

**Chapter 1 - Matter, Measurements, and Calculations**

1. The mass of an object is
- the force between the object and the earth.
  - a measure of the amount of matter in the object.
  - the amount of space the object occupies.
  - depends on the location of the object on the earth.

ANSWER: b

2. Any two objects are attracted to each other by \_\_\_\_\_.
- gravity
  - electrostatic forces
  - magnetism
  - all of them

ANSWER: a

3. How is the weight of an object influenced when the gravitational force on the object is increased?
- it decreases
  - it increases
  - it is unchanged
  - it equals the mass

ANSWER: b

4. The weight of an object is
- a measure of the gravitational force pulling the object toward the earth.
  - equal to the mass of the matter in the object.
  - a measure of the space occupied by the object.
  - the same at any location on the earth.

ANSWER: a

5. The fact that gold does not corrode is a \_\_\_\_\_ property
- physical
  - personal
  - real
  - chemical

ANSWER: d

6. Which of the following represents a physical change in matter?
- A substance solidifies at 443 K.
  - A substance produces a gas and a solid when heated.
  - A substance burns when heated.
  - A substance changes color when exposed to air.

ANSWER: a

7. The melting of ice to liquid water is correctly classified as
- a chemical change.
  - a physical change.
  - both a chemical and a physical change.
  - neither a chemical nor physical change.

ANSWER: b

8. Which of the following is a physical property of matter?
- it does not burn

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- b. produces a gas when placed in an acid
- c. freezes at  $-10^{\circ}\text{F}$
- d. the surface turns black in air

ANSWER:

c

9. Which of the following is a chemical property of matter?

- a. color
- b. density
- c. freezing point
- d. flammability

ANSWER:

d

10. As two clear liquid solutions are thoroughly mixed, a red solid forms. This change is most likely \_\_\_\_\_.

- a. physical.
- b. chemical.
- c. neither chemical nor physical.
- d. both chemical and physical.

ANSWER:

b

11. The limit of chemical subdivision of an element is the \_\_\_\_\_.

- a. atom
- b. molecule
- c. proton
- d. compound

ANSWER:

a

12. Which of the following substances are composed of heteroatomic molecules?

- a. an iron nail
- b. oxygen
- c. copper wire
- d. water

ANSWER:

d

13. A molecule represented by O-O-O must be classified as

- a. homoatomic and polyatomic.
- b. homoatomic and monoatomic.
- c. heteroatomic and polyatomic.
- d. heteroatomic and monoatomic.

ANSWER:

a

14. Which of the following terms correctly applies to a molecule of  $\text{CO}_2$ ?

- a. triatomic, heteroatomic
- b. polyatomic, diatomic
- c. triatomic, homoatomic
- d. diatomic, heteroatomic

ANSWER:

a

15. Table salt,  $\text{NaCl}$  is best classified as a(n) \_\_\_\_\_.

- a. compound
- b. element
- c. homogeneous mixture
- d. heterogeneous mixture

ANSWER:

a

16. The limit of physical subdivision of pure  $\text{H}_2\text{O}$  is \_\_\_\_\_.

- a. the atom
- b. the molecule
- c. the element
- d. a proton

ANSWER:

b

17. Homoatomic pure substances are known as \_\_\_\_\_.

- a. protons
- b. elements
- c. compound
- d. molecules

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**ANSWER:** b

18. After heating, a pure substance, A, is found to produce both B and C. What can be said about the substance A?

- a. It is an element
- b. It is a compound
- c. It is either an element or compound
- d. Impossible to predict

**ANSWER:** b

19. Two pure substances A and B react to form a new pure substance C. From this, we may conclude that

- a. A and B are both elements
- b. C is a compound, A and B may or may not be elements
- c. C is an element, A and B are compounds
- d. A, B, and C are all compounds

**ANSWER:** b

20. Which of the following is an example of a homogeneous mixture?

- a. NaOH solution
- b. mortar (mixture of water, sand and cement)
- c. vinegar and oil salad dressing
- d. more than one response is correct

**ANSWER:** a

21. Which of the following consists of a single chemical species?

- a. solution
- b. homogeneous mixture
- c. heterogeneous mixture
- d. compound

**ANSWER:** d

22. Early measurements of length were based on

- a. dimensions of astronomical bodies.
- b. dimensions of the human body.
- c. dimensions of bodies of water.
- d. distances between cities.

