

Chapter 2

The Metric System

Key Terms

1. What is the term for the amount of energy required to raise one gram of water one degree on the Celsius scale?
 - (a) Calorie
 - (B) calorie
 - (c) joule
 - (d) kilocalorie
 - (e) none of the above
2. What is the term for the basic unit of temperature in the metric system?
 - (A) Celsius degree ($^{\circ}\text{C}$)
 - (b) Fahrenheit degree ($^{\circ}\text{F}$)
 - (c) Kelvin unit (K)
 - (d) all of the above
 - (e) none of the above
3. What is the term for a unit that expresses the volume occupied by a cube 1 centimeter on a side?
 - (a) cm^2
 - (B) cm^3
 - (c) mm^2
 - (d) mm^3
 - (e) none of the above
4. What is the term for the amount of mass in a unit volume?
 - (A) density
 - (b) specific mass
 - (c) specific gravity
 - (d) specific volume
 - (e) none of the above
5. What is the term for a nondecimal system of measurement without a basic unit for length, mass, or volume?
 - (A) English system
 - (b) metric system
 - (c) International System (SI)
 - (d) all of the above
 - (e) none of the above

6. What is the term for a statement of two exactly equal values?
 - (A) exact equivalent
 - (b) exact value
 - (c) identical equivalent
 - (d) identical value
 - (e) none of the above
7. What is the term for the basic unit of temperature in the English system?
 - (a) Celsius degree ($^{\circ}\text{C}$)
 - (B) Fahrenheit degree ($^{\circ}\text{F}$)
 - (c) Kelvin unit (K)
 - (d) all of the above
 - (e) none of the above
8. What is the term for the basic unit of mass in the metric system?
 - (A) gram
 - (b) liter
 - (c) meter
 - (d) second
 - (e) none of the above
9. What is the term that refers to the flow of energy from an object at a higher temperature to an object at a lower temperature?
 - (a) calorie
 - (B) heat
 - (c) joule
 - (d) specific heat
 - (e) none of the above
10. What is the term that refers to a measurement system with seven base units?
 - (a) English system
 - (b) metric system
 - (C) International System (SI)
 - (d) all of the above
 - (e) none of the above
11. What is the term for a unit of energy in the SI system?
 - (a) Calorie
 - (b) calorie
 - (C) joule
 - (d) kilocalorie
 - (e) none of the above

12. What is the term for the base unit of temperature in the SI system?
- (a) Celsius degree ($^{\circ}\text{C}$)
 - (b) Fahrenheit degree ($^{\circ}\text{F}$)
 - (c) Kelvin unit (K)
 - (d) all of the above
 - (e) none of the above
13. What is the term for the basic unit of volume in the metric system?
- (a) gram
 - (B) liter
 - (c) meter
 - (d) second
 - (e) none of the above
14. What is the term for the basic unit of length in the metric system?
- (a) gram
 - (b) liter
 - (C) meter
 - (d) second
 - (e) none of the above
15. What is the term for a decimal system of measurement with basic units for length, mass, and volume?
- (a) English system
 - (B) metric system
 - (c) troy system
 - (d) all of the above
 - (e) none of the above
16. What is the term that expresses the amount of a single quantity compared to an entire sample; an expression of parts per hundred parts?
- (A) percent
 - (b) proportion
 - (c) quotient
 - (d) reciprocal
 - (e) none of the above
17. What is the term for the relationship between a fraction and its inverse?
- (a) percent
 - (b) proportion
 - (c) ratio
 - (D) reciprocal
 - (e) none of the above

18. What is the term for the basic unit of time in the metric system?
- (a) gram
 - (b) liter
 - (c) meter
 - (D) second
 - (e) none of the above
19. What is the term for the ratio of the density of a substance compared to the density of water at 4 °C?
- (a) density
 - (b) specific mass
 - (C) specific gravity
 - (d) specific volume
 - (e) none of the above
20. What is the term for the amount of energy required to raise one gram of any substance one degree on the Celsius scale?
- (a) calorie
 - (b) heat
 - (C) specific heat
 - (d) joule
 - (e) none of the above
21. What is the term for the average energy of molecules in motion?
- (a) heat
 - (b) joule
 - (c) specific heat
 - (D) temperature
 - (e) none of the above
22. What is the term for a systematic method of problem solving which proceeds from a given value to a desired value by the conversion of units?
- (a) algebraic analysis
 - (b) metric analysis
 - (c) problem analysis
 - (D) unit analysis
 - (e) none of the above
23. What is the term for a statement of two equivalent quantities?
- (a) unit analysis
 - (B) unit equation
 - (c) unit equivalent
 - (d) unit factor
 - (e) none of the above

24. What is the term for the ratio of two equivalent quantities?
- (a) unit analysis
 - (b) unit equation
 - (c) unit equivalent
 - (D) unit factor
 - (e) none of the above
25. What is the term for the technique of determining the volume of a solid or a gas by measuring the volume of water it displaces?
- (a) volume by calculation
 - (b) volume by difference
 - (C) volume by displacement
 - (d) volume by immersion
 - (e) none of the above

Section 2.1 Basic Units and Symbols

1. Which of the following is a basic unit and symbol in the metric system?
- (a) meter (m)
 - (b) gram (g)
 - (c) liter (L)
 - (D) all of the above
 - (e) none of the above
2. Which of the following is a basic unit and symbol in the metric system?
- (a) centimeter (cm)
 - (b) kilogram (kg)
 - (c) milliliter (mL)
 - (d) all of the above
 - (E) none of the above
3. Which of the following is a basic unit and symbol in the metric system?
- (a) decimeter (dm)
 - (b) gram (gm)
 - (C) liter (L)
 - (d) all of the above
 - (e) none of the above
4. What is the symbol for the metric unit micrometer?
- (a) cm
 - (b) mm
 - (c) Mm
 - (D) μm
 - (e) none of the above

5. What is the symbol for the metric unit nanogram?
- (a) mg
 - (b) Ng
 - (c) ng
 - (d) μg
 - (e) none of the above
6. What is the symbol for the metric unit microliter?
- (a) cL
 - (b) mL
 - (c) ML
 - (D) μL
 - (e) none of the above
7. What is the name corresponding to the metric symbol km?
- (a) kilomega
 - (B) kilometer
 - (c) kilomicro
 - (d) kilomilli
 - (e) none of the above
8. What is the name corresponding to the metric symbol dg?
- (a) decagram
 - (B) decigram
 - (c) dekagram
 - (d) dekigram
 - (e) none of the above
9. What is the name corresponding to the metric symbol mL?
- (a) megaliter
 - (b) metroliter
 - (c) microliter
 - (D) milliliter
 - (e) none of the above
10. What quantity is expressed by the metric unit centimeter?
- (A) length
 - (b) mass
 - (c) volume
 - (d) time
 - (e) none of the above
11. What quantity is expressed by the metric unit kilogram?
- (a) length
 - (B) mass
 - (c) volume
 - (d) time

