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Name _____ Class _____ Date _____

Assessment

Chapter Test B

Chapter: Measurements and Calculations

PART I In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

_____ **1.** Which of the following is *not* a stage of the scientific method?
- **a.** using a hypothesis to sell a new product
- **b.** observing, collecting, and communicating data
- **c.** formulating theories
- **d.** formulating hypotheses

_____ **2.** By making several measurements of a sample with the same balance, a chemist obtained values of 5.224 g, 5.235 g, and 5.259 g for the mass of a sample. Without knowing the actual mass of the sample, we can tell that these measurements have
- **a.** high precision.
- **b.** high accuracy.
- **c.** low precision.
- **d.** low accuracy.

_____ **3.** Which equation represents an inverse proportion between the variables?
- **a.** $V = \frac{T}{k}$
- **b.** $F = -kx^2$
- **c.** $PV = k$
- **d.** $y = kx - 8$

_____ **4.** The average distance between the sun and Earth is about 150 million km. Light travels at a speed of 3.0×10^8 m/s. Dividing the distance by the speed and then multiplying by the number of meters in a kilometer will result in units of
- **a.** seconds.
- **b.** meters per second.
- **c.** kilometers squared.
- **d.** kilometers per second.

_____ **5.** In which of the following measurements are all the zeros considered to be nonsignificant figures?
- **a.** 506 mL
- **b.** 60.0 mL
- **c.** 0.0037 mL
- **d.** 400. mL

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Chapter Test B, *continued*

_____ **6.** If some measurements agree closely with each other but differ widely from the actual value, these measurements are
- **a.** both accurate and precise.
- **b.** neither precise nor accurate.
- **c.** precise but not accurate.
- **d.** accurate but not precise.

_____ **7.** If two quantities are directly proportional and one quantity increases by 10%, the other
- **a.** increases by 10%.
- **b.** decreases by 10%.
- **c.** increases by 90%.
- **d.** decreases by 90%.

_____ **8.** In division and multiplication, the answer must have the same number of significant figures as the
- **a.** number in the calculation with the fewest significant figures.
- **b.** number in the calculation with the most significant figures.
- **c.** average number of significant figures in the problem.
- **d.** total number of significant figures in the problem.

PART II

In each of the following measurements, name the quantity being measured.

example: _____*temperature*_____ **300 K**

_____ **9.** 22 s

_____ **10.** 3.5 mg

_____ **11.** 1.59 g/mL

_____ **12.** 16 J

_____ **13.** 34.5 km

_____ **14.** 0.75 mL

_____ **15.** 3.66 m^2

Identify the following data as *qualitative* or *quantitative*.

_____ **16.** The solid dissolves in water.

_____ **17.** The temperature of the solution is 3°C.

_____ **18.** The solution is dark blue.

_____ **19.** The density of the solution is 1.13 g/mL.

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Chapter Test B, *continued*

PART III Write the correct term or value in the space provided.

20. The speed of light is 300 000 km/s. Write the speed of light in scientific notation to three significant figures. _____

21. The quantity 0.202 g has _____ significant figures.

22. Write the measurement 0.0255 g in scientific notation to two significant figures. _____.

23. A Florence flask can contain 250. mL of liquid. Expressed in scientific notation, the capacity of the flask in liters is _____.

24. A(n) _____ is something that has magnitude, size, or amount.

25. Derived units are combinations of _____.

26. To change from one unit to another, you must first determine the appropriate _____.

PART IV Convert the following measurements. Write your answer on the line to the left.

27. _____ kg = 43.2 g

28. _____ mL = 5.4 L

29. _____ $cm^2 = 2.2\ m^2$

30. _____ g/mL = 4.5 g/L

31. _____ $cm = 3.51 \times 10^{10}$ nm

PART V Write the answers to the following questions in the space provided.

32. How does a theory differ from a hypothesis?

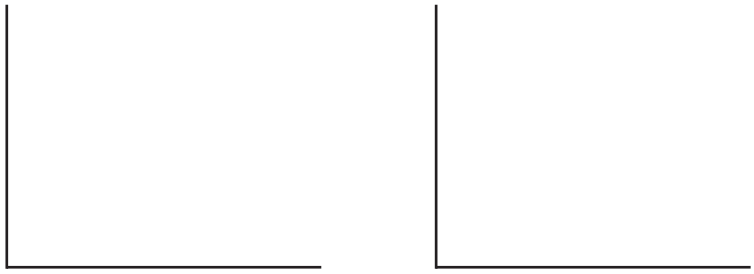
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33. How does weight differ from mass?

34. What is a model and what is the function of models in science?

35. Sketch the graph of two quantities, y and x, that are directly proportional to one another and sketch the graph of two quantities that are inversely proportional to each other. Label, title, and identify each graph.



PART VI Write the answers to the questions on the line to the left, and show your work in the space provided. Express each answer to the correct number of significant digits.

_____ **36.** The mass of a 5.00 cm^3 sample of clay is 11.0 g. What is the density of the clay?

_____ **37.** A length measurement is 1.40 cm. The correct value is 1.36 cm. Calculate the percentage error.

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_____ **38.** The density of lead is 11.35 g/cm^3. What is the mass of a piece of lead with a volume of 10.0 cm^3?

