Fifth Edition
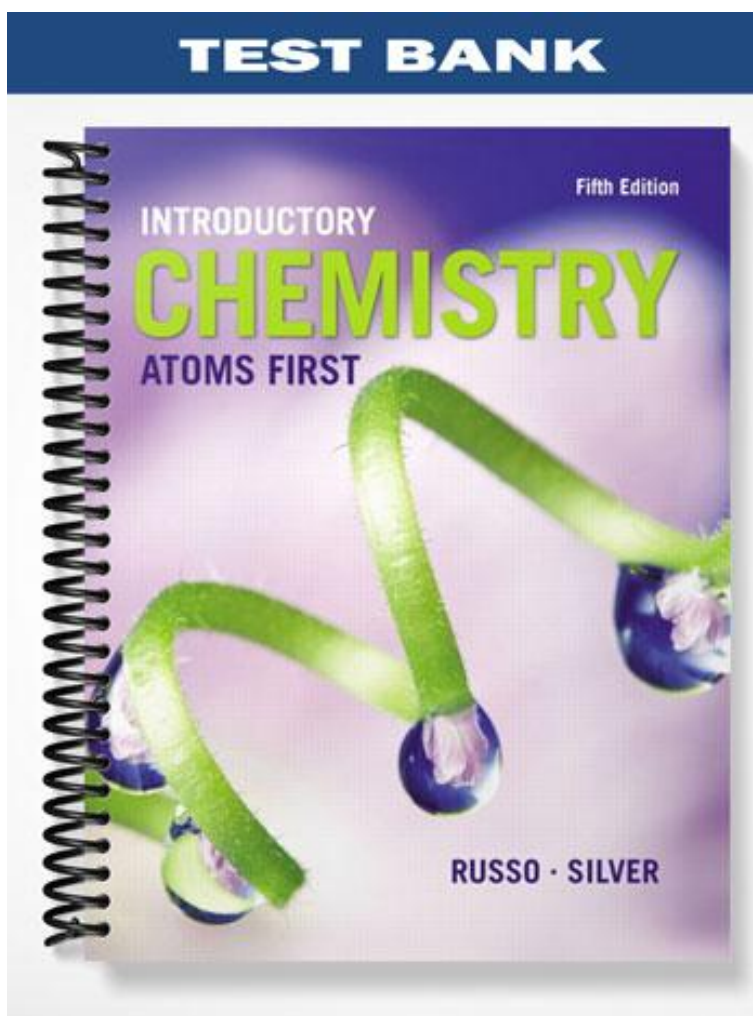
INTRODUCTORY

CHEMISTRY

ATOMS FIRST

RUSSO · SILVER

***Introductory Chemistry: Atoms First, 5e* (Russo/Silver)**
Chapter 2   The Numerical Side of Chemistry

2.1   Multiple-Choice Questions

1) Identify the exact number.
A) a number of coins
B) the diameter of a coin
C) the radius of a coin
D) the mass of a coin
Answer: A
Section: Section 2.1
Learning Outcome: 2.1 Explain what an exact number is and what a measured number is.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

2) Identify the piece of glassware that provides the least precise volume measurement of a liquid.
A) beaker
B) graduated cylinder
C) buret
D) pipette
Answer: A
Section: Section 2.1
Learning Outcome: 2.3 Explain why measured numbers always have uncertainty associated with them.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

3) Which of the following represents an estimated measurement?
A) A calendar week has 7 days.
B) The U.S. national debt is 6 trillion dollars.
C) There are 50 states in the United States of America.
D) My bank account contains 19 dollars and 26 cents.
Answer: B
Section: Section 2.1
Learning Outcome: 2.1 Explain what an exact number is and what a measured number is.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

4) For the measured value 6.73 pounds, what is the degree of uncertainty?
A) +/- 10 pounds
B) +/- 1 pound
C) +/- 0.1 pound
D) +/- 0.01 pound
Answer: D
Section: Section 2.2
Learning Outcome: 2.7 Identify the degree of uncertainty in a number written in scientific notation.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

5) How many significant figures are in 43.8001?
A) 2
B) 3
C) 4
D) 6
Answer: D
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

