

# Test Bank for Introductory Chemistry Atoms First 5th Edition Russo Silver 0321927117 9780321927118

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## *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)  $9.075 \times 10^{-5}$
- B)  $9.075 \times 10^5$
- 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 in 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  $1.519 \times 10^{-2}$ ?

- 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  $147.8 \times 10^{-3}$  is \_\_\_\_\_.

- A) 1.478
- B)  $1478 \times 10^{-4}$
- C)  $1.478 \times 10^{-1}$
- D)  $1.478 \times 10^{-5}$

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)  $1.546 \times 10^6$  mi
- B)  $1.546 \times 10^5$  mi
- C)  $1.546 \times 10^{-5}$  mi
- D)  $1.546 \times 10^{-6}$  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)  $2.47 \times 10^{-4}$
- B)  $2.47 \times 10^{-2}$
- C)  $2.47 \times 10^{-1}$
- 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)  $3.007 \times 10^{-5}$
- B)  $3.007 \times 10^5$
- C) 3.007
- D)  $3.007 \times 10^4$
- E)  $3.7 \times 10^{-5}$

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  $1.06 \times 10^{-4}$  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)  $26.255 \times 1.91$
- 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)  $63.75 \times 1.15$
- B)  $90.0 - 16.67$
- C)  $60.15 + 13.26$
- D)  $12.161 \times 6.03$

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  $1 \times 10^6$ ?

- 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  $1 \times 10^{-6}$ ?

- 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)  $4.52 \times 10^{-7}$  kg
- B)  $4.52 \times 10^{-4}$  kg
- C) 0.452 kg
- D)  $4.52 \times 10^8$  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)  $2.6 \times 10^4$  kcal
- B)  $2.600 \times 10^3$  cal
- C)  $2.60 \times 10^3$  mcal
- D)  $26 \times 10^2$  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)  $18\text{ }^{\circ}\text{C} > 80\text{ }^{\circ}\text{F} > 280\text{ K}$
- B)  $280\text{ K} > 18\text{ }^{\circ}\text{C} > 80\text{ }^{\circ}\text{F}$
- C)  $80\text{ }^{\circ}\text{F} > 18\text{ }^{\circ}\text{C} > 280\text{ K}$
- D)  $80\text{ }^{\circ}\text{F} > 280\text{ K} > 18\text{ }^{\circ}\text{C}$

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)  $2000\text{ }^{\circ}\text{C}$
- B)  $-425\text{ }^{\circ}\text{F}$
- C)  $-425\text{ }^{\circ}\text{C}$
- D)  $5\text{ K}$

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)  $120\text{ g/mL}$
- B)  $0.12\text{ g/mL}$
- C)  $0.0080\text{ g/mL}$
- D)  $8.5\text{ g/mL}$

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  $2.70 \text{ g/cm}^3$ , the mass of  $10.0 \text{ cm}^3$  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  $4.0 \text{ cm}^3$  sample of a metal is  $11.3 \text{ g/cm}^3$ . What is the density of  $8.0 \text{ cm}^3$  sample of the same metal?

- A)  $11.3 \text{ g/mL}$
- B)  $22.6 \text{ g/mL}$
- C)  $5.65 \text{ g/mL}$
- D)  $2.0 \text{ g/mL}$

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
- 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<sup>3</sup> = 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)  $1.64 \times 10^{-3}$

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)  $9.14 \times 10^{-2}$  mm

B)  $9.14 \times 10^2$  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)  $8.13 \times 10^{-3}$  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<sup>3</sup>.

- A)  $2.7 \times 10^4$
- B) 2.7
- C) 0.27
- D)  $2.7 \times 10^3$

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<sup>2</sup> are there in 5.20 in<sup>2</sup>?

- 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)  $7.92 \times 10^3$
- 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)  $2.0 \times 10^3$  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)  $8.37 \times 10^3$  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)  $5.975 \times 10^4$  J
- C)  $1.046 \times 10^6$  J
- D)  $1.046 \times 10^3$  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)  $2.6 \times 10^3$  J
- C)  $1.1 \times 10^4$  J
- D)  $1.0 \times 10^3$  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  $\pm 0.001$ .

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  $\pm 1,000,000$  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 ( $2.150 \times 12.2$ ) 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)  $2 \times 10^{-3}$  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  $-273.15\text{ }^{\circ}\text{C}$ .

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)  $-40\text{ }^{\circ}\text{C}$  is equivalent to  $-40\text{ }^{\circ}\text{F}$ .

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)  $40\text{ }^{\circ}\text{C}$  is equivalent to  $40\text{ }^{\circ}\text{F}$ .

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:  $d = 13.7 \text{ g/mL}$

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:  $(302 \text{ in}^3) \times (2.54 \text{ cm}/1 \text{ in})^3 \times (1 \text{ mL}/1 \text{ cm}^3) \times (1 \text{ L}/1000 \text{ mL}) = 4.95 \text{ L}$

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<sup>3</sup> to m<sup>3</sup>. Show the math.

Answer:  $(15.0 \text{ ft}^3) \times (12 \text{ in}/1 \text{ ft})^3 \times (2.54 \text{ cm}/1 \text{ in})^3 \times (1 \text{ m}/100 \text{ cm})^3 = 0.425 \text{ m}^3$

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  $3.0 \times 10^{10}$  cm/s and that it takes about 8.5 minutes for sunlight to reach earth.

Answer:  $(3 \times 10^{10} \text{ cm/s}) \times (60 \text{ s/min}) \times (8.5 \text{ min}) \times (1 \text{ m}/100 \text{ cm}) \times (1 \text{ km}/1,000 \text{ m}) = 1.5 \times 10^8 \text{ km}$

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 ( $c = 0.581 \text{ cal/g}^\circ\text{C}$ ) both in cal and joules.

Answer: Density = mass/ volume; mass of ethanol =  $0.80 \times 25 = 20. \text{ g}$ ;

Heat = mass  $\times$  specific heat  $\times$  difference in temperature

$$= 20. \times 0.581 \times 10 = 120 \text{ cal} = 490 \text{ joules}$$

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)  $2.456 \times 10^{-3}$

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)  $1.570 \times 10^0$
- B)  $1.570 \times 10^1$
- C)  $1.570 \times 10^{-3}$
- D)  $1.570 \times 10^{-2}$

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)  $-40\text{ }^{\circ}\text{C}$

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)  $212\text{ }^{\circ}\text{F}$

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)  $0\text{ K}$

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<sup>3</sup>

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)  $\text{cm}^3$

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