

**Test Bank for Foundations of College Chemistry 14th Edition by Hein Arena ISBN  
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Package Title: Hein Test Bank

Course Title: Hein 14e

Chapter Number: 2

Question type: Multiple Choice

1) Which of the following is the SI prefix that means 1000?

- a) milli
- b) centi
- c) deci
- d) kilo

Answer: D

Difficulty: easy

Learning Objective 1: Name the units for mass, length, and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

2) The number, 14.74999, when rounded to three digits is \_\_\_\_.

- a) 15.0
- b) 14.8
- c) 14.7
- d) 10.0

Answer: C

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Section Reference 1: Section 2.3

3) How many significant figures are in the number 0.0032?

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

Answer: B

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Section Reference 1: Section 2.3

4) How many significant figures are in the number 1.500?

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

Answer: D

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Section Reference 1: Section 2.3

5) How many significant figures are in the number 14.04?

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

Answer: D

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Section Reference 1: Section 2.3

6) How many significant figures are in the number 0.0015070?

- a) 5
- b) 4
- c) 7
- d) 8

Answer: A

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Section Reference 1: Section 2.3

7) How many significant figures are in the number 0.0050?

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

Answer: B

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Section Reference 1: Section 2.3

8) How many significant digits are in the number  $1.30 \times 10^4$ ?

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

Answer: C

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Section Reference 1: Section 2.3

9) The density of a solid is 1.36 g/mL. The specific gravity of the substance is \_\_\_\_.

- a) 1.00
- b) 1.40
- c) 1.36
- d) cannot be determined

Answer: C

Difficulty: easy

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

10) One kilometer is equal to \_\_\_\_.

- a) 0.001 m
- b) 0.01 m
- c) 100 m
- d) 1000 m

Answer: D

Difficulty: easy

Learning Objective 1: Name the units for mass, length, and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

11) One centigram is equal to \_\_\_\_.

- a) 0.001 g
- b) 0.01 g
- c) 100 g
- d) 1000 g

Answer: B

Difficulty: easy

Learning Objective 1: Name the units for mass, length, and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

12) The prefixes nano and mega correspond to which of the following pair, respectively?

- a)  $10^9$  and  $10^6$
- b)  $10^6$  and  $10^{-9}$
- c)  $10^{-9}$  and  $10^6$
- d)  $10^{-9}$  and  $10^9$

Answer: C

Difficulty: medium

Learning Objective 1: Name the units for mass, length, and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

13) The temperature of 295 K is equal to which Fahrenheit temperature?

- a) 72 °F
- b) 41 °F
- c) 44 °F
- d) 32 °F

Answer: A

Difficulty: medium

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius, and Kelvin temperature scales.

Section Reference 1: Section 2.7

14) The temperature of  $-100.^\circ\text{C}$  is equal to \_\_\_\_.

- a)  $-173\text{ K}$
- b)  $-137\text{ K}$
- c)  $137\text{ K}$
- d)  $173\text{ K}$

Answer: D

Difficulty: easy

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius, and Kelvin temperature scales.

Section Reference 1: Section 2.7

15) A temperature of 100. K is equal to which Celsius temperature?

- a)  $-173^\circ\text{C}$
- b)  $-137^\circ\text{C}$
- c)  $237^\circ\text{C}$
- d)  $273^\circ\text{C}$

Answer: A

Difficulty: easy

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius, and Kelvin temperature scales.

Section Reference 1: Section 2.7

16) The temperature of 40.0 °Fahrenheit is equal to which Celsius temperature?

- a) 4.44 °C
- b) 20.0 °C
- c) 45.0 °C
- d) 115 °C

Answer: A

Difficulty: medium

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius, and Kelvin temperature scales.

Section Reference 1: Section 2.7

17) The temperature of 40.0 degrees Celsius is equal to which Fahrenheit temperature?

- a) 23.0 °F
- b) 13.0 °F
- c) 74.0 °F
- d) 104 °F

Answer: D

Difficulty: medium

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius, and Kelvin temperature scales.

Section Reference 1: Section 2.7

18) A piece of metal has a mass of 245 mg and volume of 15.3 mL. What is its density?