6) Which one of the following numbers does **not** have four significant figures?
A) 1.007 g
B) 0.0007 g
C) 1.070 g
D) 1700. g
E) 1.700 g
Answer: B
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

7) Round off 907,506 to four significant figures.
A) 9.075×10^{-5}
B) 9.075×10^{5}
C) 9,075
D) 90,751
E) 908,000
Answer: B
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

8) How many significant digits are present n the number 6046.2?
A) 4
B) 3
C) 5
D) 1
Answer: C
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

9) How many significant digits are present in the number 0.02560?
A) 3
B) 4
C) 5
D) 6
Answer: B
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

10) How many significant figures are present in 0.00123, 7000, and 1.519×10^{-2}?
A) 6, 4, 4
B) 4, 1, 1
C) 7, 1, 4
D) 3, 1, 4
Answer: D
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

11) The number 0.0040600 has _____ trailing zeros.
A) 0
B) 1
C) 2
D) 6
Answer: C
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

12) The correct scientific notation for 147.8×10^{-3} is _____.
A) 1.478
B) 1478×10^{-4}
C) 1.478×10^{-1}
D) 1.478×10^{-5}
Answer: C
Section: Section 2.4
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

13) Convert 0.000001546 mi to scientific notation.
A) 1.546×10^6 mi
B) 1.546×10^5 mi
C) 1.546×10^{-5} mi
D) 1.546×10^{-6} mi
Answer: D
Section: Section 2.4
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

14) The number 0.0247 expressed in scientific notation is _____.
A) 2.47×10^{-4}
B) 2.47×10^{-2}
C) 2.47×10^{-1}
D) 24.7
Answer: B
Section: Section 2.4
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

15) The number 0.00003007 expressed in scientific notation is _____.
A) 3.007×10^{-5}
B) 3.007×10^5
C) 3.007
D) 3.007×10^4
E) 3.7×10^{-5}
Answer: A
Section: Section 2.4
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

16) Express the number 1.06×10^{-4} in standard notation.
A) 10,600
B) 106
C) 0.0106
D) 0.000106
Answer: D
Section: Section 2.4
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

17) The United States has the unit of currency dollars (unit symbol: $). Which of the following is a proper expression of the value seventy seven hundred dollars +/- 1 dollar?
A) $ $7.7 \times 10^{+4}$
B) $ $7.7 \times 10^{+3}$
C) $ $7700
D) $ $7.700 \times 10^{+3}$
Answer: D
Section: Section 2.4
Learning Outcome: 2.5 Identify the amount of uncertainty in a written measured quantity.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

18) By how many places must the decimal point of the number 0.0000814 be moved in order to express this same number in a standard scientific notation?
A) 4
B) 5
C) 6
D) 7
Answer: B
Section: Section 2.4
Learning Outcome: 2.5 Identify the amount of uncertainty in a written measured quantity.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

19) For the *final sum* of 544.36 + 455.64, the number of significant figures is _____.
A) 6
B) 5
C) 4
D) 2
E) 1
Answer: A
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

20) The correct answer for the operation (5.61 + 7.891) / 9.1 is _____.
A) 4.86
B) 4.8646714
C) 1.5
D) 5.0
Answer: C
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures and 2.9 Correctly multiply or divide numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

21) Using the rules of significant figures, calculate the following: 14.8903 - 2.14 =
A) 12.750
B) 12.75
C) 13
D) 12.7503
E) 12
Answer: B
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

22) The sum for the operation 1.2315 + 0.116 + 15.10 is _____.
A) 16
B) 16.4
C) 16.45
D) 16.4475
Answer: C
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

23) Which of the following operations will give an answer of 50.1?
A) 29.75 + 20.3
B) 58.23 - 8.1
C) 26.255 × 1.91
D) all of the above
Answer: D
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures and 2.9 Correctly multiply or divide numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

24) Which of the following operations will **not** give an answer of 73.3?
A) 63.75 × 1.15
B) 90.0 - 16.67
C) 60.15 + 13.26
D) 12.161 × 6.03
Answer: C
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures and 2.9 Correctly multiply or divide numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

25) The correct answer in the operation below is _____.

