

Chapter Two

Multiple Choice

1. Which SI prefix means 1000?

A. Milli
B. Centi
C. Deci
D. Kilo

Answer: D; Difficulty: easy; Reference: 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; Reference: Section 2.3

3. How many significant figures are in the number 14.38?

A. 1
B. 2
C. 3
D. 4

Answer: D; Difficulty: easy; Reference: 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; Reference: 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; Reference: Section 2.3

6. How many significant figures are in the number 1360?

- A. 1
- B. 2
- C. 3
- D. 4

Answer: C; Difficulty: easy; Reference: Section 2.3

7. How many significant figures are in the number 0.005?

- A. 1
- B. 2
- C. 3
- D. 4

Answer: A; Difficulty: easy; Reference: Section 2.3

8. How many significant digits are in the number 1.30×10^4 ?

- A. 1
- B. 2
- C. 3
- D. 4

Answer: C; Difficulty: easy; Reference: Section 2.3

9. The density of a solid is 1.36g/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; Reference: Section 2.9

10. One kilometer is equal to

- A. 0.001m
- B. 0.01m
- C. 100m
- D. 1000m

Answer: D; Difficulty: easy; Reference: Section 2.5

11. One centigram is equal to

- A. 0.001g
- B. 0.01g
- C. 100g
- D. 1000g

Answer: B; Difficulty: easy; Reference: Section 2.5

12. One millimeter is equal to

- A. 0.001m
- B. 0.01m
- C. 100m
- D. 1000m

Answer: A; Difficulty: easy; Reference: Section 2.5

13. The temperature of 400. degrees Celsius is equal to

- A. 127 K
- B. 163 K
- C. 637 K
- D. 673 K

Answer: D; Difficulty: easy; Reference: Section 2.8

14. The temperature of -100. degrees Celsius is equal to

- A. -173 K
- B. -137 K
- C. 137 K
- D. 173 K

Answer: D; Difficulty: easy; Reference: Section 2.8

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

- A. -173
- B. -137
- C. 237
- D. 273

Answer: A; Difficulty: easy; Reference: Section 2.8

16. The temperature of 40.0 degrees Fahrenheit is equal to which Celsius temperature?

- A. 4.44
- B. 20.0
- C. 45.0
- D. 115

Answer: A; Difficulty: medium; Reference: Section 2.8

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

- A. 23.0
- B. 13.0
- C. 74.0
- D. 104

Answer: D; Difficulty: medium; Reference: Section 2.8

18. When the Celsius temperature changes 40. degrees, the Kelvin temperature will change
- A. 40 degrees
 - B. 277 degrees
 - C. 313 degrees
 - D. 72 degrees

Answer: A; Difficulty: easy; Reference: Section 2.8

19. A piece of metal has a mass of 86.24g and a volume of 13.4mL. What is its density?
- A. 0.155g/mL
 - B. 6.44g/mL
 - C. 72.8g/mL
 - D. 99.6g/mL

Answer: B; Difficulty: easy; Reference: Section 2.9

20. A liquid has a mass of 40.24g and a volume of 50.0mL. What is its density?
- A. 0.805g/mL
 - B. 1.24g/mL
 - C. 9.76g/mL
 - D. 90.2g/mL

Answer: A; Difficulty: easy; Reference: Section 2.9

21. A solid substance has a density of 4.36g/mL. What is the volume of 30.0g of this substance?
- A. 0.145mL
 - B. 6.88mL
 - C. 34.36mL
 - D. 131mL

Answer: B; Difficulty: medium; Reference: Section 2.9

22. A liquid has a density of 1.27g/mL. What is the mass of 20.0mL of this liquid?
- A. 0.0635g
 - B. 15.7g
 - C. 21.27g
 - D. 25.4g

Answer: D; Difficulty: medium; Reference: Section 2.9

23. Convert 3.00 yards into centimeters.
- A. 22.9cm
 - B. 43.2cm
 - C. 254cm
 - D. 274cm

Answer: D; Difficulty: easy; Reference: Section 2.6

24. Convert 3.00 feet into centimeters.

- A. 10.2cm
- B. 14.2cm
- C. 25.4cm
- D. 91.4cm

Answer: D; Difficulty: medium; Reference: Section 2.6

25. Convert 3.00 inches into centimeters.

- A. 1.18cm
- B. 2.54cm
- C. 7.62cm
- D. 10.2cm

Answer: C; Difficulty: easy; Reference: Section 2.6

26. Convert 3.00 centimeters into inches.

- A. 1.18 inches
- B. 2.54 inches
- C. 7.62 inches
- D. 10.2 inches

Answer: A; Difficulty: easy; Reference: 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; Reference: 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; Reference: Section 2.5