- a) 16.0 g/cm<sup>3</sup>
- b) 0.0160 g/cm<sup>3</sup>
- c) 16013 g/cm<sup>3</sup>
- d) 3.75x10<sup>3</sup> g/cm<sup>3</sup>

Answer: B

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

19) A piece of metal has a mass of 86.24 g and a volume of 13.4mL. What is its density?

- a) 0.155 g/mL
- b) 6.44 g/mL
- c) 72.8 g/mL
- d) 99.6 g/mL

Answer: B

Difficulty: easy

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

20) What is the SI unit for temperature?

- a) °C
- b) K
- c) °F
- d) none of these choices

Answer: B

Difficulty: easy

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

21) A solid substance has a density of 4.36 g/mL. What is the volume of 30.0 g of this substance?

- a) 0.145 mL
- b) 6.88 mL
- c) 34.36 mL
- d) 131 mL

Answer: B

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

22) A liquid has a density of 1.27 g/mL. What is the mass of 20.0 mL of this liquid?

- a) 0.0635 g
- b) 15.7 g
- c) 21.3 g
- d) 25.4 g

Answer: D

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

23) Convert 1.00 in<sup>2</sup> to cm<sup>2</sup>.

- a) 2.54 cm<sup>2</sup>
- b) 6.45 cm<sup>2</sup>
- c) 1.00 cm<sup>2</sup>
- d) 0.16 cm<sup>2</sup>

Answer: B

Difficulty: medium

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Section 2.6

24) The number 0.02857 rounded to three significant figures is \_\_\_\_.

- a) 0.029
- b) 0.0285
- c) 0.0286
- d) 0.03

Answer: C

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4



25) Convert 3.00 in. to centimeters.

- a) 1.18 cm
- b) 2.54 cm
- c) 7.62 cm
- d) 10.2 cm

Answer: C

Difficulty: easy

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Section 2.6

26) Convert 3.00 centimeters into inches.

- a) 1.18 in.
- b) 2.54 in.
- c) 7.62 in.
- d) 10.2 in.

Answer: A

Difficulty: easy

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Section 2.6

27) Which SI unit is most appropriate to measure the distance between Chicago and Detroit?

- a) millimeter
- b) centimeter
- c) meter
- d) kilometer

Answer: D

Difficulty: medium

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

28) Which SI unit is most appropriate to measure the thickness of a dime?

- a) meter
- b) millimeter
- c) decimeter
- d) kilometer

Answer: B

Difficulty: medium

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

29) Multiply (40.36) by (37.40). The product expressed to the proper number of significant figures is \_\_\_\_.

- a) 151
- b) 1509
- c) 1510.
- d) 1509.464

Answer: B

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

30) Divide 1436 by 203. The quotient expressed to the proper number of significant figures is \_\_\_\_.

- a) 0.141
- b) 0.1414
- c) 7.07
- d) 7.074

Answer: C

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

31) Add  $114.32 + 12.1 + 13$ . The sum expressed to the proper number of significant figures is \_\_\_\_.

- a) 139
- b) 139.4
- c) 139.42
- d) 140

Answer: A

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

32) Subtract 14.3 from 130.670. The difference expressed to the correct number of significant figures is \_\_\_\_.

- a) 116
- b) 116.3
- c) 116.4
- d) 116.37

Answer: C

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

33) How many significant figures should be included in the answer to the following calculation?  
 $(3.48)(3.6) / 2.470$

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

Answer: B

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

34) How many significant figures should be included in the answer to the following calculation?  
 $(3.60)(2.489)(5.1110)$

- a) 2
- b) 3
- c) 4
- d) 5

Answer: B

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

35) How many significant figures should be included in the answer to the following calculation?  
 $(3.4876) / (4.11 + 1.2)$

- a) 2
- b) 3
- c) 4
- d) 5

Answer: A

Difficulty: Medium

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

36) How many zeroes are significant in the number 0.0040?

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

Answer: A

Difficulty: medium

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.  
Section Reference 1: Section 2.3

37) How many zeroes are significant in the number 0.030030?

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

Answer: C

Difficulty: medium

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.  
Section Reference 1: Section 2.3

38) How many zeroes are significant in the number 40400302?

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

Answer: D

Difficulty: medium

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.  
Section Reference 1: Section 2.3

39) How many zeroes are significant in the number 30000?