$(30.004 \text{ cm} \times 14.01 \text{ g}) / 6.08 \text{ cm}^2$

A) 69.1375 g/cm
B) 69.14 g/cm
C) 69.1 g/cm
D) 69.138 g/cm
Answer: C
Section: Section 2.5
Learning Outcome: 2.9 Correctly multiply or divide numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

26) Which of the following is defined as the quantity of matter in a sample that is independent of where it is measured?
A) weight
B) mass
C) volume
D) both A and B
Answer: B
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

27) Which of the following is **not** an SI unit that is used in chemistry?
A) s
B) K
C) kg
D) quart
Answer: D
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

28) Which is the SI unit for mass?
A) kilogram
B) pound
C) gram
D) ounce
Answer: A
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

29) Which is the SI unit for temperature?
A) Fahrenheit
B) Celsius
C) Kelvin
D) either A or C
Answer: C
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

30) Which is the SI unit for length?
A) meter
B) inch
C) kilometer
D) mile
Answer: A
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

31) Which is the SI unit for time?
A) year
B) day
C) minute
D) second
Answer: D
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

32) Which is a derived SI unit?
A) J
B) m
C) K
D) s
Answer: A
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

33) Which is **not** a derived SI unit?
A) Pa
B) J
C) C
D) s
Answer: D
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

34) The prefix used to indicate 10^{-12} is _____.
A) micro-
B) nano-
C) pico-
D) giga-
Answer: C
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

35) What is the prefix for the multiplier 1×10^6?
A) micro-
B) nano-
C) mega-
D) kilo-
Answer: C
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

36) What is the prefix for the multiplier 1×10^{-6}?
A) micro-
B) nano-
C) mega-
D) kilo-
Answer: A
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

37) 10 millimeters are equal to _____ nanometers.
A) 10^7
B) 10^{-7}
C) 10^3
D) 10^{-3}
Answer: A
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

38) How many kilograms are in 452 mg?
A) 4.52×10^{-7} kg
B) 4.52×10^{-4} kg
C) 0.452 kg
D) 4.52×10^8 kg
Answer: B
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

39) 465.000 g is equivalent to _____.
A) 0.0465 kg
B) 465,000 mg
C) 4.65 kg
D) 465,000 ng
Answer: B
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

40) Which of the following numbers expresses the value 2600. calories with both the correct units and proper scientific notation?
A) 2.6×10^4 kcal
B) 2.600×10^3 cal
C) 2.60×10^3 mcal
D) 26×10^2 dcal
Answer: B
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

41) In order to convert 121 dm to mm one needs to multiply by _____.
A) 10^7
B) 10^2
C) 10^{-2}
D) 10^{-5}
Answer: B
Section: Section 2.6
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

42) Which of the following does **not** measure temperature?
A) °C
B) °F
C) K
D) J
Answer: D
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

43) 68 °F is equal to _____.
A) 37 °C
B) 32 °C
C) 25 °C
D) 20. °C
Answer: D
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

44) 40. °C is equal to _____ K.
A) 313
B) 293
C) 263
D) 233
Answer: A
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

45) A liquid boils at 68 °F at one atmosphere pressure. This is equal to _____ K.
A) 341
B) 205
C) 253
D) 293
Answer: D
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

46) Which is the lowest temperature?
A) 40 °C
B) 104 °F
C) 313 K
D) All of them are about the same.
Answer: D
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

47) Which of the following is the hottest temperature?
A) 90 °C
B) 104 °F
C) 353 K
D) All of the above are the same.
Answer: A
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

48) Which of the following is coldest temperature?
A) -40 °C
B) -40 °F
C) 210 K
D) All of the above are the same.
Answer: C
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

49) The correct order of decreasing temperatures in the set below is _____.
A) 18 °C > 80 °F > 280 K
B) 280 K > 18 °C > 80 °F
C) 80 °F > 18 °C > 280 K
D) 80 °F > 280 K > 18 °C
Answer: C
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

50) Which of the following temperatures are not possible?
A) 2000 °C
B) -425 °F
C) -425 °C
D) 5 K
Answer: C
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

51) The units of density for a liquid are usually expressed as _____.
A) g/mL
B) g/L
C) mg/mL
D) mg/L
Answer: A
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