- (e) none of the above
12. What quantity is expressed by the metric unit milliliter?
- (a) length
 - (b) mass
 - (c) volume
 - (d) time
 - (e) none of the above

Section 2.2 Metric Conversion Factors

13. According to the metric system, 1 Tm = _____ m.
- (A) 1×10^{12}
 - (b) 1×10^9
 - (c) 1×10^{-9}
 - (d) 1×10^{-12}
 - (e) none of the above
14. According to the metric system, 1 Gg = _____ g.
- (a) 1×10^{12}
 - (B) 1×10^9
 - (c) 1×10^{-9}
 - (d) 1×10^{-12}
 - (e) none of the above
15. According to the metric system, 1 ML = _____ L.
- (A) 1×10^6
 - (b) 1×10^3
 - (c) 1×10^{-3}
 - (d) 1×10^{-6}
 - (e) none of the above
16. According to the metric system, 1 ks = _____ s.
- (a) 1×10^6
 - (B) 1×10^3
 - (c) 1×10^{-3}
 - (d) 1×10^{-6}
 - (e) none of the above
17. According to the metric system, 1 m = _____ dm.
- (a) 1×10^2
 - (B) 1×10^1
 - (c) 1×10^{-1}
 - (d) 1×10^{-2}
 - (e) none of the above

18. According to the metric system, 1 g = _____ cg.
(A) 1×10^2
(b) 1×10^1
(c) 1×10^{-1}
(d) 1×10^{-2}
(e) none of the above
19. According to the metric system, 1 L = _____ mL.
(A) 1×10^3
(b) 1×10^2
(c) 1×10^{-2}
(d) 1×10^{-3}
(e) none of the above
20. According to the metric system, 1 s = _____ μ s.
(a) 1×10^9
(B) 1×10^6
(c) 1×10^{-6}
(d) 1×10^{-9}
(e) none of the above
21. According to the metric system, 1 s = _____ ns.
(a) 1×10^{12}
(B) 1×10^9
(c) 1×10^{-9}
(d) 1×10^{-12}
(e) none of the above
22. According to the metric system, 1 s = _____ ps.
(A) 1×10^{12}
(b) 1×10^9
(c) 1×10^{-9}
(d) 1×10^{-12}
(e) none of the above

Section 2.3 Metric–Metric Conversions

23. What is the *first step* in the unit analysis method of problem solving?
(A) Write down the unit asked for in the answer.
(b) Write down the given value related to the answer.
(c) Apply a unit factor to convert a unit in the given value.
(d) Round off the answer in the calculator display.
(e) none of the above

24. What is the *second step* in the unit analysis method of problem solving?
- (a) Write down the unit asked for in the answer.
 - (B) Write down the given value related to the answer.
 - (c) Apply a unit factor to convert a unit in the given value.
 - (d) Round off the answer in the calculator display.
 - (e) none of the above
25. What is the *third step* in the unit analysis method of problem solving?
- (a) Write down the unit asked for in the answer.
 - (b) Write down the given value related to the answer.
 - (C) Apply a unit factor to convert a unit in the given value.
 - (d) Round off the answer in the calculator display.
 - (e) none of the above
26. What is the three-step sequence in applying the unit analysis method?
- (a) 1–unknown unit, 2–unit factor, 3–relevant given value
 - (B) 1–unknown unit, 2–relevant given value, 3–unit factor
 - (c) 1–relevant given value, 2–unknown unit, 3–unit factor
 - (d) 1–unit factor, 2–unknown unit, 3–relevant given value
 - (e) 1–unit factor, 2–relevant given value, 3–unknown unit
27. What is the three-step sequence in applying the unit analysis method?
- (a) 1–unit factor, 2–unknown unit, 3–relevant given value
 - (b) 1–unit factor, 2–relevant given value, 3–unknown unit
 - (C) 1–unknown unit, 2–relevant given value, 3–unit factor
 - (d) 1–unknown unit, 2–unit factor, 3–relevant given value
 - (e) 1–relevant given value, 2–unknown unit, 3–unit factor
28. What is the three-step sequence in applying the unit analysis method?
- (a) 1–relevant given value, 2–unknown unit, 3–unit factor
 - (b) 1–unit factor, 2–unknown unit, 3–relevant given value
 - (c) 1–unknown unit, 2–unit factor, 3–relevant given value
 - (D) 1–unknown unit, 2–relevant given value, 3–unit factor
 - (e) 1–unit factor, 2–relevant given value, 3–unknown unit
29. Which of the following unit factors is derived from 1 meter = 100 centimeters?
- (a) 1 m/1 cm
 - (b) 100 cm/100 m
 - (C) 1 m/100 cm
 - (d) 1 cm/100 m
 - (e) none of the above
30. Which of the following unit factors is derived from 1 kilogram = 1000 grams?
- (a) 1 g/1 kg
 - (b) 1000 kg/1000 g

- (c) 1 g/1000 kg
 - (D) 1 kg/1000 g
 - (e) none of the above
31. Which of the following unit factors is derived from 1 liter = 1000 milliliters?
- (a) 1 L/1 mL
 - (b) 1000 mL/1000 L
 - (C) 1 L/1000 mL
 - (d) 1 mL/1000 L
 - (e) none of the above
32. If a 20.0 mL test tube measures 15.0 cm, what is the length in meters?
- (A) 0.150 m
 - (b) 1.50 m
 - (c) 15.0 m
 - (d) 1500 m
 - (e) none of the above
33. If a 250 mL beaker weighs 95.4 g, what is the mass in kilograms?
- (A) 0.0954 kg
 - (b) 0.954 kg
 - (c) 95.4 kg
 - (d) 95,400 kg
 - (e) none of the above
34. If a 125 mL Erlenmeyer flask weighs 88.5 g, what is the volume in liters?
- (A) 0.125 L
 - (b) 1.25 L
 - (c) 125 L
 - (d) 125,000 L
 - (e) none of the above
35. If an automobile airbag inflates in 25 μ s, what is the time in seconds?
- (A) 0.000 025 s
 - (b) 0.000 25 s
 - (c) 25,000 s
 - (d) 25,000,000 s
 - (e) none of the above
36. If a downhill ski measures 185 cm, what is the length in decimeters?
- (a) 1.85 dm
 - (B) 18.5 dm
 - (c) 1850 dm
 - (d) 18,500 dm
 - (e) none of the above
37. If a glass marble weighs 3150 mg, what is the mass in centigrams?
- (a) 3.15 cg
 - (b) 31.5 cg