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

Answer: D

Difficulty: medium

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures

Section Reference 1: Section 2.3

40) What numerical value is indicated by the SI prefix milli?

- a) 1/100
- b) 1/1000
- c) 100
- d) 1000

Answer: B

Difficulty: easy

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

41) Convert 4.30 feet into centimeters.

- a) 10.9 cm
- b) 30.5 cm
- c) 131 cm
- d) 151 cm

Answer: C

Difficulty: medium

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions

Section Reference 1: Section 2.6

42) Convert 10.00 g into decigrams.

- a) 1.000 dg
- b) 10.00 dg
- c) 100.0 dg
- d) 1000. dg

Answer: C

Difficulty: medium

Learning Objective 1: Name the units for mass, length and volume in the metric system and

convert from one unit to another.  
Section Reference 1: Section 2.5

43) The density of copper is 8.96 g/mL. The mass of 7.00 mL of copper is \_\_\_\_.

- a) 62.7 g
- b) 1.28 g
- c) 0.781 g
- d) 1.96 g

Answer: A

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference: Section 2.8

44) The density of copper is 8.96 g/mL. The volume of 12 mg of copper is \_\_\_\_.

- a) 1.3 mL
- b) 0.0013 mL
- c) 13 mL
- d) 13 mL

Answer: b

Difficulty: difficult

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

45) The mass of a substance is 17.46 g and its volume is 3.42 mL. What is the density of the substance rounded to the correct number of significant figures?

- a) 0.1959 g/mL
- b) 0.196 g/mL
- c) 5.105 g/mL
- d) 5.11 g/mL

Answer: D

Difficulty: medium

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Learning Objective 2: Solve problems involving density.  
Section Reference 1: Sections 2.3 and 2.8

46) Convert 30.0 ml to liters.

- a) 0.0300 L
- b) 0.00300 L
- c) 300. L
- d) 30000 L

Answer: A

Difficulty: easy

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

47) The space occupied by a sample is its \_\_\_\_.

- a) mass
- b) volume
- c) length
- d) temperature

Answer: B

Difficulty: easy

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

48) If the Celsius temperature of a sample changes twenty degrees, how many degrees does its Kelvin temperature change?

- a) 20
- b) 257
- c) 273
- d) 293

Answer: A

Difficulty: easy

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius and Kelvin



temperature scales.

Section Reference 1: Section 2.7

49) A rectangular piece of metal measures 8.0 cm by 1.20 m by 15.0 mm. What is its volume rounded to the correct number of significant figures?

- a)  $14 \text{ cm}^3$
- b)  $144 \text{ cm}^3$
- c)  $1400 \text{ cm}^3$
- d)  $1440 \text{ cm}^3$

Answer: C

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Learning Objective 2: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Sections 2.4 and 2.6

50) A cube measures 13.00 cm on edge. What is its volume?

- a)  $13.00 \text{ cm}^3$
- b)  $169.0 \text{ cm}^3$
- c)  $2197 \text{ cm}^3$
- d)  $28600 \text{ cm}^3$

Answer: C

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Learning Objective 2: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Sections 2.4 and 2.6

51) A metal cube measures 8.60 cm on edge and has a density of 11.4 g/mL. What is its mass?

- a) 98.0g
- b) 843g
- c) 7250g
- d) 62400g

Answer: C

Difficulty: hard

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

52) A 48.0-g piece of metal is dropped into 50.0 mL of water in a graduated cylinder. The water level rises to 62.4 mL. What is the density of the metal?

- a) 12.4 g/mL
- b) 0.258 g/ml
- c) 3.87 g/mL
- d) 595 g/ml

Answer: C

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference: Section 2.8

53) One centimeter is equal to \_\_\_\_.

- a) 2.54 in.
- b) 0.394 in.
- c) 12.0 in.
- d) 0.100 in.

Answer: B

Difficulty: easy

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Section 2.6

54) An empty graduated cylinder has a mass of 68.00 g. 50.0 mL of water is added to the cylinder and its mass increases to 109.5 g. What is the density of the liquid?