29. Multiply (40.36) by (37.4). The product expressed to the proper number of significant figures is

- A. 151
- B. 1509
- C. 1510
- D. 1509.464

Answer: C; Difficulty: easy; Reference: 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; Reference: 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; Reference: 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; Reference: 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; Reference: 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; Reference: Section 2.4

35. How many significant figures should be included in the answer to the following calculation?

$$(3.4876) / (4.11)$$

- A. 2
- B. 3
- C. 4
- D. 5

Answer: B; Difficulty: easy; Reference: 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; Reference: Section 2.3

37. How many zeroes are significant in the number 0.03003?

- A. 1
- B. 2
- C. 3
- D. 4

Answer: B; Difficulty: medium; Reference: 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; Reference: 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; Reference: Section 2.3

40. What number is indicated by the SI prefix milli?

- A. 1/100
- B. 1/1000
- C. 100
- D. 1000

Answer: B; Difficulty: easy; Reference: Section 2.5

41. Convert 4.30 feet into centimeters.

- A. 10.9cm
- B. 30.5cm
- C. 131cm
- D. 151cm

Answer: C; Difficulty: medium; Reference: Section 2.6

42. Convert 10.00 grams into decigrams.

- A. 1.000dg
- B. 10.00dg
- C. 100.0dg
- D. 1000.dg

Answer: C; Difficulty: medium; Reference: Section 2.5

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

- A. 62.7g
- B. 1.28g
- C. 0.781g
- D. 1.96g

Answer: A; Difficulty: medium; Reference: Section 2.9

44. The density of copper is 8.96g/mL. The volume of 12.0g of copper is

- A. 0.747g
- B. 1.34g
- C. 3.04g
- D. 108g

Answer: B; Difficulty: medium; Reference: Section 2.9

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

- A. 0.1959g/mL
- B. 0.196g/mL
- C. 5.105g/mL
- D. 5.11g/mL

Answer: D; Difficulty: medium; Reference: Section 2.3 and 2.9

46. Convert 30.0 milliliters to Liters.

- A. 0.0300L
- B. 0.00300L
- C. 300.L
- D. 30000L

Answer: A; Difficulty: easy; Reference: Section 2.5

47. The space occupied by a sample is its

- A. Mass
- B. Volume
- C. Length
- D. Temperature

Answer: B; Difficulty: easy; Reference: Section 2.9

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; Reference: Section 2.8

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

- A. 14cm^3
- B. 144cm^3
- C. 1400cm^3
- D. 1440cm^3

Answer: C; Difficulty: easy; Reference: Section 2.4

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

- A. 13.00cm^3
- B. 169.0cm^3
- C. 2197cm^3
- D. 28600cm^3

Answer: C; Difficulty: easy; Reference: Section 2.4

51. A metal cube measures 8.60cm on edge and has a density of 11.4g/cm^3 . What is its mass?

- A. 98.0g
- B. 843g
- C. 7250g
- D. 62400g

Answer: C; Difficulty: medium; Reference: Section 2.9

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

- A. 12.4mL
- B. 0.258mL/g
- C. 3.87g/mL
- D. 595gmL

Answer: C; Difficulty: medium; Reference: Section 2.9

53. One centimeter is equal to

- A. 2.54 inches
- B. 0.394 inches
- C. 12.0 inches
- D. 0.100 inches

Answer: B; Difficulty: easy; Reference: Section 2.6

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

- A. 41.5g
- B. 1.20mL/g
- C. 0.830g/mL
- D. 1.36g/mL

Answer: C; Difficulty: medium; Reference: Section 2.9

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

- A. 1454 miles
- B. 96.9 miles
- C. 1.71 miles
- D. 384 miles

Answer: D; Difficulty: medium; Reference: Section 2.6

56. Convert 4.34 yards to centimeters.

- A. 4.34cm
- B. 132cm
- C. 264cm
- D. 397cm

Answer: D; Difficulty: hard; Reference: Section 2.6

57. The number of centimeters in one inch is

- A. 0.109
- B. 0.328
- C. 0.394
- D. 2.54

Answer: D; Difficulty: easy; Reference: 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. 13m
- B. 128m
- C. 130m
- D. 128.4m