- (c) 315 cg
 - (d) 31,050 cg
 - (e) none of the above
38. If a can of soda contains 355 mL, what is the volume in deciliters?
- (a) 0.355 dL
 - (B) 3.55 dL
 - (c) 35.5 dL
 - (d) 3550 dL
 - (e) none of the above
39. If a computer chip switches off-on-off in 0.015 μs , what is the switching time in nanoseconds?
- (a) 0.000 000 015 ns
 - (b) 0.000 015 ns
 - (C) 15 ns
 - (d) 15,000 ns
 - (e) none of the above
40. If Earth is 1.50×10^8 km from the Sun, what is the distance in Tm?
- (A) 1.50×10^{-1} Tm
 - (b) 1.50×10^2 Tm
 - (c) 1.50×10^5 Tm
 - (d) 1.50×10^{23} Tm
 - (e) none of the above
41. If Earth is 1.50×10^8 km from the Sun, what is the distance in Gm?
- (a) 1.50×10^{-1} Gm
 - (B) 1.50×10^2 Gm
 - (c) 1.50×10^5 Gm
 - (d) 1.50×10^{20} Gm
 - (e) none of the above
42. If Earth is 1.50×10^8 km from the Sun, what is the distance in Mm?
- (a) 1.50×10^{-1} Mm
 - (b) 1.50×10^2 Mm
 - (C) 1.50×10^5 Mm
 - (d) 1.50×10^{17} Mm
 - (e) none of the above
43. If the radius of a potassium atom is 2.27×10^{-7} mm, what is the radius in μm ?
- (a) 2.27×10^{-16} μm
 - (b) 2.27×10^{-10} μm
 - (C) 2.27×10^{-4} μm
 - (d) 2.27×10^5 μm
 - (e) none of the above

44. If the radius of a silicon atom is 1.18×10^{-8} cm, what is the radius in nm?
- (a) 1.18×10^{-15} nm
 - (b) 1.18×10^{-10} nm
 - (c) 1.18×10^{-1} nm
 - (d) 1.18×10^3 nm
 - (e) none of the above
45. If the radius of a nickel atom is 1.25×10^{-9} dm, what is the radius in pm?
- (a) 1.25×10^{-20} pm
 - (b) 1.25×10^{-18} pm
 - (c) 1.25×10^{-10} pm
 - (D) 1.25×10^2 pm
 - (e) none of the above

Section 2.4 Metric–English Conversions

46. Which of the following English–metric equivalents is correct?
- (a) 1 in. = 2.54 cm
 - (b) 1 lb = 454 g
 - (c) 1 qt = 946 mL
 - (D) all of the above
 - (e) none of the above
47. Which of the following English–metric equivalents is correct?
- (a) 1 in. = 454 cm
 - (b) 1 lb = 2.54 g
 - (C) 1 qt = 946 mL
 - (d) all of the above
 - (e) none of the above
48. Which of the following English–metric equivalents is correct?
- (a) 1 in. = 2.54 cm
 - (b) 1 lb = 454 g
 - (c) 1 qt = 946 mL
 - (d) 1 sec = 1.00 s
 - (E) all of the above
49. Which of the following unit factors is derived from 1 meter = 39.4 inches?
- (a) 1 m/1 in.
 - (B) 1 m/39.4 in.
 - (c) 39.4 in./39.4 m
 - (d) 1 in./39.4 m
 - (e) none of the above

50. Which of the following unit factors is derived from 1 kilogram = 2.20 pounds?
- (a) 1 kg/1 lb
 - (B) 1 kg/2.20 lb
 - (c) 1 lb/1 kg
 - (d) 1 lb/2.20 kg
 - (e) none of the above
51. Which of the following unit factors is derived from 1 liter = 1.06 quarts?
- (a) 1 L/1 qt
 - (B) 1 L/1.06 qt
 - (c) 1 qt/1 L
 - (d) 1 qt/1.06 L
 - (e) none of the above
52. If a copper wire is 195 cm long, what is the length in inches?
- (a) 43.0 in.
 - (B) 76.8 in.
 - (c) 195 in.
 - (d) 495 in.
 - (e) 885 in.
53. If a silver chain has a mass of 25.0 g, what is the mass in pounds?
- (A) 0.0551 lb
 - (b) 0.0264 lb
 - (c) 18.1 lb
 - (d) 37.8 lb
 - (e) 11,400 lb
54. If a water bottle contains 375 mL, what is the volume in quarts?
- (A) 0.396 qt
 - (b) 0.826 qt
 - (c) 1.21 qt
 - (d) 2.52 qt
 - (e) 355,000 qt
55. If the Moon is 246,000 miles from Earth, what is the distance in kilometers?
(Given: 1 mi = 1.61 km)
- (a) 0.000 006 54 km
 - (b) 15,300 km
 - (c) 153,000 km
 - (D) 396,000 km
 - (e) 3,960,000 km

56. If 842 pounds of Moon samples have been collected from lunar landings, what is the mass expressed in kilograms? (Given: 1 kg = 2.20 lb)
- (a) 309 kg
 - (B) 383 kg
 - (c) 3830 kg
 - (d) 1850 kg
 - (e) 11,100 kg
57. If an automobile gas tank holds 17.4 gallons, what is the volume in liters?
(Given: 1 gal = 3.785 L)
- (a) 0.218 L
 - (b) 3.785 L
 - (c) 4.60 L
 - (d) 17.4 L
 - (E) 65.9 L
58. If a 10K race is 10.0 km, what is the distance in yards?
(Given: 1 yd = 0.914 m)
- (a) 0.00914 yd
 - (b) 0.0109 yd
 - (c) 9140 yd
 - (d) 10,000 yd
 - (E) 10,900 yd
59. If the mass of Mars is 6.42×10^{23} kg, what is the mass in pounds?
(Given: 1 lb = 454 g)
- (a) 1.41×10^{18} lb
 - (b) 2.91×10^{23} lb
 - (c) 6.42×10^{23} lb
 - (D) 1.41×10^{24} lb
 - (e) 2.91×10^{24} lb
60. If a patient is injected with 0.500 L of IV saline, what is the volume in quarts?
(Given: 1 qt = 946 mL)
- (a) 5.29×10^{-7} qt
 - (b) 0.500 qt
 - (c) 0.529 qt
 - (d) 4.73 qt
 - (e) 4.73×10^5 qt
61. If a 125 micron tissue slice is 125 μm thick, what is the thickness in inches?
- (a) 4.92×10^{-7} in.
 - (B) 4.92×10^{-3} in.
 - (c) 3.18×10^{-2} in.