- a) 41.5 g/ml
- b) 1.20 g/mL
- c) 0.830 g/mL
- d) 1.36 g/mL

Answer: C

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

55) A car gets 25.6 miles per gallon of gasoline. A full tank of gasoline contains 56.8 L. How many miles can this car travel on a full tank of gasoline? ( 1.000 L = 1.057 qt )

- a) 1454 mi
- b) 96.9 mi
- c) 1.71 mi
- d) 384 mi

Answer: D

Difficulty: medium

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Section 2.6

56) Convert 4.34 yds to centimeters.

- a) 4.34 cm
- b) 132 cm
- c) 264 cm
- d) 397 cm

Answer: D

Difficulty: hard

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Section 2.6

57) The number of centimeters in one inch is\_\_\_\_\_.

- a) 0.109 cm
- b) 0.328 cm
- c) 0.394 cm
- d) 2.54 cm

Answer: D

Difficulty: easy

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.

Section Reference 1: Section 2.6

58) Add:  $3.604\text{ m} + 104.29\text{ m} + 3.1\text{ m} + 17.41\text{ m}$ . The sum expressed in the correct number of significant figures is \_\_\_\_.

- a) 13 m
- b) 128 m
- c) 130 m
- d) 128.4 m

Answer: D

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

59) Subtract:  $14.278\text{ m}$  from  $106.31\text{ m}$ . The difference expressed in the correct number of significant figures is \_\_\_\_.

- a) 92.032 m
- b) 92.03 m
- c) 92.0 m
- d) 92 m

Answer: B

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

60) Multiply:  $(3.687)(14.1)(36.22)$ . The product expressed in the correct number of significant figures is \_\_\_\_.

- a) 1882.9583
- b) 188
- c) 1883.0
- d) 1880

Answer: D

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

61) Divide: 34.72 by 4.7. The quotient expressed to the correct number of significant figures is \_\_\_\_.

- a) 0.14
- b) 0.1
- c) 7.39
- d) 7.4

Answer: D

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

62) Divide: 32.14 by 0.204. The quotient expressed to the correct number of significant figures is \_\_\_\_.

- a) 157.55
- b) 158
- c) 6347
- d) 6350

Answer: B

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

63) When expressed in proper scientific notation the number 4289 is \_\_\_\_.

- a)  $4.289 \times 10^{-4}$
- b)  $4.289 \times 10^{-3}$
- c)  $4.289 \times 10^3$
- d)  $4.289 \times 10^4$

Answer: C

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

64) When expressed in proper scientific notation the number 286 is \_\_\_\_.

- a)  $2.86 \times 10^1$
- b)  $2.86 \times 10^2$
- c)  $2.86 \times 10^{-2}$
- d)  $28.6 \times 10^1$

Answer: B

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

65) When expressed in proper scientific notation the number 0.00364 is \_\_\_\_.

- a)  $3.64 \times 10^3$
- b)  $3.64 \times 10^2$
- c)  $3.64 \times 10^{-2}$
- d)  $3.64 \times 10^{-3}$

Answer: D

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

66) When expressed in proper scientific notation the number 0.000034 is \_\_\_\_.

- a)  $3.4 \times 10^4$
- b)  $3.4 \times 10^{-4}$
- c)  $3.4 \times 10^3$
- d)  $3.4 \times 10^{-5}$

Answer: D

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

67) Express the number  $2.64 \times 10^4$  in decimal notation.

- a) 0.000264
- b) 0.0000264
- c) 26400
- d) 2640

Answer: C

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

68) Express the number  $3.00 \times 10^{-3}$  in decimal notation.

- a) 0.00300
- b) 0.003
- c) 3000.
- d) 3000.

Answer: A

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

69) Express the number  $4.3170 \times 10^{-4}$  in decimal notation.

- a) 0.0043170
- b) 0.00043170
- c) 0.0004317
- d) 43170

Answer: B

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

Commented [AW1]: Same answer

70) Express the number  $5.0 \times 10^{-2}$  in decimal notation.

- a) 500
- b) 50
- c) 0.050
- d) 0.0050

Answer: C

Difficulty: easy

Learning Objective 1: Write decimal numbers in scientific notation.

Section Reference 1: Section 2.1

71) Multiply:  $(4.36 \times 10^{-2}) (3.17 \times 10^4)$ . When expressed properly the product is \_\_\_\_.

