aluminum which weighs 4.32 kg?
A. 0.000625 cm^3
B. 0.625 cm^3
C. 1.60 cm^3
D. 1.60 L

102. Titanium has a density of 4.54 g/mL. What is the mass of 17.3 mL of titanium?
A. 3.81 g
B. 38.1 g
C. 78.5 g
D. 785 g

103. Iron has a density of 7.874 g/cm^3. What is the mass of a rectangular block of iron with dimensions of 3.000 cm by 4.000 cm by 5.000 cm?
A. 7.629 g
B. 60.00 g
C. 94.48 g
D. 472.4 g

104. Iron has a density of 7.874 g/cm^3. What is the volume of a block of iron which weighs 15.321 g?
A. 0.008289 cm^3
B. 0.5139 cm^3
C. 1.946 cm^3
D. 120.6 cm^3

105. Which of the following is true about specific gravity of a material?
A. it has units of g/mL
B. it is defined as the density of the material divided by the density of water
C. both a and b
D. neither a nor b

106. If specific gravities were defined by reference to oil (density = 0.89 g/mL) rather than water (density = 1.0 g/mL) which of the following would be true?
A. the specific densities of all materials would be larger than those given in tables in handbooks
B. the specific densities of all materials would be smaller than those given in tables in handbooks
C. the specific densities of some objects would be larger and of other objects would be smaller than those given in tables in handbooks
D. the question is meaningless since water is the only permissible reference material

107. A particular material has a specific gravity of 1.04 at 20°C. As this material is heated from 20°C to 30°C its volume increases faster than does the volume of water. Which of the following statements is true of the specific gravity of this material as it is heated to 30°C?
A. its specific gravity decreases
B. its specific gravity increases
C. its specific gravity remains the same
D. there is insufficient information to answer the question

108. What is the name of the instrument used to measure specific gravity?
A. densitometer
B. gravameter
C. hydrometer
D. spectrometer

109. Which of the following is the formula used to calculate the kinetic energy of a moving object?
A. K.E. = $1/2$ mv
B. K.E. = $1/2 mv^2$
C. K.E. = mv
D. K.E. = mv^2

110. Chemical energy is an example of which of the following?
A. kinetic energy
B. mechanical energy
C. potential energy
D. radiant energy

111. Nuclear energy is an example of which for the following?
A. kinetic energy
B. mechanical energy
C. potential energy
D. radiant energy

112. Which of the following is not a form of kinetic energy?
A. chemical energy
B. electrical energy
C. light energy
D. mechanical energy

113. Which of the following is a form of potential energy?
A. chemical energy
B. nuclear energy
C. both a and b
D. neither a nor b

114. Which of the following is true as a student slides down a waterslide?
A. her kinetic energy decreases
B. her potential energy increases
C. her total energy increases
D. none of the above

115. Which of the following is true as a student slides down a waterslide?
A. her kinetic energy increases
B. her potential energy decreases
C. her total energy remains constant
D. all of the above

116. The Law of Conservation of Energy states which of the following?
A. energy cannot be converted from one form to another
B. kinetic energy is conserved
C. potential energy is conserved
D. none of the above

117. The Law of Conservation of Energy states which of the following?
A. kinetic energy is conserved
B. potential energy is conserved
C. the sum of kinetic energy and potential energy is conserved
D. all of the above

118. Which of the following statements is true about a swinging pendulum?
A. its kinetic energy is greatest when it is vertical (at the midpoint of its swing)
B. its potential energy is greatest when it is vertical (at the midpoint of its swing)
C. its kinetic energy does not change as it swings
D. its potential energy does not change as it swings

119. Which of the following statements is true about a swinging pendulum?
A. its kinetic energy is greatest when it is at the extreme (the highest point) of its swing
B. its potential energy is greatest when it is at the extreme (the highest point) of its swing
C. its kinetic energy does not change as it swings
D. its potential energy does not change as it swings

120. Which of the following objects has the largest kinetic energy?
A. a 1.00 gram object moving at 1.0 cm/sec
B. a 0.25 gram object moving at 2.0 cm/sec
C. a 16.00 gram object moving at 0.25 cm/sec
D. they all have the same kinetic energy

121. Which of the following statements is true?
A. Both heat and temperature are forms of energy.
B. Neither heat nor temperature is a form of energy.
C. Heat is a form of energy, but temperature is not.
D. Temperature is a form of energy, but heat is not.