- (d) 3.18×10^6 in.
 - (e) 4.92×10^9 in.
62. If 500 mL of liquid mercury weighs 6.53 kg, what is the mass in pounds?
- (a) 1.44 lb
 - (b) 2.96 lb
 - (c) 7.19 lb
 - (D) 14.4 lb
 - (e) 2960 lb
63. If 10.0 kg of water occupies 10.0 liters, what is the volume in quarts?
- (a) 9.46×10^6 qt
 - (B) 10.6 qt
 - (c) 10.0 qt
 - (d) 9.46 qt
 - (e) 1.06×10^{-5} qt

Section 2.5 The Percent Concept

64. A sample of white gold is: 18.0 g gold, 3.0 g silver, 2.0 g cobalt, and 1.0 g platinum. What is the percent platinum in the sample?
- (A) 4.2%
 - (b) 8.3%
 - (c) 13%
 - (d) 25%
 - (e) 75%
65. A sample of rose gold is: 12.0 g gold, 5.0 g silver, and 7.0 g copper. What is the percent copper in the sample?
- (a) 12%
 - (B) 29%
 - (c) 50%
 - (d) 58%
 - (e) 75%
66. A sample of lime gold is: 14.0 g gold, 7.0 g silver, and 3.0 g copper. What is the percent copper in the sample?
- (a) 3.0%
 - (B) 13%
 - (c) 29%
 - (d) 58%
 - (e) 67%
67. A sample of 10K gold contains the following: 10.0 g gold, 4.0 g silver, 5.0 g copper, and 5.0 g nickel. What is the percent gold in the sample?
- (a) 10%

- (b) 14%
 - (c) 42%
 - (d) 58%
 - (e) 71%
68. A sample of 18K gold contains the following: 18.0 g gold, 3.0 g silver, and 3.0 g copper. What is the percent gold in the sample?
- (a) 6.0%
 - (b) 18%
 - (c) 25%
 - (d) 33%
 - (E) 75%
69. A sample of 22K gold contains the following: 22 g gold, 1.0 g silver, and 1.0 g copper. What is the percent gold in the sample?
- (a) 1.0%
 - (b) 4.5%
 - (c) 9.1%
 - (D) 92%
 - (e) 96%
70. Sterling silver contains 925 parts silver and 75 parts copper by mass. What is the percent silver in sterling silver in the sample?
- (a) 7.50%
 - (b) 8.11%
 - (c) 12.3%
 - (D) 92.5%
 - (e) 100%
71. Sterling silver contains 925 parts silver and 75 parts copper by mass. What is the percent copper in sterling silver in the sample?
- (A) 7.5%
 - (b) 8.1%
 - (c) 12%
 - (d) 93%
 - (e) 100%
72. A 1980 penny has a mass of 3.015 g and is 95.0% copper. What is the mass of copper in the coin?
- (a) 0.151 g
 - (b) 0.286 g
 - (c) 0.603 g
 - (d) 1.51 g
 - (E) 2.86 g
73. A 1980 penny has a mass of 3.015 g and is 5.00% zinc. What is the mass of zinc in the coin?
- (A) 0.151 g
 - (b) 0.286 g

- (c) 0.603 g
 - (d) 1.51 g
 - (e) 2.86 g
74. A 2015 penny has a mass of 2.507 g and is 2.5% copper. What is the mass of copper in the coin?
- (A) 0.063 g
 - (b) 0.24 g
 - (c) 0.63 g
 - (d) 2.4 g
 - (e) 6.3 g
75. A 2015 penny has a mass of 2.507 g and is 97.5% zinc. What is the mass of zinc in the coin?
- (a) 0.0627 g
 - (b) 0.244 g
 - (c) 0.627 g
 - (d) 2.38 g
 - (E) 2.44 g
76. If a 5¢ coin has a mass of 5.07 g and is 75.0% copper, what is the mass of copper in the coin?
- (a) 0.203 g
 - (b) 0.676 g
 - (c) 1.27 g
 - (d) 1.69 g
 - (E) 3.80 g
77. If a 5¢ coin has a mass of 5.07 g and is 25.0% nickel, what is the mass of nickel in the coin?
- (a) 0.203 g
 - (b) 0.676 g
 - (c) 1.27 g
 - (d) 1.69 g
 - (e) 3.80 g
78. Stainless steel is an alloy of iron, chromium, nickel, and manganese metals. If a 5.00 g sample is 18.0% chromium, what is the mass of chromium in the sample?
- (a) 0.0450 g
 - (b) 0.0900 g
 - (c) 0.450 g
 - (D) 0.900 g
 - (e) 1.80 g
79. Stainless steel is an alloy of iron, chromium, nickel, and manganese metals. If a 5.00 g sample is 10.5% nickel, what is the mass of nickel in the sample?
- (a) 0.0263 g
 - (b) 0.0525 g
 - (c) 0.263 g
 - (D) 0.525 g

- (e) 1.05 g
80. Stainless steel is an alloy of iron, chromium, nickel, and manganese metals. If a 5.00 g sample is 2.00% manganese, what is the mass of manganese in the sample?
- (a) 0.00500 g
 - (b) 0.0100 g
 - (c) 0.0500 g
 - (D) 0.100 g
 - (e) 0.200 g
81. Sterling silver is composed of 92.5% silver and 7.5% copper. If a sterling silver ring contains 6.55 g of silver, what is the mass of the ring?
- (a) 0.0708 g
 - (b) 0.491 g
 - (c) 6.06 g
 - (D) 7.08 g
 - (e) 87.3 g
82. A ruby contains 52.7% aluminum, 47.1% oxygen, and traces of chromium. If the ruby contains 0.125 g of aluminum, what is the mass of the gemstone?
- (a) 0.0659 g
 - (b) 0.125 g
 - (C) 0.237 g
 - (d) 0.265 g
 - (e) 0.625 g
83. A sapphire contains 52.7% aluminum, 47.1% oxygen, and traces of titanium. If the sapphire contains 0.155 g of oxygen, what is the mass of the gemstone?
- (a) 0.0730 g
 - (b) 0.155 g
 - (c) 0.294 g
 - (D) 0.329 g
 - (e) 0.775 g

Section 2.6 Volume by Calculation

84. If a brass rectangular solid measures 3.80 cm by 2.55 cm by 1.25 cm, what is the volume of the solid?
- (a) 0.0826 cm³
 - (b) 1.19 cm³
 - (c) 1.86 cm³
 - (d) 7.75 cm³
 - (E) 12.1 cm³