**ANSWER:** b

23. The metric system is a measurement system that is

- a. the official system for all nations of the world.
- b. only used by a few of the nations of the world.
- c. commonly used by U.S. physical scientists.
- d. used exclusively in chemical calculations.

**ANSWER:** c

24. The basic unit of length in the metric system is the \_\_\_\_.

- a. mil
- b. millimeter
- c. foot
- d. meter

**ANSWER:** d

25. Which of the following is an SI unit?

- a. gram
- b. liter
- c. meter
- d. calorie

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ANSWER:

c

26. The prefix centi- denotes what fraction of a basic unit?

- a. 1/10                      b. 1/100                      c. 1/1000                      d. 1000

ANSWER:

b

27. Which of the following is a derived unit of the S.I. system?

- a. kilogram                      b. meter                      c. liter                      d. mole

ANSWER:

c

28. Convert a temperature of 76°F to a Celsius value.

- a. 10                      b. 24                      c. 44                      d. 169

ANSWER:

b

29. Which of the following numbers is correctly expressed using scientific notation?

- a. 3489                      b.  $5.248 \times 10^4$                       c.  $45.78 \times 10^6$                       d.  $.0987 \times 10^3$

ANSWER:

b

30. Do the following calculation and express the answer using correct scientific notation.

$$\underline{\hspace{2cm}} = (2.97 \times 10^2) \times (6.09 \times 10^{-7})$$

- a.  $5.53 \times 10^3$                       b.  $1.81 \times 10^{-4}$                       c.  $4.88 \times 10^8$                       d.  $2.05 \times 10^{-9}$

ANSWER:

b

31. Do the following calculation, and express the answer using correct scientific notation.

$$\underline{\hspace{2cm}} = (6.00 \times 10^{23}) \times (3.00) / (284)$$

- a.  $6.34 \times 10^{21}$                       b.  $1.58 \times 10^{-22}$                       c.  $6.34 \times 10^{-2}$                       d. 15.8

ANSWER:

a

32. The number 0.00816 expressed correctly using scientific notation is \_\_\_\_\_.

- a.  $8.16 \times 10^2$                       b.  $8.16 \times 10^3$                       c.  $8.16 \times 10^{-2}$                       d.  $8.16 \times 10^{-3}$

ANSWER:

d

33. How many significant figures are justified in a measurement of a length that is between 9 and 10 centimeters if the measuring device (ruler) has smallest divisions of 0.1 cm?

- a. one                      b. two                      c. three                      d. four

ANSWER:

c

34. How many significant figures are used in expressing a measurement as 0.2503 L?

- a. one                      b. two                      c. three                      d. four

ANSWER:

d

35. Which number has the greatest number of significant digits?

- a. 1.0035                      b. 17.5000                      c. 0.0000625                      d.  $6.022 \times 10^{23}$

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ANSWER:

b

36. Do the following calculation and express the answer using the correct number of significant figures. \_\_\_\_\_ = (342) × (0.0012) ÷ 100.0

- a. 0.00410                      b. 0.0041                      c.  $4.10 \times 10^{-3}$                       d. 0.004104

ANSWER:

b

37. Do the following calculation. How many significant figures are justified for the answer? \_\_\_\_\_ = 6.02 + 5.119 + 0.04218

- a. three                      b. four                      c. five                      d. seven

ANSWER:

b

38. A furnace delivers  $8.0 \times 10^4$  BTU per hour. How many kilocalories per hour is this? (hint: 1 cal = 0.00397 BTU)

- a.  $3.2 \times 10^{-5}$  kcal                      b.  $3.2 \times 10^2$  kcal  
c.  $2.0 \times 10^4$  kcal                      d.  $2.5 \times 10^2$  kcal

ANSWER:

c

39. Which of the following set-ups will allow you to calculate the cost of fruit in dollars per gram, if the price is given as 0.79 dollars per pound?