_____ **39.** What is the volume in liters of a cube whose edge is 4.33 cm long?

_____ **40.** What is the sum of 3.089 g and 0.074 52 g?

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Answer Key

1 *Matter and Change,* *pp. 1–8*

TEST A

1. c
2. b
3. a
4. b
5. d
6. a
7. d
8. b
9. c
10. b
11. a
12. d
13. b
14. b
15. b
16. b
17. c
18. b
19. a
20. b
21. a
22. d
23. c
24. b
25. b

TEST B

1. c
2. d
3. a
4. d
5. c
6. c
7. c
8. a
9. mass and volume
10. group or family
11. homogeneous
12. products
13. metals
14. solid state
15. chemical properties
16. atom
17. compound
18. nonmetal
19. mixture
20. pure substance
21. basic
22. metalloid
23. reactants: carbon and oxygen; product: carbon dioxide
24. reactant: mercury(II) oxide; products: mercury and oxygen
25. f
26. g
27. c
28. a
29. b
30. i
31. d
32. h
33. e
34. physical change
35. chemical change
36. physical change
37. physical change
38. chemical change
39. physical change
40. In a solid, particles are packed together in relatively fixed positions. The particles vibrate about a fixed point. In a liquid, particles are close together but can flow around one another. In a gas, particles are at great distances from one another, compared to the particles of liquids and solids.
41. The composition of a pure substance is the same throughout and does not vary from sample to sample. Pure substances include elements and compounds. A mixture contains more than one substance and can vary in composition from one sample to another and sometimes within different parts of the same sample.
42. Although energy can be absorbed or released in a change, it is not destroyed or created. It simply takes a different form.
43. Homogeneous mixtures are uniform in composition; heterogeneous mixtures are not.
44. An element cannot be broken down, but water can be decomposed into hydrogen and oxygen by passing an electrical current through it (electrolysis).

2 *Measurements and Calculations,* *pp. 9–17*

TEST A

1. a
2. c
3. d
4. d
5. a
6. a
7. d
8. c
9. d
10. b
11. a
12. b
13. d
14. a
15. d
16. b
17. d
18. a
19. c
20. a
21. d
22. d
23. d
24. c
25. c

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TEST B

1. a
2. c
3. c
4. a
5. c
6. c
7. a
8. a
9. time
10. mass
11. density
12. energy or work
13. length or distance
14. volume
15. area
16. qualitative
17. quantitative
18. qualitative
19. quantitative
20. 3.00×10^5 km/s
21. three
22. 2.6×10^{-2} g
23. 2.50×10^{-1} L
24. quantity
25. SI base units
26. conversion factor
27. 0.0432 or 4.32×10^{-2}
28. 5400 or 5.4×10^3
29. 22 000 or 2.2×10^4
30. 0.0045 or 4.5×10^{-3}
31. 3510 or 3.51×10^3
32. A hypothesis is a statement that can be tested experimentally. A theory is a broad generalization that explains a body of facts or phenomena.
33. Mass is a measure of the quantity of matter. Weight is a measure of the gravitational pull on matter. Mass does not depend on gravitational attraction.
34. Models are visual, verbal, or mathematical representations. They are used to explain how phenomena occur or how data or events are related.
35. The graph of two quantities that are directly proportional is a straight line through the origin. The graph of two quantities that are inversely proportional is a hyperbola.

36. $D = \frac{m}{V} = \frac{11.0\text{ g}}{5.00\text{ cm}^3} = 2.20\text{ g/cm}^3$

37. *Percentage error* = $\frac{\textit{experimental value} - \textit{accepted value}}{\textit{accepted value}} \times 100$

$= \frac{(1.40\text{ cm} - 1.36\text{ cm})}{1.36\text{ cm}} \times 100 = +2.94\%$

38. $10.0\ \cancel{\text{cm}^3} \times \frac{11.35\text{ g}}{\cancel{\text{cm}^3}} = 113.5\text{ g}$

$= 1.14 \times 10^2$ g

or $m = D \times V = 11.35\text{g/cm}^3 \times 10.0\text{ cm}^3 = 114\text{ g}$

39. $(4.33\text{ cm})^3 = 81.18\text{ cm}^3$

$81.18\ \cancel{\text{cm}^3} \times \frac{1\ \cancel{\text{mL}}}{1\ \cancel{\text{cm}^3}} \times \frac{1\text{ L}}{10^3\ \cancel{\text{mL}}}$

$= 8.12 \times 10^{-2}$ L

40. 3.089 g

0.07452 g

3.16352 g = 3.164 g

3 *Atoms the Building Blocks of Matter,*

pp. 18–25

TEST A

1. c
2. a
3. b
4. c
5. c
6. d
7. a
8. c
9. d
10. c
11. c
12. a
13. c
14. a
15. b
16. b
17. c
18. a
19. b
20. d
21. c
22. b
23. c
24. a
25. b

TEST B

1. c
2. c
3. c
4. b
5. d
6. c
7. b
8. c
9. definite proportions
10. mole
11. electrons
12. atom
13. isotopes
14. mass
15. nuclear forces
16. atomic
17. multiple proportions
18. All atoms of the same element have the same mass; atoms cannot be subdivided.

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