85. If a copper rectangular solid measures 5.15 cm by 1.25 cm by 1.25 cm, what is the volume of the solid?
- (a) 0.124 cm³
 - (b) 3.30 cm³
 - (c) 4.12 cm³
 - (d) 6.44 cm³
 - (E) 8.05 cm³
86. If a stainless steel rectangular solid measures 5.05 cm by 1.50 cm by 1.25 cm, what is the volume of the solid?
- (a) 0.106 cm³
 - (b) 2.69 cm³
 - (c) 4.21 cm³
 - (d) 6.06 cm³
 - (E) 9.47 cm³
87. A sheet of aluminum foil has a volume of 0.555 cm³. If the foil measures 10.0 cm by 10.0 cm, what is the thickness of the foil?
- (a) 0.000 555 cm
 - (B) 0.005 55 cm
 - (c) 0.0555 cm
 - (d) 55.5 cm
 - (e) 180 cm
88. A sheet of tin foil has a volume of 0.645 mm³. If the foil measures 10.0 mm by 12.5 mm, what is the thickness of the foil?
- (a) 0.000 516 mm
 - (B) 0.005 16 mm
 - (c) 0.0516 mm
 - (d) 80.6 mm
 - (e) 194 mm
89. A sheet of gold foil has a volume of 0.750 cm³. If the foil measures 50.0 cm by 10.0 cm, what is the thickness of the foil?
- (a) 0.000 150 cm
 - (B) 0.001 50 cm
 - (c) 0.0150 cm
 - (d) 375 cm
 - (e) 667 cm
90. If a brass solid has a volume of 46.5 cm³, what is the volume in cubic inches?
- (A) 2.84 in.³
 - (b) 7.21 in.³

- (c) 18.3 in.³
- (d) 118 in.³
- (e) 762 in.³

91. If a bronze solid has a volume of 25.5 cm³, what is the volume in cubic inches?

- (A) 1.56 in.³
- (b) 3.95 in.³
- (c) 10.0 in.³
- (d) 64.8 in.³
- (e) 418 in.³

92. If a copper solid has a volume of 8.75 cm³, what is the volume in cubic inches?

- (A) 0.534 in.³
- (b) 1.36 in.³
- (c) 3.44 in.³
- (d) 22.2 in.³
- (e) 143 in.³

Section 2.7 Volume by Displacement

93. A piece of jade is added to a 100-mL graduated cylinder with 50.0 mL of water. If the resulting water level is 60.5 mL, what is the volume of the jade?

- (A) 10.5 mL
- (b) 39.5 mL
- (c) 50.0 mL
- (d) 89.5 mL
- (e) none of the above

94. A piece of jade is added to a 100-mL graduated cylinder with 45.0 mL of water. If the resulting water level is 60.5 mL, what is the volume of the jade?

- (A) 15.5 mL
- (b) 39.5 mL
- (c) 55.0 mL
- (d) 84.5 mL
- (e) none of the above

95. A piece of jade is added to a 100-mL graduated cylinder with 55.5 mL of water. If the resulting water level is 68.0 mL, what is the volume of the jade?

- (A) 12.5 mL
- (b) 32.0 mL
- (c) 44.5 mL
- (d) 87.5 mL
- (e) none of the above

96. A sample of baking soda is heated and releases carbon dioxide gas into a 1000-mL flask. If the flask initially contains 555 mL of water and 101 mL remain after the gas has displaced a portion of the water, what is the volume of the gas?
- (a) 101 mL
 - (b) 445 mL
 - (c) 454 mL
 - (d) 899 mL
 - (e) none of the above
97. A sample of baking soda is heated and releases carbon dioxide gas into a 1000-mL flask. If the flask initially contains 655 mL of water and 203 mL remain after the gas has displaced a portion of the water, what is the volume of the gas?
- (a) 203 mL
 - (b) 345 mL
 - (c) 452 mL
 - (d) 797 mL
 - (e) none of the above
98. A sample of baking soda is heated and releases carbon dioxide gas into a 1000-mL flask. If the flask initially contains 752 mL of water and 305 mL remain after the gas has displaced a portion of the water, what is the volume of the gas?
- (a) 248 mL
 - (b) 305 mL
 - (c) 447 mL
 - (d) 695 mL
 - (e) none of the above

Section 2.8 The Density Concept

99. A glass cylinder contains four liquid layers: mercury ($d = 13.6 \text{ g/mL}$), chloroform ($d = 1.49 \text{ g/mL}$), water ($d = 1.00 \text{ g/mL}$), ether ($d = 0.708 \text{ g/mL}$). If a cork stopper ($d = 0.50 \text{ g/mL}$) is dropped into the cylinder, where does it come to rest?
- (A) on top of the ether layer
 - (b) on top of the water layer
 - (c) on top of the chloroform layer
 - (d) on top of the mercury layer
 - (e) on the bottom of the cylinder
100. A glass cylinder contains four liquid layers: mercury ($d = 13.6 \text{ g/mL}$), chloroform ($d = 1.49 \text{ g/mL}$), water ($d = 1.00 \text{ g/mL}$), and ether ($d = 0.708 \text{ g/mL}$). If an ice cube ($d = 0.92 \text{ g/mL}$) is dropped into the cylinder, where does it come to rest?
- (a) on top of the ether layer

- (B) on top of the water layer
 - (c) on top of the chloroform layer
 - (d) on top of the mercury layer
 - (e) on the bottom of the cylinder
101. A glass cylinder contains four liquid layers: mercury ($d = 13.6 \text{ g/mL}$), chloroform ($d = 1.49 \text{ g/mL}$), water ($d = 1.00 \text{ g/mL}$), ether ($d = 0.708 \text{ g/mL}$). If a rubber stopper ($d = 1.2 \text{ g/mL}$) is dropped into the cylinder, where does it come to rest?
- (a) on top of the ether layer
 - (b) on top of the water layer
 - (C) on top of the chloroform layer
 - (d) on top of the mercury layer
 - (e) on the bottom of the cylinder
102. A glass cylinder contains four liquid layers: mercury ($d = 13.6 \text{ g/mL}$), chloroform ($d = 1.49 \text{ g/mL}$), water ($d = 1.00 \text{ g/mL}$), and ether ($d = 0.708 \text{ g/mL}$). If a marble ($d = 2.7 \text{ g/mL}$) is dropped into the cylinder, where does it come to rest?
- (a) on top of the ether layer
 - (b) on top of the water layer
 - (c) on top of the chloroform layer
 - (D) on top of the mercury layer
 - (e) on the bottom of the cylinder
103. A glass cylinder contains four liquid layers: mercury ($d = 13.6 \text{ g/mL}$), chloroform ($d = 1.49 \text{ g/mL}$), water ($d = 1.00 \text{ g/mL}$), ether ($d = 0.708 \text{ g/mL}$). If a gold nugget ($d = 19.3 \text{ g/mL}$) is dropped into the cylinder, where does it come to rest?
- (a) on top of the ether layer
 - (b) on top of the water layer
 - (c) on top of the chloroform layer
 - (d) on top of the mercury layer
 - (E) on the bottom of the cylinder
104. If the density of air is 1.29 g/L , which of the following is a unit factor?
- (a) 1 g/1 L
 - (b) 1 g/1.29 L
 - (C) 1.29 g/1 L
 - (d) 1.29 g/1.29 L
 - (e) 1.29 L/1 g
105. If the density of alcohol is 0.813 g/mL , which of the following is a unit factor?
- (a) 1 g/1 mL
 - (b) 1 g/0.813 mL
 - (C) 0.813 g/1 mL
 - (d) 0.813 g/0.813 mL
 - (e) 0.813 mL/1 g
106. If the density of silver is 10.5 g/cm^3 , which of the following is a unit factor?
- (a) 1 g/1 cm^3