Answer: D; Difficulty: easy; Reference: Section 2.4

59. Subtract: 14.278m from 106.31m. The difference expressed in the correct number of significant figures is
- A. 92.032m
 - B. 92.03m
 - C. 92.0m
 - D. 92m

Answer: B; Difficulty: easy; Reference: 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; Reference: 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; Reference: 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; Reference: Section 2.4

63. When expressed in proper scientific notation the number 4289 is
- A. 4.289×10^{-4}
 - B. 4.289×10^{-3}
 - C. 4.289×10^3
 - D. 4.289×10^4

Answer: C; Difficulty: easy; Reference: Section 2.1

64. When expressed in proper scientific notation the number 286 is
- A. 2.86×10^1
 - B. 2.86×10^2
 - C. 2.86×10^{-2}
 - D. 28.6×10^1

Answer: B; Difficulty: easy; Reference: Section 2.1

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

- A. 3.64×10^3
- B. 3.64×10^2
- C. 3.64×10^{-2}
- D. 3.64×10^{-3}

Answer: D; Difficulty: easy; Reference: Section 2.1

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

- A. 3.4×10^4
- B. 3.4×10^{-4}
- C. 3.4×10^3
- D. 3.4×10^{-5}

Answer: D; Difficulty: easy; Reference: Section 2.1

67. Express the number 2.64×10^4 in decimal notation

- A. 0.000264
- B. 0.0000264
- C. 26400
- D. 2640

Answer: C; Difficulty: easy; Reference: Section 2.1

68. Express the number 3.00×10^2 in decimal notation

- A. 3.00
- B. 30.0
- C. 300.
- D. 3000.

Answer: C; Difficulty: easy; Reference: Section 2.1

69. Express the number 4.317×10^{-4} in decimal notation

- A. 0.04317
- B. 0.004317
- C. 0.0004317
- D. 43170

Answer: C; Difficulty: easy; Reference: Section 2.1

70. Express the number 5.0×10^{-2} in decimal notation

- A. 500
- B. 50
- C. 0.050
- D. 0.0050

Answer: C; Difficulty: easy; Reference: Section 2.1

71. Multiply: $(4.36 \times 10^{-2})(3.17 \times 10^4)$. When expressed properly the product is
- A. 1.38×10^3
 - B. 1.38×10^2
 - C. 1.38×10^{-2}
 - D. 1.38×10^5

Answer: A; Difficulty: easy; Reference: Section 2.4

72. Multiply: $(5.24 \times 10^4)(2.36 \times 10^{-5})$. When expressed properly the product is
- A. 1.24×10^{-1}
 - B. 1.24×10^0
 - C. 1.24×10^1
 - D. 1.24×10^9

Answer: B; Difficulty: easy; Reference: Section 2.4

73. Divide: 3.724×10^{-3} by 2.46×10^4 . When expressed properly the result is
- A. 1.51×10^1
 - B. 1.51×10^{-7}
 - C. 6.61×10^1
 - D. 6.61×10^2

Answer: B; Difficulty: easy; Reference: Section 2.4

74. Divide: 4.863×10^4 by 2.12×10^4 . When expressed properly the result is
- A. 4.36×10^{-1}
 - B. 4.36×10^8
 - C. 2.29×10^8
 - D. 2.29×10^0

Answer: D; Difficulty: easy; Reference: 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.

$$\frac{65.43 - 43.2}{1.232 \times 10^{-3}}$$

- A. 1.80×10^{-4}
- B. 1.804×10^4
- C. 1.80×10^4
- D. 1.8×10^4

Answer: C; Difficulty: hard; Reference: Section 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; Reference: 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; Reference: Section 2.4

78. Convert 12.5 m^3 to 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; Reference: Section 2.6

79. Convert 76.9 L to cm^3 .

- A. 76900 cm^3
- B. 7690 cm^3
- C. 76900000 cm^3
- D. 769000 cm^3

Answer: A; Difficulty: hard; Reference: Section 2.6

80. Convert 33.0 inch^2 to 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; Reference: Section 2.6

81. An empty jar weighs 1.43 pounds. How much will it weigh when 1.00 L of homogenized milk is poured into it? The density of homogenized milk is 1.03 g/mL. (1 pound = 453.6 g)
- A. 442 pounds
 - B. 3.57 pounds
 - C. 2.46 pounds
 - D. 3.70 pounds