52) What is the density of a piece of wood that weighs 62 grams and displaces 0.525 L of water?
A) 120 g/mL
B) 0.12 g/mL
C) 0.0080 g/mL
D) 8.5 g/mL
Answer: B
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

53) If the density of aluminum is 2.70 g/ cm^3, the mass of 10.0 cm^3 of this material is _____.
A) 27.0 g
B) 2.70 g
C) 3.70 g
D) 0.270 g
Answer: A
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

54) The density of a 4.0 cm^3 sample of a metal is 11.3 g/cm^3. What is the density of 8.0 cm^3 sample of the same metal?
A) 11.3 g/ mL
B) 22.6 g/ mL
C) 5.65 g/ mL
D) 2.0 g/ mL
Answer: A
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

55) A popular science demonstration is to take several liquids that will not mix together and "stack" these liquids in a tall glass cylinder. Suppose the following three liquids were placed in the same tall, narrow glass cylinder:

SUBSTANCE	DENSITY g/mL
vinegar	1.01
motor oil	0.87
corn syrup	1.36

The substance that should be placed first in the cylinder so that it is on the bottom is _____.
A) vinegar
B) motor oil
C) corn syrup
D) cannot be determined
Answer: C
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

56) The density of copper is about 8.96 g/mL. This means that a certain mass of copper will
_____.
A) occupy the same volume as the same mass of water
B) occupy a volume 8.96 times larger than the volume occupied by the same mass of water
C) occupy a volume that is 8.96 times smaller than the volume occupied by the same mass of water
water
D) always occupy a volume of 8.96 mL
Answer: C
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

57) Ethanol has a density of 0.789 g/mL. This means that a certain volume of ethanol will
_____.
A) weigh more than an equal volume of water
B) weigh less than an equal volume of water
C) weigh exactly the same as an equal volume of water
D) always weigh 0.8 g
Answer: B
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

58) An 80.0 g sample of metal A displaces 20.0 mL of water, while a 56.0 g sample of metal B
displaces 14.0 mL of water. The conclusion one may draw from this information is that
_____.
A) A and B are the same metal
B) A and B are not the same metal
C) A and B may be the same metal, but more studies are needed to decide if they are the same
D) The above results tell us nothing about the nature of A and B.
Answer: C
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

59) 164.0 g of a substance occupy a volume of 120.0 mL. In relation to water, which statement is
true?
A) The substance will float in water.
B) The substance will sink in water.
C) The substance will react with water.
D) The substance is a metal.
Answer: B
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

60) 20.5 g of a liquid has a volume of 15 mL. What is the density?
A) 1 g/mL
B) 1.3 g/mL
C) 1.4 g/mL
D) 1.36 g/mL
Answer: C
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

61) Which statement is **true**?
A) 1 mm = 0.0394 in.
B) 1 cm^3 = 1 mL
C) 1 g = 0.0022 lb
D) All of the above are true.
Answer: D
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using
Unit Analysis.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

62) 5 gallons is equal to _____ quarts.
A) 5
B) 10
C) 20
D) 40
Answer: C
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using
Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

63) The closest number of grams that is equivalent to 0.745 lb is _____.
A) 338
B) 3.379
C) 0.338
D) 1.64×10^{-3}
Answer: A
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using
Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

64) One thousand yards are equivalent to _____.
A) 9.14×10^{-2} mm
B) 9.14×10^{2} m
C) 12,000 in
D) 1,094 m
Answer: B
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

65) How many moles of copper are present in 128 grams of copper (for copper, 1 mole = 63.546 grams)?
A) 0.496 moles
B) 8134 moles
C) 8.13×10^{-3} moles
D) 2.01 moles
Answer: D
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

66) If the speed limit is 60. mi/hr, its equivalent in km/hr is _____.
A) 38
B) 97
C) 27
D) 123
Answer: B
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

67) If the speed limit is 120 km/hr, its equivalent in mi/hr is _____.
A) 75
B) 192
C) 133
D) 210
Answer: A
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

68) A person is 6 ft 10 in tall. This is equivalent to _____ m.
A) 2.08 m
B) 2.69 m
C) 3.22 m
D) 1.68 m
Answer: A
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