- (b) $1 \text{ g}/10.5 \text{ cm}^3$
- (c) $10.5 \text{ g}/1 \text{ cm}^3$
- (d) $10.5 \text{ g}/10.5 \text{ cm}^3$
- (e) $10.5 \text{ cm}^3/1 \text{ g}$

107. A 10.0 mL volume of alcohol has a mass of 7.89 g. What is the density of the alcohol in grams per milliliter?

- (a) 0.0789 g/mL
- (B) 0.789 g/mL
- (c) 7.89 g/mL
- (d) 10.0 g/mL
- (e) 78.9 g/mL

108. A 10.0 mL volume of ether has a mass of 7.14 g. What is the density of the ether in grams per milliliter?

- (a) 0.0714 g/mL
- (B) 0.714 g/mL
- (c) 7.14 g/mL
- (d) 10.0 g/mL
- (e) 71.4 g/mL

109. A 10.0 cm³ volume of alcohol has a mass of 0.00705 kg. What is the density of the alcohol in grams per cubic centimeter?

- (a) 0.0705 g/cm³
- (B) 0.705 g/cm³
- (c) 7.05 g/cm³
- (d) 10.0 g/cm³
- (e) 70.5 g/cm³

110. A 10.0 mL volume of mercury has a mass of 0.136 kg. What is the density of mercury in grams per milliliter?

- (a) 1.36 g/mL
- (b) 7.35 g/mL
- (c) 13.6 g/mL
- (d) 73.5 g/mL
- (e) 136 g/mL

111. A block of aluminum has a mass of 39.589 g and measures 5.10 cm by 2.50 cm by 1.15 cm. What is the density of the rectangular aluminum block?

- (a) 0.370 g/cm³
- (B) 2.70 g/cm³
- (c) 3.11 g/cm³
- (d) 14.7 g/cm³
- (e) 22.3 g/cm³

112. A block of copper has a mass of 143.584 g and measures 5.05 cm by 2.55 cm by 1.25 cm. What is the density of the rectangular copper block?

- (a) 0.112 g/cm³

- (B) 8.92 g/cm³
- (c) 11.1 g/cm³
- (d) 28.4 g/cm³
- (e) 29.0 g/cm³

113. Osmium metal is one of the most dense elements (22.5 g/cm³). What is the mass of 10.0 cm³ of the metal?

- (a) 0.444 g
- (b) 2.25 g
- (c) 22.5 g
- (D) 225 g
- (e) 444 g

114. The density of ether is 0.714 g/mL. What is the mass of 10.0 mL of ether?

- (a) 0.0714 g
- (b) 1.40 g
- (C) 7.14 g
- (d) 14.0 g
- (e) 71.4 g

115. The density of ethanol is 0.789 g/mL. What is the volume of 35.5 g of ethanol?

- (a) 2.80 mL
- (b) 4.50 mL
- (c) 28.0 mL
- (D) 45.0 mL
- (e) 280 mL

116. Platinum metal is one of the most dense elements ($d = 21.5$ g/cm³). What is the volume of a 10.0 g sample of the metal?

- (A) 0.465 cm³
- (b) 2.15 cm³
- (c) 21.5 cm³
- (d) 215 cm³
- (e) 465 cm³

117. Magnesium metal is one of the least dense elements ($d = 1.74$ g/cm³). What is the volume of a 10.0 g sample of the metal?

- (A) 5.75 cm³
- (b) 10.0 cm³
- (c) 17.4 cm³
- (d) 57.5 cm³
- (e) 174 cm³

Section 2.9 Temperature

118. What are the freezing point and boiling point of water on the Fahrenheit scale?

- (a) -32°F and 212°F
- (b) 0°F and 100°F
- (c) 0°F and 212°F
- (d) 32°F and 100°F
- (E) 32°F and 212°F

119. What are the freezing point and boiling point of water on the Celsius scale?

- (A) 0°C and 100°C
- (b) 0°C and 212°C
- (c) 32°C and 100°C
- (d) 32°C and 212°C
- (e) 273°C and 373°C

120. What are the freezing point and boiling point of water on the Kelvin scale?

- (a) 0 K and 100 K
- (b) 0 K and 273 K
- (c) 100 K and 273 K
- (d) 100 K and 373 K
- (E) 273 K and 373 K

121. Table salt melts at 801°C . What is the melting point on the Fahrenheit scale?

- (a) 427°F
- (b) 1384°F
- (c) 1410°F
- (D) 1470°F
- (e) 1490°F

122. An antifreeze solution freezes at -100°C . What is the freezing point on the Fahrenheit scale?

- (a) -212°F
- (B) -148°F
- (c) -88°F
- (d) -82°F
- (e) -73°F

123. Aluminum melts at 1220°F . What is the melting point on the Celsius scale?

- (a) 646°C
- (B) 660°C
- (c) 696°C
- (d) 2138°C
- (e) 2164°C

124. Rubbing alcohol freezes at -129°F . What is the freezing point on the Celsius scale?

- (a) -290°C
- (b) -200°C
- (c) -103°C
- (D) -89.4°C
- (e) -54°C

125. Liquid hydrogen boils at $-252\text{ }^{\circ}\text{C}$. What is the boiling point on the Kelvin scale?

- (a) -525 K
- (b) -252 K
- (c) -21 K
- (D) 21 K
- (e) 525 K

126. Liquid argon boils at $-186\text{ }^{\circ}\text{C}$. What is the boiling point on the Kelvin scale?

- (a) -459 K
- (b) -186 K
- (c) -87 K
- (D) 87 K
- (e) 459 K

127. Liquid krypton boils at $-152\text{ }^{\circ}\text{C}$. What is the temperature on the Kelvin scale?

- (a) -425 K
- (b) -152 K
- (c) -121 K
- (D) 121 K
- (e) 425 K

128. Liquid helium boils at 4 K . What is the boiling point on the Celsius scale?

- (a) $-277\text{ }^{\circ}\text{C}$
- (B) $-269\text{ }^{\circ}\text{C}$
- (c) $4\text{ }^{\circ}\text{C}$
- (d) $269\text{ }^{\circ}\text{C}$
- (e) $277\text{ }^{\circ}\text{C}$