- a)  $1.38 \times 10^3$
- b)  $1.38 \times 10^2$
- c)  $1.38 \times 10^{-2}$
- d)  $1.38 \times 10^5$

Answer: A

Difficulty: easy

Learning Objective 1:

Section Reference 1: Section 2.4

72) Multiply:  $(5.24 \times 10^4) (2.36 \times 10^{-5})$ . When expressed properly the product is \_\_\_\_.

- a)  $1.24 \times 10^{-1}$
- b)  $1.24 \times 10^0$
- c)  $1.24 \times 10^1$
- d)  $1.24 \times 10^9$

Answer: B

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

73) Divide:  $3.724 \times 10^{-3}$  by  $2.46 \times 10^4$ . When expressed properly the result is \_\_\_\_.



- a)  $1.51 \times 10^1$
- b)  $1.51 \times 10^{-7}$
- c)  $6.61 \times 10^1$
- d)  $6.61 \times 10^2$

Answer: B

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

74) Divide:  $4.863 \times 10^4$  by  $2.12 \times 10^4$ . When expressed properly the result is \_\_\_\_.

- a)  $4.36 \times 10^{-1}$
- b)  $4.36 \times 10^8$
- c)  $2.29 \times 10^8$
- d)  $2.29 \times 10^0$

Answer: D

Difficulty: easy

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

75) Perform the following set of operations and choose the alternative that expresses the result to the proper number of significant figures.

$$(1.5 \times 10^{-4} * 61.3) + 2.01$$

- a) 2.0192
- b) 2.0
- c) 2.019
- d) 2.02

Answer: D

Difficulty: medium

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: 2.4

76) Perform the following set of operations and choose the alternative that expresses the result to the proper number of significant figures.

$$\frac{3.45 \times 10^{-2} + 2.31 \times 10^{-1}}{0.044}$$

- a) 6.0
- b) 6.03
- c) 6.034
- d) 6

Answer: A

Difficulty: hard

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

77) Perform the following set of operations and choose the alternative that expresses the result to the proper number of significant figures.

$$\frac{54.331}{2.345 - 1.521}$$

- a) 65.94
- b) 65
- c) 70
- d) 65.9

Answer: D

Difficulty: hard

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

78) Convert  $12.5 \text{ m}^3$  to  $\text{cm}^3$ .

- a)  $1.25 \times 10^3 \text{ cm}^3$
- b)  $1.25 \times 10^7 \text{ cm}^3$
- c)  $1.25 \times 10^5 \text{ cm}^3$
- d)  $1.25 \times 10^{-3} \text{ cm}^3$

Answer: B

Difficulty: hard  
Learning Objective 1:  
Section Reference 1: Section 2.6

79) Convert 76.9 L to  $\text{cm}^3$ .

- a)  $76900 \text{ cm}^3$
- b)  $7690 \text{ cm}^3$
- c)  $76900000 \text{ cm}^3$
- d)  $769000 \text{ cm}^3$

Answer: A

Difficulty: medium  
Learning Objective 1:  
Section Reference 1: Section 2.6

80) Convert  $33.0 \text{ inch}^2$  to  $\text{mm}^2$ .

- a)  $2.13 \times 10^3 \text{ mm}^2$
- b)  $8.38 \times 10^2 \text{ mm}^2$
- c)  $2.13 \times 10^4 \text{ mm}^2$
- d)  $5.12 \times 10^2 \text{ mm}^2$

Answer: C

Difficulty: hard  
Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.  
Section Reference 1: Section 2.6

81) An empty jar weighs 1.43 lb. How much will it weigh when 1.00 L of homogenized milk is poured into it? The density of homogenized milk is  $1.03 \text{ g/mL}$ . (1 lb = 453.6 g)

- a) 442 lb
- b) 3.57 lb
- c) 2.46 lb
- d) 3.70 lb

Answer: D

Difficulty: hard

Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

82) An empty glass tube weighs 37.3 g. When filled to the rim with water, it weighs 54.1 g. What is the volume of the glass tube? Assume the density of water is 1.00 g/mL.

