***Introductory Chemistry*, 4e (Tro)**

**Chapter 2 Measurement and Problem Solving**

True/False Questions

1) Numbers are usually written so that the uncertainty is in the last reported digit.

Answer: TRUE

Diff: 1 Page Ref: 2.1

2) The decimal number 0.0000010 expressed in scientific notation is 1.0 × 106.

Answer: FALSE

Diff: 1 Page Ref: 2.2

3) The decimal number 0.0210 expressed in scientific notation is 2.10 ×10-2.

Answer: TRUE

Diff: 1 Page Ref: 2.2

4) The mass of an object, 4.55 × 10-3 g, expressed in decimal notation is 0.000455 g.

Answer: FALSE

Diff: 1 Page Ref: 2.2

5) If you count 7 pennies, you can only report one significant figure in that measurement.

Answer: FALSE

Diff: 1 Page Ref: 2.3

6) Exact numbers have an unlimited number of significant figures.

Answer: TRUE

Diff: 1 Page Ref: 2.3

7) Zeros located between two numbers are not significant.

Answer: FALSE

Diff: 1 Page Ref: 2.3

8) Zeros located after a number and after a decimal point are significant.

Answer: TRUE

Diff: 1 Page Ref: 2.3

9) Trailing zeros at the end of a number, but before an implied decimal point, are ambiguous.

Answer: TRUE

Diff: 1 Page Ref: 2.3

10) The number 0.010100 has five significant figures.

Answer: TRUE

Diff: 1 Page Ref: 2.3

11) The number 4,450,000.0 has 3 significant figures.

Answer: FALSE

Diff: 1 Page Ref: 2.3

12) The number 7.20 × 103 contains three significant figures.

Answer: TRUE

Diff: 1 Page Ref: 2.3

13) When the temperature of an object is reported as 23.7°C, the actual temperature can be assumed to be between 23.6°C and 23.8°C.

Answer: TRUE

Diff: 1 Page Ref: 2.3

14) Scientific numbers are reported so that every digit is certain except the last, which is estimated.

Answer: TRUE

Diff: 1 Page Ref: 2.3

15) When the number 65.59 is rounded to contain 2 significant figures, it becomes 66.0.

Answer: FALSE

Diff: 1 Page Ref: 2.4

16) When the number 2.35 is rounded to contain 2 significant figures it becomes 2.4.

Answer: TRUE

Diff: 1 Page Ref: 2.4

17) In multiplication and division calculations, the answer will have the same number of decimal places as the number carrying the fewest decimal places.

Answer: FALSE

Diff: 1 Page Ref: 2.4

18) In multiplication or division calculations, the answer will have the same number of decimal places as the number carrying the most decimal places.

Answer: FALSE

Diff: 1 Page Ref: 2.4

19) In addition or subtraction, the result carries the same number of decimal places as the quantity carrying the fewest decimal places.

Answer: TRUE

Diff: 1 Page Ref: 2.4

20) The mass of an object depends on gravity.

Answer: FALSE

Diff: 1 Page Ref: 2.5

21) The standard unit of length in the SI system is the cm.

Answer: FALSE

Diff: 1 Page Ref: 2.5

22) The standard unit of mass in the SI system is the kg.

Answer: TRUE

Diff: 1 Page Ref: 2.5

23) The prefix nano represents the multiplier 0.000000001.

Answer: TRUE

Diff: 1 Page Ref: 2.5

24) The prefix micro represents the multiplier 0.001.

Answer: FALSE

Diff: 1 Page Ref: 2.5

25) A nine gigagram mass is heavier than a nine nanogram mass.

Answer: TRUE

Diff: 1 Page Ref: 2.5

26) There are 1000 kilometers in one meter.

Answer: FALSE

Diff: 1 Page Ref: 2.5

27) You do not need to write units in calculations as long as you can remember them.

Answer: FALSE

Diff: 1 Page Ref: 2.6

28) Conversion factors are constructed from any two quantities known to be equivalent.

Answer: TRUE

Diff: 1 Page Ref: 2.6

29) A conversion factor is a fraction with one unit on top and a different unit on the bottom.