- a.  $\frac{0.79 \text{ dollars}}{\text{lb}} \times \frac{2.20 \text{ lb}}{1000 \text{ g}}$                       b.  $\frac{0.79 \text{ dollars}}{\text{lb}} \times \frac{457 \text{ g}}{1 \text{ dollar}}$   
c.  $\frac{\text{lb}}{0.79 \text{ dollars}} \times \frac{1 \text{ lb}}{457 \text{ g}}$                       d.  $\frac{\text{lb}}{0.79 \text{ dollars}} \times \frac{1 \text{ kg}}{2.20 \text{ lb}}$

ANSWER:

a

40. A mass 0.0040 kg is equal to \_\_\_\_\_ cg.

- a.  $4.0 \times 10^{-8}$                       b. 400  
c. 0.40                      d. 40

ANSWER:

b

41. Suppose the speedometer in your car reads 55.0 mph. What is your speed in km/hr? (1 km = 0.621 mi.)

- a. 34.1                      b. 0.029                      c. 88.6                      d. 0.011

ANSWER:

c

42. Knowing that 1 g = 0.035 oz and 16 ounces = 1 lb, calculate the number of grams in 10 pounds.

- a. 35                      b. 0.56                      c. 1.8                      d.  $4.6 \times 10^3$

ANSWER:

d

43. If a student completes 5 problems out of a total of 8 on a pop quiz, what percentage of the quiz was completed?

- a. 0.625                      b. 6.25                      c. 16.0                      d. 62.5

ANSWER:

d

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44. If 13% of a class cheats on an exam and there are 93 students in the class, how many students should you recommend be expelled (to the nearest whole student)?

- a. 9                      b. 10                      c. 12                      d. 15

ANSWER: c

45. A hiker began a hike with a pint canteen full of water. One pint equals 16 fluid ounces. At the end of the hike, 7.0 fluid ounces of water remained. What percent of the water was *used* during the hike?

- a. 78                      b. 44                      c. 56                      d. 13

ANSWER: c

46. Eighteen students in a class will get this question correct. If that represents 45% of the class, how large is the class?

- a. 20                      b. 40                      c. 60                      d. 100

ANSWER: b

47. If urine has a density of 1.08 g/mL, what would be the mass of a 125 mL urine sample?

- a. 135 g                      b. 0.00864 g                      c. 116 g                      d. 125 g

ANSWER: a

48. You are able to carry a maximum of 20 kg. What is the maximum volume of gold that you can carry? (Au has a density of 19.6 g/cm<sup>3</sup>)

- a. 392 cm<sup>3</sup>                      b.  $1.0 \times 10^3$  cm<sup>3</sup>                      c. 0.98 cm<sup>3</sup>                      d. none of these

ANSWER: b

49. The fact that iron (Fe) corrodes when exposed to water and air is a

- a. physical property.                      b. metal property.  
c. chemical property.                      d. real property.

ANSWER: c

50. Convert 30.0°C to Fahrenheit.

- a. 112                      b. 86.0                      c. 48.7                      d. 34.4

ANSWER: b

51. Which of the following is not one of the five key body characteristics that provide a good assessment of a person's overall health?

- a. blood pressure                      b. blood cholesterol  
c. body fat                      d. age

ANSWER: d

52. How can the volume of an irregular unknown object be measured?

- a. using a ruler to measure length, width, and depth  
b. measuring the volume of water displaced by the object  
c. obtaining the mass of the object  
d. measure the radius and use  $V = \pi r^2$

ANSWER: b

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53. Do the following calculation and express the answer using the correct number of significant figures.

$$\underline{\hspace{2cm}} = (1.21 \times 10^{-3} + 1.3 \times 10^{-3}) \times 6.453 \times 10^2$$

- a. 1.619                      b. 2                      c. 1.6                      d. 1.62

ANSWER: c

54. If a sample of blood was found to have a density of 1.05 g/mL, what would be the mass of 1.000 liters of this material? Express your answer with the proper number of significant figures.

- a.  $1.05 \times 10^{-3}$  g                      b.  $1.05 \times 10^3$  g                      c. 1050 g                      d. 1.050 kg

ANSWER: b

55. On a cold winter day the weather report gives the temperature as -5.0° F. What would this temperature be if reported on the Kelvin scale?