69) The density of aluminum is 2.7 g/mL. This is equivalent to _____ kg/m^3.
A) 2.7×10^4
B) 2.7
C) 0.27
D) 2.7×10^3
Answer: D
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

70) How many cm^2 are there in 5.20 in^2?
A) 33.5
B) 13.2
C) 2.05
D) 0.806
Answer: A
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

71) The distance of the 220-yard race is equivalent to _____ ft.
A) 660
B) 2,640
C) 7.92×10^3
D) 73.3
Answer: A
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

72) The world record for the 100-meter dash is 9.8 s. If the world record holding runner could maintain the same pace when running five kilometers, he would cover the distance in _____.
A) 9.8 min
B) 8.2 min
C) 1.6 min
D) 5.1 min
Answer: B
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

73) Which of the following is the shortest?
A) 18 inches
B) 0.58 m
C) 580 mm
D) 1.9 ft
Answer: A
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

74) Which of the following has the greatest mass?
A) 4.4 lb
B) 2.0 kg
C) 165 oz
D) 2.0×10^3 g
Answer: C
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

75) The dietary energy requirement for an adult is 2000 kcal per day. This is equivalent to _____.
A) 478 J
B) 8.37 J
C) 47.8 kJ
D) 8.37×10^3 kJ
Answer: D
Section: Section 2.10
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

76) 20.9 kJ is equal to _____ kcal.
A) 5,000
B) 5.00
C) 873.6
D) 20
Answer: B
Section: Section 2.10
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

77) Convert 250.0 kcal to Joules.
A) 250.0 J
B) 5.975×10^4 J
C) 1.046×10^6 J
D) 1.046×10^3 J
Answer: C
Section: Section 2.10
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

78) 500 cal are added to 10 g of water (specific heat of 1.000 cal/g °C) originally at 20 °C. The final temperature is _____.
A) 70 °C
B) 50 °C
C) 25 °C
D) 22.5 °C
Answer: A
Section: Section 2.10
Learning Outcome: 2.14e Calculate the amount of heat energy using specific heat.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

79) 10. g of a certain metal absorb 40. cal of heat and the temperature is observed to rise from 20. °C to 60. °C. The specific heat of this metal is _____ cal/g °C.
A) 0.050
B) 0.10
C) 0.16
D) 0.40
Answer: B
Section: Section 2.10
Learning Outcome: 2.14e Calculate the amount of heat energy using specific heat.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

80) 100. cal of heat are added to 10 g of ethanol (0.581 cal/g °C) originally at 15 °C. The final temperature is _____.
A) 17 °C
B) 27 °C
C) 32 °C
D) 38 °C
Answer: C
Section: Section 2.10
Learning Outcome: 2.14e Calculate the amount of heat energy using specific heat.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

81) How many Joules of heat are required to raise the temperature of 35 mL of water from 25 °C to 100 °C?
A) 630 J
B) 2.6×10^3 J
C) 1.1×10^4 J
D) 1.0×10^3 J
Answer: C
Section: Section 2.10
Learning Outcome: 2.14e Calculate the amount of heat energy using specific heat.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

82) Which of the following statements about energy is correct?
A) Energy is the ability to do work.
B) When energy is absorbed by a system, its temperature increases.
C) Heat energy may be converted to work.
D) All of the above are correct.
Answer: D
Section: Section 2.10
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

83) The specific heat of water is higher than that of iron. Which of the following statements is correct?
A) The energy needed to heat iron to a certain temperature is less than the energy needed to raise the water temperature to the same level.
B) If the same quantity of energy is applied to both water and iron, iron's temperature will be much higher.
C) Iron is a better heat conductor.
D) All of the above statements are correct.
Answer: D
Section: Section 2.10
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

84) Which of the following is **not** a conversion factor?
A) speed
B) density
C) energy
D) specific heat
Answer: C
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

85) Which of the following is a conversion factor?
A) mass
B) density
C) volume
D) time
Answer: B
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

2.2   True/False Questions

1) Precision refers to how close the measured result is to the true value.
Answer: FALSE
Section: Section 2.1
Learning Outcome: 2.2 Describe the difference between precision and accuracy.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

2) The measured value 12.011 can be assumed to be accurate to +/- 0.001.
Answer: TRUE
Section: Section 2.2
Learning Outcome: 2.3 Explain why measured numbers always have uncertainty associated with them.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

3) The commonly quoted distance from the earth to the sun (93,000,000 miles) is accurate to only +/- 1,000,000 miles.
Answer: TRUE
Section: Section 2.2
Learning Outcome: 2.3 Explain why measured numbers always have uncertainty associated with them.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry and G5 Demonstrate an understanding of the impact of science on society.