Answer: TRUE

Diff: 1 Page Ref: 2.6

30) A solution map diagrams the steps required to get from the starting point to the end point of a calculation problem.

Answer: TRUE

Diff: 1 Page Ref: 2.6

Multiple Choice Questions

1) The correct scientific notation for the number 0.00050210 is:

A) 5.0210 × 104

B) 5.021 ×10-4

C) 5.021 ×104

D) 5.0210 ×10-4

E) none of the above

Answer: D

Diff: 1 Page Ref: 2.2

2) The correct scientific notation for the number 500.0 is:

A) 5 × 102

B) 5.00 × 102

C) 5.000 × 102

D) 5 × 10-2

E) none of the above

Answer: C

Diff: 1 Page Ref: 2.2

3) The distance between the two hydrogen atoms in a molecule of water is 0.000000000172 m. Express this distance in scientific notation.

A) 1.72 ×10-9 m

B) 1.72 × 10-10 m

C) 0.172 × 10-10 m

D) 17.2 × 109 m

E) 1.72 × 1010 m

Answer: B

Diff: 1 Page Ref: 2.2

4) The wavelength of blue light is 0.00000045 m. Express this wavelength in scientific notation.

A) 4.5 × 10-6 m

B) 4.5 × 106 m

C) 4.5 × 10-7 m

D) 4.5 × 107 m

E) 0.45 × 10-7 m

Answer: C

Diff: 1 Page Ref: 2.2

5) The correct decimal representation of 1.201 × 10-7 is:

A) 12010000

B) 0.0001201

C) 0.0000001201

D) 1201.000

E) none of the above

Answer: C

Diff: 1 Page Ref: 2.2

6) The correct decimal representation of 6.453 × 103 is:

A) 6,453

B) 0.006453

C) 6.5 ×103

D) 6.453

E) none of the above

Answer: A

Diff: 1 Page Ref: 2.2

7) The correct number of significant figures in the number 4.0 ×10-2 is:

A) 1

B) 2

C) 3

D) ambiguous.

E) none of the above

Answer: B

Diff: 1 Page Ref: 2.3

8) The correct number of significant figures in the number 0.002320 is:

A) 7

B) 4

C) 3

D) ambiguous

E) none of the above

Answer: B

Diff: 1 Page Ref: 2.3

9) Which of the following statements is NOT part of the rules for determining significant figures?

A) Non-zero digits at the end of a number are not significant.

B) Zeroes between two numbers are significant.

C) Zeroes to the left of the first non-zero number are not significant.

D) Zeroes at the end of a number, but before a decimal are ambiguous.

E) All of the above statements are part of the rules.

Answer: A

Diff: 1 Page Ref: 2.3

10) When the value 4.449 is rounded to two significant figures, the number should be reported as:

A) 4.4

B) 4.5

C) 4.44

D) 4.45

E) none of the above

Answer: A

Diff: 1 Page Ref: 2.4

11) How many significant digits should be reported in the answer to the following calculation?

(4.3 - 3.7) × 12.3=

A) 1

B) 2

C) 3

D) 4

E) none of the above

Answer: A

Diff: 2 Page Ref: 2.4

12) Determine the answer for the equation below with correct number of significant figures:

3.215 × 13.2 ÷ 0.218 = \_\_\_\_\_\_\_\_

A) 194.669

B) 195

C) 194.7

D) 194.67

E) none of the above

Answer: B

Diff: 2 Page Ref: 2.4

13) Determine the answer for the equation below with correct number of significant figures:

1.2 × 1.79 = \_\_\_\_\_\_\_\_

A) 2.148

B) 2.15

C) 2.1

D) 2.2

E) none of the above

Answer: C

Diff: 2 Page Ref: 2.4

14) Determine the answer to the following equation with correct number of significant figures:

106 ÷ 9.02 × 1.9 = \_\_\_\_\_\_\_\_

A) 22.32816

B) 22.328

C) 22.3

D) 22

E) none of the above

Answer: D

Diff: 2 Page Ref: 2.4

15) Determine the answer to the following equation with correct number of significant figures:

2.02 + 8.102 - 0.0297 = \_\_\_\_\_\_\_\_

A) 10.0923

B) 10.09

C) 10.1

D) 10.092

E) none of the above

Answer: B

Diff: 2 Page Ref: 2.4

16) Determine the answer to the following equation with correct number of significant figures:

13.96 - 4.9102 + 71.5 = \_\_\_\_\_\_\_\_

A) 80.5498

B) 81

C) 80.5

D) 80.55

E) none of the above

Answer: C

Diff: 2 Page Ref: 2.4

17) Determine the answer to the following equation with correct number of significant figures:

(4.123 × 0.12) + 24.2 = \_\_\_\_\_\_\_\_

A) 25

B) 24.695

C) 24.70

D) 24.7

E) none of the above

Answer: D

Diff: 2 Page Ref: 2.4

18) Determine the answer to the following equation with correct number of significant figures:

(17.103 + 2.03) × 1.02521 = \_\_\_\_\_\_\_\_

A) 19.6153

B) 19.62

C) 19.6

D) 20

E) none of the above

Answer: B

Diff: 2 Page Ref: 2.4

1) How many milliliters are in 17.5 L?

A) 175

B) 1.75 × 10-2

C) 1.75 × 103

D) 1.75 × 104

E) none of the above

Answer: D

Diff: 2 Page Ref: 2.6

2) How many microliters are in 41.0 mL?

A) 4.1 × 103

B) 4.1 ×1010

C) 0.041

D) 4.10 ×104

E) none of the above

Answer: D

Diff: 2 Page Ref: 2.6

3) How many liters are in 333 mL?

A) 3.33 ×105

B) 0.333

C) 33.3

D) 3.33

E) none of the above

Answer: B

Diff: 2 Page Ref: 2.6

4) How many low dose 81 mg aspirin tablets can be made from 1.21 kg of aspirin?

A) 1.5 × 103 tablets

B) 1.5 × 104 tablets

C) 1.5 × 105 tablets

D) 1.21 × 103 tablets

E) 1.21 × 104 tablets

Answer: B

Diff: 2 Page Ref: 2.7

5) A room has dimensions of 10.0 ft × 20.0 ft × 8.00 ft. Given that there are three feet in a yard, what is the volume of the room in yd3?

A) 178

B) 59.3

C) 1.60 × 103

D) 533

E) none of the above

Answer: B

Diff: 3 Page Ref: 2.8

6) What is the volume of a cube with dimensions 11.0 cm × 11.0 cm × 11.0 cm in m3?

A) 1.331 ×10-3

B) 1.33 ×103

C) 1.33 ×10-3

D) 1.3 ×103

E) none of the above

Answer: C

Diff: 2 Page Ref: 2.8

7) Given the density of Au is 19.3 g/cm3, determine the mass of gold in an ingot with the dimensions of

10.0 in × 4.00 in × 3.00 in.

A) 3.80 ×104

B) 102

C) 2.32 ×103

D) 0.161

E) none of the above

Answer: A

Diff: 2 Page Ref: 2.9

8) What is the density (g/mL) of an object that has a mass of 14.01 grams and, when placed into a graduated cylinder, causes the water level to rise from 25.2 mL to 33.6 mL?

A) 0.60

B) 1.7

C) 1.8

D) 2.4

E) none of the above

Answer: B

Diff: 3 Page Ref: 2.9

9) An object weighing 1.840 kg has a volume of 0.0015 m3. What is the density of the object in g/cm3?

A) 1.2

B) 0.0012

C) 0.82

D) 0.0028

E) none of the above

Answer: A

Diff: 3 Page Ref: 2.9

10) Given the following list of densities, which materials would float in a molten vat of lead provided that they do not themselves melt? Densities (g/mL): lead = 11.4, glass = 2.6, gold = 19.3, charcoal = 0.57, platinum = 21.4.

A) gold and platinum

B) glass and charcoal

C) gold, platinum, glass and coal

D) gold and charcoal

E) none of the above

Answer: B

Diff: 2 Page Ref: 2.9