- a) 16.8 cm<sup>3</sup>
- b) 54.1 cm<sup>3</sup>
- c) 37.3 cm<sup>3</sup>
- d) 91.4 cm<sup>3</sup>

Answer: A

Difficulty: hard  
Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

83) How many grams of iron (density = 7.87 g/mL ) would occupy the same volume as 96.4 g of aluminum (density = 2.70 g/mL)?

- a) 4.54 g
- b) 33.1 g
- c) 281 g
- d) 220. g

Answer: C

Difficulty: hard  
Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

84) If you travel to Canada, speed limits are posted in km/hr. For a speed limit of 70. mi/hr, what would be the speed limit posted on a Canadian highway? (1 mile = 1.609 km)

- a) 110 km/hr
- b) 44 km/hr
- c) 68 km/hr
- d) 72 km/hr

Answer: A

Difficulty: hard

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.  
Section Reference 1: Section 2.6

85) A police car on a high-speed chase travels at a speed of 85 mi/hr. The chase covered 82.3 miles of roadway. For how long were the police chasing the suspects?

- a) 63 minutes
- b) 58 minutes
- c) 291 minutes
- d) 97 minutes

Answer: B

Difficulty: easy

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions.  
Section Reference 1: Section 2.6

86) The speed of light is  $2.9987 \times 10^8$  m/s. Convert this speed to km/hr.

- a)  $1.0795 \times 10^9$  km/hr
- b)  $1.7992 \times 10^7$  km/hr
- c)  $8.3297 \times 10^1$  km/hr
- d)  $8.3297 \times 10^4$  km/hr

Answer: A

Difficulty: hard

Learning Objective 1: Use dimensional analysis to solve problems involving unit conversions  
Section Reference 1: Section 2.6

87) Calculate the density (in g/mL) of an unknown substance if 0.897 pounds occupy 13.5 inch<sup>3</sup>.

- a) 1.84 g/mL
- b) 11.9 g/mL
- c) 2.29 g/mL
- d) 1.09 g/mL

Answer: A

Difficulty: hard

Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

88) The following alternatives represent numbers that were rounded to three significant figures. Which of the alternatives is expressed incorrectly?

- a) 45.7899 to 45.8
- b) 890.332 to 891
- c) 0.002346 to 0.00235
- d) 1543456 to  $1.54 \times 10^6$

Answer: B

Difficulty: medium

Learning Objective 1: Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Section Reference 1: Section 2.4

Question type: True/False

89) The mass of a substance depends on gravity.

Answer: False

Difficulty: easy

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

90) The weight of a substance depends on gravity.

Answer: True

Difficulty: easy

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

91) A solid with a lower density will float on a liquid with a higher density.

Answer: True

Difficulty: easy  
Learning Objective 1:  
Section Reference 1: Section 2.8

92) If two substances have the same mass, the one with the greater volume will have the greater density.

Answer: False

Difficulty: medium  
Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

93) The prefix kilo means 1000.

Answer: True

Difficulty: easy  
Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.  
Section Reference 1: Section 2.5

94) A solid with a specific gravity of 0.800 will float in water.

Answer: True

Difficulty: medium  
Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

95) The centimeter is the SI unit of length.

Answer: False

Difficulty: easy  
Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.  
Section Reference 1: Section 2.5

96) The mass of a substance is independent of its location.

Answer: True

Difficulty: easy

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

97) The density of liquid A is 2.14 g/mL and the density of liquid B is 1.46 g/mL. When equal masses of these liquids are compared, liquid A will have the greater volume.

Answer: False

Difficulty: hard

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

98) A volume of 300.mL is the same as a volume of 30.0cm<sup>3</sup>.

Answer: False

Difficulty: easy

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

99) Two substances A and B occupy the same volume. The mass of substance A is half that of substance B. Therefore, the density of substance A is lower than the density of substance B.

Answer: True

Difficulty: hard

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

100) Two substances A and B have the same mass. Substance A occupies half the volume of substance B. Therefore, the density of substance A is lower than the density of substance B.

Answer: False

Difficulty: hard



Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

101) The significant figures in a number include all the digits that are certain plus the first uncertain digit.

Answer: True

Difficulty: easy

Learning Objective 1: Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.  
Section Reference 1: Section 2.3

102) The kilogram is the SI unit for mass.

Answer: True

Difficulty: easy

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.  
Section Reference 1: Section 2.5

Question type: Essay

103) A student determines the density of a solid by determining its mass and then immersing it in 50.0mL of water in a graduated cylinder.