- a. 252 K                      b. 258 K                      c. 268 K                      d. -20.6 K

ANSWER: a

56. Express the following “generic” number in standard notation.  $X.XX \times 10^4$

- a. 0.000XXX                      b. XX,X00                      c. X,XX0                      d. 0.00XXX

ANSWER: b

57. Express the following “generic number” in scientific notation. 0.0000XXX

- a.  $XXX \times 10^{-7}$                       b.  $X.XX \times 10^5$                       c.  $X.XX \times 10^{-5}$                       d.  $X.XX \times 10^{-4}$

ANSWER: c

58. The density of zinc is 7.13 g/cm<sup>3</sup>. What is the mass in kilograms of a 125 cm<sup>3</sup> cylinder of zinc?

- a. 891 kg                      b. 17.5 kg                      c. 0.0175 kg                      d. 0.891 kg

ANSWER: d

59. Ethanol (ethyl alcohol) has a density of 0.789 g/mL at 25°C. If 75.5 g of ethanol is needed for a reaction, what volume in mL should be added to the reaction container?

- a. 95.7 mL                      b. 59.6 mL                      c. 0.0105 mL                      d. 78.9 mL

ANSWER: a

60. Based on data obtained in an experiment, to determine the density of a metal, the following calculation is carried out. Express the answer to the correct number of significant figures.

$$\frac{57.675 \text{ g} - 3.047 \text{ g}}{25.65 \text{ mL} - 0.15 \text{ mL}} = 2.1422745098 \text{ g/mL}$$

- a. 2.1 g/mL                      b. 2.14 g/mL                      c. 2.142 g/mL                      d. 2.1423 g/mL

ANSWER: c

61. You are saving for a new \$1226 (including taxes) laptop computer using earnings from your part-time job. At that job, you work 20 hours/week, earning \$10.25/hour take home pay. If you can save 25% of all of your income, how many weeks will it take for you to save enough money?

- a. 48 weeks                      b. 24 weeks                      c. 12 weeks                      d. 6 weeks

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ANSWER:

b

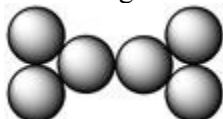
62. It turns out that the dark side of the moon has as a mean temperature of  $-280^{\circ}\text{F}$ . What would that the temperature be on the Kelvin scale?

- a.  $-553\text{ K}$                       b.  $-7\text{ K}$                       c.  $100\text{ K}$                       d.  $173\text{ K}$

ANSWER:

c

63. The figure shown below is an example of what type of molecule?



- a. homoatomic, triatomic                      b. heteroatomic, polyatomic  
 c. homoatomic, polyatomic                      d. heteroatomic, triatomic

ANSWER:

c

64. Which of the following properties is characteristic of a mixture?

- a. constant composition  
 b. variation of physical properties  
 c. fixed melting point.  
 d. cannot be physically separated into simpler materials

ANSWER:

b

65. The average gestation period (length of a pregnancy) for humans is 40 weeks. If a child is born after just 36 weeks, what was the percentage of this gestation period compared to the normal length?

- a.  $4.0\%$                       b.  $10\%$                       c.  $28\%$                       d.  $90\%$

ANSWER:

b

66. One system of rating food is to determine its energy density in kcal/g. If your 200 g snack contains 100 g fat (900 cal/g) and a total of 100 g of protein and carbohydrates (400 cal/gram). What is its energy density?