4) Leading zeros are all the zeros that follow the first non-zero digit.
Answer: FALSE
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

5) When determining the number of significant figures in a number, leading zeros are not significant.
Answer: TRUE
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

6) When determining the number of significant figures in a number, trailing zeros are not significant.
Answer: FALSE
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

7) Trailing zeros are also called place-holding zeros.
Answer: FALSE
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

8) When adding or subtracting measured numbers, the answer contains no more significant figures than the number with the least number of significant figures being added or subtracted.
Answer: TRUE
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

9) The correct answer for the product (2.150×12.2) is 26.23.
Answer: FALSE
Section: Section 2.5
Learning Outcome: 2.8 Correctly add or subtract numbers according to the rules of significant figures.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

10) Coulomb is the derived SI unit that measures electrical charge.
Answer: TRUE
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

11) Joule is the derived SI unit that measures energy.
Answer: TRUE
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

12) The derived SI unit for pressure is cubic inches.
Answer: FALSE
Section: Section 2.6
Learning Outcome: 2.10a Identify the common SI units used by science.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

13) 1 kilowatt is equal to 10,000 watts.
Answer: FALSE
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

14) 2×10^{-3} meters is equal to 2 kilometers.
Answer: FALSE
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

15) One meter is equal to 1 million micrometers.
Answer: TRUE
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

16) The prefix micro- indicates one millionth.
Answer: TRUE
Section: Section 2.6
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

17) The prefix pico- indicates one billionth.
Answer: FALSE
Section: Section 2.6
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

18) One mL is equal to 1 cc.
Answer: TRUE
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

19) A pound of feathers really does not weigh more than a pound of gold.
Answer: TRUE
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills and G5 Demonstrate an understanding of the impact of science on society.

20) 0 K is equal to -273.15 °C.
Answer: TRUE
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

21) -40 °C is equivalent to -40 °F.
Answer: TRUE
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

22) 40 °C is equivalent to 40 °F.
Answer: FALSE
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

23) There has never been recorded a negative Kelvin temperature.
Answer: TRUE
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

24) The Kelvin temperature is not always higher than the equivalent Celsius temperature.
Answer: FALSE
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

25) The Fahrenheit temperature is always numerically higher than the equivalent Celsius temperature.
Answer: FALSE
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

26) Density is an extensive property of matter the more of a given substance you have, the more dense it becomes.
Answer: FALSE
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G1 Demonstrate an understanding of the principles of scientific inquiry.

27) Oil "floats" on water because oil weighs less than water.
Answer: FALSE
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills and G5 Demonstrate an understanding of the impact of science on society.

28) Oil "floats" on water because oil is less dense than water.
Answer: TRUE
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills and G5 Demonstrate an understanding of the impact of science on society.

29) Density units may be in lb/ gallon.
Answer: TRUE
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

30) The fact that ice has a lower density than liquid water is advantageous to marine life.
Answer: TRUE
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills and G5 Demonstrate an understanding of the impact of science on society.

31) Salt water has a density that is less than 1 g/mL.
Answer: FALSE
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills and G5 Demonstrate an understanding of the impact of science on society.

32) Ice always occupies a smaller volume than water.
Answer: FALSE
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills and G5 Demonstrate an understanding of the impact of science on society.

33) Density is a conversion factor.
Answer: TRUE
Section: Section 2.8
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

34) One week contains 604,800 seconds.
Answer: TRUE
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry and G5 Demonstrate an understanding of the impact of science on society.

35) There are 4 pints in a gallon.
Answer: FALSE
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry and G5 Demonstrate an understanding of the impact of science on society.