129. Liquid neon boils at 27 K . What is the boiling point on the Celsius scale?

- (a) $-300\text{ }^{\circ}\text{C}$
- (B) $-246\text{ }^{\circ}\text{C}$
- (c) $27\text{ }^{\circ}\text{C}$
- (d) $246\text{ }^{\circ}\text{C}$
- (e) $300\text{ }^{\circ}\text{C}$

130. Liquid xenon boils at 166 K . What is the boiling point on the Celsius scale?

- (a) $-439\text{ }^{\circ}\text{C}$
- (B) -107°C
- (c) $166\text{ }^{\circ}\text{C}$
- (d) 107°C
- (e) $439\text{ }^{\circ}\text{C}$

Section 2.10 The Heat Concept

131. What is the difference between a cup of tea at 95 °C, and a drop of tea at 95 °C?
- (a) Temperature is greater in the cup of tea.
 - (b) Temperature is greater in the drop of tea.
 - (c) Heat is greater in the cup of tea.
 - (d) Heat is greater in the drop of tea.
 - (e) none of the above
132. What is the difference between a cup of tea at 95 °C, and a drop of tea at 95 °C?
- (A) Heat is greater in the cup of tea.
 - (b) Heat is greater in the drop of tea.
 - (c) Temperature is greater in the cup of tea.
 - (d) Temperature is greater in the drop of tea.
 - (e) none of the above
133. Which of the following can express the *total* amount of heat energy in a sealed, insulated chamber?
- (a) 20.0 °C
 - (b) 68.0 °F
 - (c) 293.0 K
 - (D) 20.0 kcal
 - (e) all of the above
134. Which of the following can express the *average* amount of heat energy in a sealed, insulated chamber?
- (A) 20.0 °C
 - (b) 68.0 cal
 - (c) 293.0 kcal
 - (d) 20.0 J
 - (e) all of the above
135. When 100.0 g of gasoline undergoes combustion, 9560 kJ of energy is released. Express the heat released in kilocalories. (Given: 4.184 kJ = 1 kcal)
- (a) 2.28×10^0 kcal
 - (B) 2.28×10^3 kcal
 - (c) 2.28×10^6 kcal
 - (d) 4.00×10^4 kcal
 - (e) 4.00×10^7 kcal
136. When 100.0 g of gasoline undergoes combustion, 2280 kcal of energy is released. Express the heat released in kilojoules. (Given: 4.184 kJ = 1 kcal)

- (a) 9.54×10^0 kJ
- (B) 9.54×10^3 kJ
- (c) 9.54×10^6 kJ
- (d) 5.45×10^4 kJ
- (e) 5.45×10^7 kJ

General Exercises

137. Which of the following are basic units and symbols in the English system?

- (a) inch (in.), ounce (oz), pint (pt)
- (b) foot (ft), pound (lb), quart (qt)
- (c) yard (yd), pound (lb), gallon (gal)
- (d) mile (mi), ton (ton), gallon (gal)
- (E) The English system does not have basic units.

138. Which of the following are base units and symbols in the International system?

- (a) centimeter (cm), gram (g), second (s)
- (b) meter (m), gram (g), second (s)
- (C) meter (m), kilogram (kg), second (s)
- (d) kilometer (km), kilogram (kg), second (s)
- (e) The International system does not have base units.

139. In performing a multistep multiplication or division calculation, when should you round off the answer in the calculator display?

- (a) after each step in the calculation
- (b) after the first unit factor
- (c) after the second unit factor
- (D) after the final calculation
- (e) none of the above

140. How many significant digits are justified by the unit factor 1 m/100 cm?

- (a) 1
- (b) 2
- (c) 3
- (D) infinite
- (e) impossible to determine

141. How many significant digits are justified by the unit factor 1 lb/454 g?

- (a) 1
- (b) 2
- (C) 3
- (d) infinite
- (e) impossible to determine

142. How many significant digits are justified by the unit factor 1 qt/946 mL?

- (a) 1
- (b) 2
- (C) 3

- (d) infinite
- (e) impossible to determine

143. Which of the following is equivalent to the volume of a 1-cm cube?

- (a) 1 L
- (b) 1 cL
- (c) 1 dL
- (d) 1 kL
- (E) 1 mL

144. Which of the following is equivalent to the volume of a 10-cm cube?

- (A) 1 L
- (b) 1 cL
- (c) 1 dL
- (d) 1 kL
- (e) 1 mL

145. Which of the following is equivalent to the volume of a 1.00-L flask?

- (a) 1.00 cm^3
- (b) 10.0 cm^3
- (c) 100 cm^3
- (d) 946 cm^3
- (E) 1000 cm^3

146. If a diamond weighs 1.33 carats, what is the mass in grams?

(Given: 1 ct = 200 mg)

- (a) 0.133 g
- (b) 0.150 g
- (c) 0.200 g
- (D) 0.266 g
- (e) 6.65 g

147. An Apple iPhone has a mass of 112 g. What is its weight in ounces?

(Given: 1 lb = 454 g; 1 lb = 16 oz)

- (a) 0.0154 oz
- (b) 0.247 oz
- (C) 3.95 oz
- (d) 1790 oz
- (e) 3180 oz

148. An Apple iPad has a mass of 652 g. What is its weight in ounces?

(Given: 1 lb = 454 g; 1 lb = 16 oz)

- (a) 0.0898 oz
- (c) 1.44 oz
- (C) 23.0 oz

- (d) 40.8 oz
- (e) 18,500 oz

149. An Apple iPad has a thickness of 9.4 mm. What is its thickness in inches?

(Given: 1 in. = 2.54 cm; 1 cm = 10 mm)

- (a) 0.0239 in.
- (b) 0.239 in.
- (c) 0.370 in.
- (d) 3.70 in.
- (e) 37.0 in.

150. How many minutes for sunlight to travel from the Sun to Earth? (Assume the Sun is 93,000,000 miles from Earth and sunlight travels at 1.86×10^5 miles per second.)