- a.  $1.3\text{ kcal/g}$                       b.  $6.5\text{ kcal/g}$                       c.  $9.0\text{ kcal/g}$                       d.  $13\text{ kcal/g}$

ANSWER:

b

67. The number twelve, representing a dozen, has two significant figures.

- a. True  
 b. False

ANSWER:

True

68. The number 6730.0 contains five significant figures.

- a. True  
 b. False

ANSWER:

True

69. If 3333 is divided by 5.0, the answer should have two significant figures.

- a. True

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b. False

ANSWER: True

70. If 6526 is added to 15.0, the answer should have two significant figures.

a. True

b. False

ANSWER: False

71. To convert feet to inches, you should multiply by the factor 12 in./ft.

a. True

b. False

ANSWER: True

72. To convert micrograms to grams, you should multiply by 1,000,000 g/microgram.

a. True

b. False

ANSWER: False

73. To convert microliters to liters, you should multiply by 1 liter/1,000,000 microliters.

a. True

b. False

ANSWER: True

74. If a 50 gram sample of iron alloy contains 40 grams of iron, it contains 80% iron by weight.

a. True

b. False

ANSWER: True

75. If 100 people in a town of 5,000 people own a certain color car, this represents 0.1% of the population.

a. True

b. False

ANSWER: False

76. If a 200 gram sample of water is partially frozen forming 40 g of ice, then 80% of the original sample is still a liquid.

a. True

b. False

ANSWER: True

77. A sample of urine is measured to have the density of 1.15 g/mL which is an indicator that there may be a medical problem.

a. True

b. False

ANSWER: True

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78. A patient weights 220 lbs. A medication for this patient is supposed to be taken 3 mg per kg per day. The correct dose for this patient is 3000 mg per day.

- a. True
- b. False

ANSWER: False

79. A particular medication is a heterogeneous mixture. Since heterogeneous mixtures are consistent throughout, this medication does not need to be shaken.

- a. True
- b. False

ANSWER: False

80. A Celsius degree is the same size as a Kelvin degree.

- a. True
- b. False

ANSWER: True

81. One advantage of the Kelvin system is that it is impossible to have temperatures below zero.

- a. True
- b. False

ANSWER: True

82. Body density can be used to determine the amount of fat carried by an individual because the density of muscle is greater than that of fat.

- a. True
- b. False

ANSWER: True

83. A scientific model is an explanation for observed behavior.

- a. True
- b. False

ANSWER: True

84. Molarity ( $M$ ) is calculated as:  $M = \frac{\text{mol}}{\text{liters}}$ .  $M$  would be considered a derived unit.

- a. True
- b. False

ANSWER: True

85. A monoatomic molecule cannot be reduced to a simpler chemical.

- a. True
- b. False

ANSWER: True

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86. The yard is considered a derived SI unit.

- a. True
- b. False

ANSWER: False

87. A patient with a body temperature of 300 K would be considered as suffering from hypothermia.

- a. True
- b. False

ANSWER: True

88. Identify a true statement of matter.

- a. Matter is a measurement of gravitational force acting on an object.
- b. Matter is anything that has mass and occupies space.
- c. The amount of matter in an object varies in different locations.
- d. Matter is a measurement of mass in an object.

ANSWER: b

89. Which of the following units of measure is a derived unit of measurement?

- a. Length
- b. Area
- c. Mass
- d. Time

ANSWER: b

90. Molecules that contain two or more kinds of atoms are \_\_\_\_.

- a. Diatomic molecules
- b. Homoatomic molecules
- c. Heteroatomic molecule
- d. Triatomic molecules
- e. Polyatomic molecules

ANSWER: c

91. Molecules that contain more than three atoms are \_\_\_\_.

- a. Diatomic molecules
- b. Homoatomic molecules
- c. Heteroatomic molecule
- d. Triatomic molecules
- e. Polyatomic molecules

ANSWER: e

92. Molecules that contain two atoms are \_\_\_\_.

- a. Diatomic molecules
- b. Homoatomic molecules

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_  
: \_\_\_\_\_ : \_\_\_\_\_ e: \_\_\_\_\_

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- c. Heteroatomic molecule
- d. Triatomic molecules
- e. Polyatomic molecules

**ANSWER:**

a

93. Molecules that contain three atoms are \_\_\_\_.

- a. Diatomic molecules
- b. Homoatomic molecules
- c. Heteroatomic molecule
- d. Triatomic molecules
- e. Polyatomic molecules

**ANSWER:**

d

94. Molecules that contain only one kind of atom are \_\_\_\_.

- a. Diatomic molecules
- b. Homoatomic molecules
- c. Heteroatomic molecule
- d. Triatomic molecules
- e. Polyatomic molecules

**ANSWER:**

b