36) Specific heat may be measured as cal. g/°C.
Answer: FALSE
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

37) A substance that may be a good heat conductor **usually** has a low value for specific heat.
Answer: TRUE
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

38) Water is a good heat conductor.
Answer: FALSE
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

39) When heat is absorbed the temperature of the system increases.
Answer: TRUE
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

40) Temperature changes that may be used for energy difference calculations are measured through a bomb calorimeter.
Answer: TRUE
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

41) One Cal of energy used by dieticians and the food industry is equal to 4.184 joules.
Answer: FALSE
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

42) One Cal is equal to 1 kcal.
Answer: TRUE
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

2.3   Short Answer Questions

1) How many significant digits are there in the number 740.2?
Answer: 4
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

2) How many significant digits are there in the number 0.0038040?
Answer: 5
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

3) What is the Greek prefix and abbreviation which signifies one thousand?
Answer: k, for kilo
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

4) Convert 16.8 meters to: a) millimeters, b) centimeters, c) kilometers.
Answer:
a) 16,800 mm
b) 1,680 cm
c) 0.0168 km
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

5) Convert 65 °F, a cool summer's daytime temperature, to:
a) degrees Celsius.
b) absolute temperature (Kelvin).
Answer:
a) 18 °C
b) 291 K
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

6) What is the density, in g/mL, of a piece of metal that weighs 0.408 kg and displaces 0.0297 L of water?
Answer: d = 13.7 g/mL
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

7) Convert 302 cubic inches to liters (1 inch = 2.54 centimeters). Show the math.
Answer: $(302 \text{ in}^3) \times (2.54 \text{ cm/1 in})^3 \times (1 \text{ mL/1 cm}^3) \times (1 \text{ L/1000 mL}) = 4.95$ L
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

8) Convert 15.0 ft^3 to m^3. Show the math.
Answer: $(15.0 \text{ ft}^3) \times (12 \text{ in/1 ft})^3 \times (2.54 \text{ cm/1 in})^3 \times (1 \text{ m/100 cm})^3 = 0.425 \text{ m}^3$
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

9) It is 1148 miles from Grand Rapids, Michigan, to Starkville, Mississippi. What is the same distance in kilometers (1 mile = 1.61 kilometers)?
Answer: 1850 kilometers (although it seems much longer by car)
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

10) Calculate the approximate distance (in km) between earth and sun, given that the speed of light is about 3.0×10^{10} cm/s and that it takes about 8.5 minutes for sunlight to reach earth.
Answer: $(3 \times 10^{10}$ cm/s$) \times (60$ s/min$) \times (8.5$ min$) \times (1$ m/100 cm$) \times (1$ km/1,000 m$) = 1.5 \times 10^{8}$ km
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

11) Solve the equation 4x + 3y = 246 for the x-variable, and report the value for x when y = 2.36.
Answer: (246 - 3y)/4 = x; when y = 2.36, x = 59.7
Section: Section 2.9
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

12) Solve the equation PV = nRT for the n-variable.
Answer: n = (PV)/(RT)
Section: Section 2.9
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

13) Calculate the amount of energy needed to raise the temperature of 25 mL ethanol (density = 0.80 g/mL) from 10.0 °C to 20.0 °C (c = 0.581 cal/g°C) both in cal and joules.
Answer: Density = mass/ volume; mass of ethanol = 0.80 × 25 = 20. g;
Heat = mass × specific heat × difference in temperature
     = 20. × 0.581 × 10 = 120 cal = 490 joules
Section: Section 2.10
Learning Outcome: 2.14e Calculate the amount of heat energy using specific heat.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

2.4 Matching Questions

Match the correct number of significant figures from the second column with each of the numbers in the first column.

A) 7
B) 3
C) 2
D) 6
E) 5
F) 4
G) 1

1) 2.456×10^{-3}
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

2) 0.00201
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

3) 34.3004
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

4) 0.40001
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

5) 4.0
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

6) 0.7
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

7) 0.02
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

8) 5.2406
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

9) 8.901070
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

10) 0.002003
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

11) 5000
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

12) 5000.
Section: Section 2.3
Learning Outcome: 2.4 Identify leading zeros and trailing zeros in a measured number.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

Answers: 1) F 2) B 3) D 4) E 5) C 6) G 7) G 8) E 9) A 10) F 11) G 12) F

Match the correct scientific notation from column 2 with the standard notation provided in column 1.