The following data is obtained:

Mass 39.364 g

Volume of water and solid 58.0 mL

Answer the following based on the preceding information. Answers should have units and be rounded to the proper number of significant figures.

- a) What is the volume of the solid?
- b) What is the density of the solid?
- c) What is the specific gravity of the solid?
- d) Will the solid float or sink in water?

Answer:

Difficulty: medium

Learning Objective 1: Solve problems involving density.  
Section Reference 1: Section 2.8

Solution: a) The volume of the solid is 8.0 mL; b) The density of the solid is 4.9 g/mL; c) The specific gravity of the solid is 4.9; d) The solid will sink in water.

104) A student determines the density of a liquid by determining the mass of an empty graduated cylinder, adding 50.0mL of liquid to the cylinder and weighing the cylinder and liquid.

The following data is obtained:

Mass of the empty cylinder 63.416g

Mass of the cylinder and liquid 104.312g

Answer the following based on the preceding information. Answers should have units and be rounded to the proper number of significant figures.

- a) What is the mass of the liquid?
- b) What is the density of the liquid?
- c) What is the specific gravity of the liquid?
- d) Will the liquid float or sink in water?

Answer:

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

Solution: a) The mass of the liquid is 40.90 g; b) The density of the liquid is 0.818 g/mL; c) The specific gravity of the liquid is 0.818; d) The liquid will float on water.

105) A) What is the difference between mass and weight?

B) Which property, mass or weight, is better to use in science to describe a substance? Why is this true?

C) What instruments are used to measure mass and weight?

Answer:

Difficulty: medium

Learning Objective 1: Name the units for mass, length and volume in the metric system and convert from one unit to another.

Section Reference 1: Section 2.5

Solution: a) Mass is the amount of matter present in an object. Weight is a measure of the earth's gravitational attraction on an object; b) It is better to use mass to describe a substance. Mass is better to use because it does not vary in different gravitational fields. Weight varies as the force of gravity changes; c) Mass is measured with a balance. Weight is measured with a scale.

106) The density of ethanol is 0.7893 g/mL. What is the mass of one pint of ethanol?

Answer:

Difficulty: hard

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

Solution: The mass of one pint of ethanol is 373.4g.

107) A rectangular solid has a mass of 1.490 kg. The solid measures 4.3 cm by 10.6 cm by 13.6 cm. Calculate the density of the solid and express it to the correct number of significant figures in  $\text{g/cm}^3$ .

Answer:

Difficulty: medium

Learning Objective 1: Solve problems involving density.

Section Reference 1: Section 2.8

Solution: The density of the solid is  $2.4 \text{ g/cm}^3$ .

108) Of these three:  $4^\circ\text{F}$ ,  $4 \text{ K}$ , and  $-4^\circ\text{C}$ , which is the warmest?

Answer:

Difficulty: medium

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius and Kelvin temperature scales.

Section Reference 1: Section 2.7

Solution: The warmest temperature is  $-4^\circ\text{C}$ .

109) What is the appropriate SI unit to express each of the following properties?

- a) The surface area of a gymnasium floor.
- b) The volume of air in a dining room.
- c) The thickness of a quarter.
- d) The volume of liquid in a wine bottle.
- e) The height of a redwood tree.
- f) The heat energy in a thermos of hot coffee.
- g) The mass of a large textbook.

Answer:

Difficulty: medium

Learning Objective 1: Name the units for mass, length and volume in the metric system and

convert from one unit to another.

Section Reference 1: Section 2.5

Solution: a)  $\text{m}^2$ ; b)  $\text{m}^3$ ; c) mm; d) mL or  $\text{cm}^3$ ; e) m; f) kJ; g) kg

110) Explain how an ocean of water and a cup of the same ocean water can have the same temperature but contain different amounts of heat.

Answer:

Difficulty: hard

Learning Objective 1: Convert measurements among the Fahrenheit, Celsius and Kelvin temperature scales.

Section Reference 1: Section 2.7

Solution: Temperature is the average kinetic energy of the molecules in a sample. If both samples have the same temperature they consist of molecules with the same average kinetic energy. The sample with more molecules, the ocean, must have the greater total amount of energy.