Answer: D; Difficulty: hard; Reference: Section 2.9

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?
- A. 16.8 cm³
 - B. 54.1 cm³
 - C. 37.3 cm³
 - D. 91.4 cm³

Answer: A; Difficulty: hard; Reference: Section 2.9

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; Reference: Section 2.9

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; Reference: 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; Reference: Section 2.6

86. The speed of light is 2.9987×10^8 m/s. Convert this speed to km/hr.

- A. 1.0795×10^9 km/hr
- B. 1.7992×10^7 km/hr
- C. 8.3297×10^1 km/hr
- D. 8.3297×10^4 km/hr

Answer: A; Difficulty: hard; Reference: Section 2.6

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

- A. 1.84 g/mL
- B. 11.9 g/mL
- C. 2.29 g/mL
- D. 1.09 g/mL

Answer: A; Difficulty: hard; Reference: Section 2.9

88. The following alternatives represent numbers that were expressed 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 1.54×10^6

Answer: B; Difficulty: medium; Reference: Section 2.4

True/False

89. The mass of a substance depends on gravity.

Answer: False; Difficulty: easy; Reference: Section 2.7

90. The weight of a substance depends on gravity.

Answer: True; Difficulty: easy; Reference: Section 2.7

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

Answer: True; Difficulty: easy; Reference: Section 2.9

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

Answer: False; Difficulty: hard; Reference: Section 2.9

93. The prefix kilo means 1000.

Answer: True; Difficulty: easy; Reference: Section 2.5

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

Answer: True; Difficulty: medium; Reference: Section 2.9

95. The meter is a unit of length.
Answer: True; Difficulty: easy; Reference: Section 2.7
96. The mass of a substance is independent of its location.
Answer: True; Difficulty: easy; Reference: Section 2.7
97. The density of liquid A is 2.14g/mL and the density of liquid B is 1.46g/mL. When equal masses of these liquids are compared, liquid A will have the greater volume.
Answer: False; Difficulty: hard; Reference: Section 2.9
98. A volume of 300.mL is the same as a volume of 30.0cm³.
Answer: False; Difficulty: easy; Reference: Section 2.6
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; Reference: Section 2.9
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; Reference: Section 2.9
101. The significant figures in a number include all the digits that are certain plus the first uncertain digit.
Answer: True; Difficulty: easy; Reference: Section 2.3
102. The kilogram is the SI unit for mass.
Answer: True; Difficulty: easy; Reference: Section 2.7

Free Response

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

The following data is obtained:

Weight	39.364g
Volume of water and solid	58.0mL

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: A. The volume of the solid is 8.0 mL; B. The density of the solid is 4.9g/mL; C. The specific gravity of the solid is 4.9; D. The solid will sink in water; *Difficulty:* easy;
Reference: Section 2.9

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

The following data is obtained:

Weight of the empty cylinder	63.416g
Weight 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: A. The mass of the liquid is 40.90g; B. The density of the liquid is 0.818g/mL; C. The specific gravity of the liquid is 0.818; D. The liquid will float on water; *Difficulty:* easy;
Reference: Section 2.9

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: 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; *Difficulty:* medium; *Reference:* Section 2.7

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

Answer: The mass of one pint of ethanol is 373.4g; *Difficulty:* hard; *Reference:* Section 2.9

107. A rectangular solid has a mass of 1.490 kilograms. The solid measures 4.3cm by 10.6cm by 13.6cm. Calculate the density of the solid and express it to the correct number of significant figures in g/cm³.

Answer: The density of the solid is 2.4g/cm³; *Difficulty:* medium; *Reference:* Section 2.9

108. Of these three: four degrees Fahrenheit, four degrees Kelvin, and minus four degrees Celsius, which is the warmest?

Answer: The warmest temperature is minus four degrees Celsius; *Difficulty:* medium; *Reference:* Section 2.8

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: A. Square meters; B. Cubic meters; C. Millimeters; D. Milliliters or cubic centimeters; E. Meters; F. Kilojoules; G. Kilograms; *Difficulty:* medium; *Reference:* Section 2.5

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: 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; *Difficulty:* hard; *Reference:* Section 2.8