A) 1.570×10^0
B) 1.570×10^1
C) 1.570×10^{-3}
D) 1.570×10^{-2}

13) 15.70
Section:
Learning Outcome:
Section 2.4
2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

14) 1.570
Section: Section 2.4
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

15) 0.001570
Section: Section 2.4
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

16) 0.01570
Section: Section 2.4
Learning Outcome: 2.6 Convert a number from standard to scientific notation and vice versa.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

Answers: 13) B 14) A 15) C 16) D

Match each temperature in column 1 with the equivalent different scale temperature in column 2.

A) 0. °C
B) 280 K
C) 68 °F
D) 100. °C
E) -40 °F
F) 32 °F
G) 98.6 °F
H) -273 °C
I) -17.8 °C

17) 20. °C
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

18) 273 K
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

19) 40. °F
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

20) 0.00 °F
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

21) 0 °C
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

22) 310 K
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

23) -40 °C
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

24) 212 °F
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

25) 0 K
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

Answers: 17) C 18) A 19) B 20) I 21) F 22) G 23) E 24) D 25) H

Match a unit from the first column with a measurement from the second column.

A) time
B) energy
C) electrical charge
D) mass
E) length
F) volume
G) temperature
H) density

26) mg
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

27) s
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

28) ft
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

29) km
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

30) qt
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

31) mL
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

32) lb
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

33) gallon
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

34) m^3
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

35) in
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

36) K
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

37) °F
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

38) °C
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

39) Joule
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

40) C
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

41) g/L
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

42) lb/qt
Section: Section 2.7
Learning Outcome: 2.11b Define density and use it to do calculations.
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

43) Cal
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

Answers: 26) D 27) A 28) E 29) E 30) F 31) F 32) D 33) F 34) F 35) E 36) G 37) G 38) G 39) B 40) C 41) H 42) H 43) B

Match an exponential from the right column with each prefix in the left column.

A) 10^{+3}
B) 10^{-1}
C) 10^{+9}
D) 10^{-12}
E) 10^{-3}
F) 10^{+6}
G) 10^{-6}
H) 10^{-9}
I) 10^{-2}

44) giga-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

45) nano-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

46) centi-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

47) milli-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

48) micro-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

49) kilo-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

50) pico-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

51) deci-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

52) mega-
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

Answers: 44) C 45) H 46) I 47) E 48) G 49) A 50) D 51) B 52) F

Match each unit in the left column with another unit of the same physical measurement that appears in the right column.

A) joule
B) lb/qt
C) °C
D) gallon
E) km
F) lb

53) g
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

54) ton
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

55) quart
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

56) cal
Section: Section 2.10
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

57) K
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

58) g/mL
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

59) mile
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

60) cup
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

61) °F
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

62) yd
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

63) cm^3
Section: Section 2.6
Global Obj: G2 Demonstrate the ability to think critically and employ critical thinking skills.

Answers: 53) F 54) F 55) D 56) A 57) C 58) B 59) E 60) D 61) C 62) E 63) D

Choose the number in the second column that correctly fills the blank in each item in the first column.

A) 36
B) 0.556
C) 454
D) 8
E) 1,000,000
F) 1,000
G) 1
H) 2.54
I) 4.184
J) 16

64) One kg is equal to _____ g.
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

65) One degree Fahrenheit is equal to _____°C.
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

66) One Kelvin is equal to _____°C.
Section: Section 2.6
Learning Outcome: 2.13d Algebraically rearrange a mathematical equation to solve it for a desired variable.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

67) One kilometer is equal to _____ mm.
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

68) One pound is equal to _____ g.
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

69) One gallon is equal to _____ pints.
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

70) One yard is equal to _____ inches.
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

71) One inch is equal to _____ cm.
Section: Section 2.8
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

72) One pound is equal to _____ oz.
Section: Section 2.6
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

73) One cal is equal to _____ J.
Section: Section 2.10
Learning Outcome: 2.12c Convert the units of a measured quantity to some other units using Unit Analysis.
Global Obj: G4 Demonstrate the quantitative skills needed to succeed in chemistry.

Answers: 64) F 65) B 66) G 67) E 68) C 69) D 70) A 71) H 72) J 73) I