122. Which of the following is the smallest unit of heat?
A. calorie
B. Calorie
C. joule
D. kilojoule

123. Which of the following is the definition of the calorie?
A. the amount of heat required to heat 1.0 oz of water by 1.0°F
B. the amount of heat required to heat 1.0 oz of water by 1.0°C
C. the amount of heat required to heat 1.0 g of water by 1.0°F
D. the amount of heat required to heat 1.0 g of water by 1.0°C

124. Which of the following is true of the specific heat of water?
A. it is similar to that of other liquids
B. it is the same as that of ice and steam
C. it is unusually high
D. it is unusually low

125. How many calories of are required to heat 731 grams of water from 35°C to 83°C?
A. 15 cal
B. 731 cal
C. 2.6×10^4 cal
D. 3.5×10^4 cal

126. How many calories of are required to heat 139 grams of water from 15°C to 88°C?
A. 73 cal
B. 2.1×10^4 cal
C. 1.0×10^4 cal
D. 1.2×10^4 cal

127. The specific heat of ethanol is 0.58 cal /g·°C. How much energy is required to heat 60.0 g of ethanol from 25°C to 45°C?
A. 348 cal
B. 696 cal
C. 870 cal
D. 1566 cal

128. The specific heat of copper is 0.092 cal/g·°C. How much energy is required to heat 40.0 grams of copper from 25.0°C to 75.0°C?
A. 92 calories
B. 184 calories
C. 200 calories
D. 276 calories

129. The specific heat of lead is 0.0380 cal/g·°C. If 47.0 calories of energy raised the temperature of a lead sample from 28.3°C to 30.1°C what is the mass of the sample?
A. 26.1 g
B. 687 g
C. 1.24×10^3 g
D. 2.27×10^3 g

130. The specific heat of iron is 0.11 cal /g·°C. What will be the final temperature if 275 calories are added to a 75.0 piece of iron initially at 25°C?
A. 33°C
B. 36°C
C. 58°C
D. none of these

131. It required 88.2 calories to heat 14.3 g of an unknown substance from 24°C to 175°C. What is the specific heat of the unknown?
A. 0.245 cal /g·°C
B. 0.317 cal /g·°C
C. 0.408 cal /g·°C
D. none of these

132. The specific heat of iron is 0.11 cal /g·°C Assuming that no heat is lost during the experiment, what will be the final temperature if 30.0 grams of iron at 95°C are added to 100 grams of water at 25°C?
A. 23°C
B. 27°C
C. 52°C
D. 60°C

133. The specific heat of aluminum is 0.22 cal /g·°C Assuming that no heat is lost during the experiment, what will be the final temperature if 30.0 grams of aluminum at 95°C are added to 100 grams of water at 25°C?
A. 29°C
B. 33°C
C. 54°C
D. 60°C

134. On a stove we have two pots of boiling water. Pot 1 contains 1 liter of water and pot 2 contains 2 liters of water. Which of the following statements is true?
A. pot 2 is hotter than pot 1
B. pot 2 has a larger heat content than pot 1
C. both a and b
D. neither a nor b

135. If a certain amount of heat is added to a 30.0 gram sample of water the temperature of the sample increases from 27.0°C to 57.0°C. If this same amount of heat is added to a 90.0 gram sample of water initially at 40.0°C what will be the final temperature of the water?

A. 30°C
B. 50°C
C. 70°C
D. 90°C

136. A 10.0 gram sample of aluminum initially at 30.0°C is brought into contact with a 10.0 gram sample of iron originally at 60.0°C. Assuming that the heat is transferred from one metal to the other without any loss to the environment, what will be the final temperature of the metals? [the specific heat of aluminum = 0.22 cal/g·°C] [the specific heat of iron = 0.11 cal/g·°C]

A. 30.0°C
B. 40.0°C
C. 45.0°C
D. 60.0°C