- (a) 0.0020 minute
- (b) 2.0 minutes
- (c) 8.3 minutes
- (d) 500 minutes
- (e) 830 minutes

151. How many minutes for sunlight to travel from the Sun to Mars? (Assume the Sun is 2.28×10^8 kilometers from Mars and sunlight travels at 2.99×10^5 kilometers per second.)

- (a) 0.00131 minutes
- (b) 0.0787 minutes
- (c) 12.7 minutes
- (d) 763 minutes
- (e) 45,800 minutes

152. A hybrid vehicle has a mileage rating of 22 km/L. What is the gas mileage in miles per gallon? (Given: 1 mi = 1.61 km, and 1 gal = 3.78 L)

- (a) 3.6 mi/gal
- (b) 9.4 mi/gal
- (c) 35 mi/gal
- (D) 52 mi/gal
- (e) 130 mi/gal

153. An Indianapolis racecar car can travel 111 m/s. What is the speed of the car in miles per hour? (Given: 1 mi = 1.61 km, and 1 h = 3600 s)

- (a) 111 mi/h
- (b) 178 mi/h
- (c) 248 mi/h
- (d) 400 mi/h
- (e) 643 mi/h

154. The Washington Monument capstone is composed of 1.00% iron, 0.75% silicon, 0.30% manganese, 0.05% copper, 0.02% tin, 0.01% sodium, and aluminum. What is the percentage of aluminum in the capstone?
- (a) 2.13%
 - (b) 50.00%
 - (c) 95.74%
 - (D) 97.87%
 - (e) 100.00%
155. Why is a sterling silver spoon smaller than a stainless steel spoon of the same weight?
- (a) sterling silver is less valuable than stainless steel
 - (b) sterling silver is more valuable than stainless steel
 - (c) sterling silver is less dense than stainless steel
 - (D) sterling silver is more dense than stainless steel
 - (e) none of the above
156. The density of water is 1.00 g/mL at 3.98 °C. What is the density of water in g/cm³?
- (A) 1.00 g/cm³
 - (b) 2.54 g/cm³
 - (c) 3.98 g/cm³
 - (d) 16.4 g/cm³
 - (e) 62.4 g/cm³
157. The density of water is 1.00 g/mL at 4 °C. What is the density of water in kg/L?
- (A) 1.00 kg/L
 - (b) 2.54 kg/L
 - (c) 3.98 kg/L
 - (d) 16.4 kg/L
 - (e) 62.4 kg/L
158. The density of carbon tetrachloride is 1.60 g/cm³. What is the density of the liquid expressed in SI units (kg/m³)?
- (a) 0.160 kg/m³
 - (b) 1.60 kg/m³
 - (c) 16.0 kg/m³
 - (D) 1.60×10^3 kg/m³
 - (e) 1.60×10^6 kg/m³
159. Calculate the volume of Earth assuming it is spherical and has a radius (r) of 6370 km. The volume of a sphere equals $\frac{4}{3} \pi r^3$, and $\pi = 3.14$.
- (a) 2.58×10^{11} km³
 - (b) 3.45×10^{11} km³
 - (c) 6.37×10^{11} km³
 - (d) 1.03×10^{12} km³
 - (E) 1.08×10^{12} km³

160. Calculate a length of copper wire having a diameter of 0.200 cm and a mass of 15.620 g. The density of copper is 8.92 g/cm³. The volume of copper wire equals $\pi d^2 L/4$, $\pi = 3.14$, d = diameter, and L = length.
- (a) 1.80×10^{-4} cm
 - (b) 4.00×10^{-4} cm
 - (c) 5.50×10^{-2} cm
 - (d) 1.75 cm
 - (E) 55.8 cm

A CLOSER LOOK Metric Labels

1. What is the metric volume of a 12-ounce can of soda as currently shown on the label?
 - (a) 354 mL
 - (b) 354.75 mL
 - (C) 355 mL
 - (d) 12 fl oz
 - (e) 12 oz
2. Which of the following indicates metric length on a product label?
 - (A) 25.0 cm
 - (b) 25.0 g
 - (c) 25.0 oz
 - (d) 25.0 mL
 - (e) 25.0 fl oz
3. Which of the following indicates metric mass on a product label?
 - (a) 25.0 cm
 - (B) 25.0 g
 - (c) 25.0 oz
 - (d) 25.0 mL
 - (e) 25.0 fl oz
4. Which of the following indicates metric volume on a product label?
 - (a) 25.0 cm
 - (b) 25.0 g
 - (c) 25.0 oz
 - (D) 25.0 mL
 - (e) 25.0 fl oz

CHEMISTRY CONNECTION The Olympics

1. Which Olympic running race is nearly equal in length to a quarter mile?
 - (a) 100 meters
 - (b) 200 meters
 - (C) 400 meters

- (d) 1000 meters
 - (e) 2000 meters
2. Which Olympic swimming race is nearly equal in length to 100 yards?
- (A) 100 meters
 - (b) 200 meters
 - (c) 500 meters
 - (d) 50 kilometers
 - (e) 100 kilometers
3. Which Olympic skiing race is nearly equal in length to 10 kilometers?
- (a) 5000 yards
 - (B) 10,000 yards
 - (c) 10 miles
 - (d) 15 miles
 - (e) 20 miles
4. Which of the following is a running event in the Olympic Summer Games?
- (a) 100 feet
 - (b) 100 yards
 - (c) 100 furlongs
 - (D) 100 meters
 - (e) 100 miles
5. Which of the following is a swimming event in the Olympic Summer Games?
- (a) 50 feet
 - (b) 50 yards
 - (c) 50 furlongs
 - (D) 50 meters
 - (e) 50 miles
6. Which of the following is a skiing event in the Olympic Winter Games?
- (a) 1000 feet
 - (b) 100 yards
 - (c) 10 miles
 - (D) 10 kilometers
 - (e) all of the above

A CLOSER LOOK Lower Gasoline Bills

1. At which of the following temperatures is it most economical to fill a gas tank?
- (a) 50 °C
 - (b) 40 °C
 - (c) 30 °C
 - (d) 20 °C
 - (E) 10 °C

2. At which of the following temperatures is it most economical to fill a gas tank?
- (A) 40 °F
 - (b) 50 °F
 - (c) 60 °F
 - (d) 70 °F
 - (e) 80 °F
3. With the exception of ice floating in water, what is the only other substance that is less dense in the solid state than the liquid state?
- (a) acetone
 - (B) ammonia
 - (c) chloroform
 - (d) ethanol
 - (e) gasoline
4. What are the only two liquids that violate the principle of greater density at temperatures below their freezing points?
- (a) acetone and turpentine
 - (B) ammonia and water
 - (c) chloroform and ether
 - (d) ethanol and methanol
 - (e) gasoline and diesel fuel