1. It is estimated that uranium is relatively common in the earth's crust, occurring in amounts of 4 g/metric ton. A metric ton is 1000 kg. At this concentration, what mass of uranium is present in 1.0 mg of the earth's crust?

    ___ A. 4 nanograms

    ___ B. 4 micrograms

    ___ C. 4 milligrams

    ___ D. $4 > 10^{-5}$ g

    ___ E. 4 centigrams

2. In 1928, 1.0 g of a new element was isolated from 660 kg of the ore molybdenite. The percent by mass of this element in the ore was:

    ___ A. 1.5%

    ___ B. 6.6%

    ___ C. 1.0%

    ___ D. $1.5 > 10^{-4}$%

    ___ E. $3.5 > 10^{-3}$%

3. Which of the following metric relationships is incorrect?

    ___ A. 1 microliter = 10^{-6} liters

    ___ B. 1 megagram = 10^6 grams

    ___ C. 1 millimeter = 10^3 meters

    ___ D. 1 kilogram = 10^3 grams

    ___ E. 100 centimeters = 1 meter

4. Express 784000000 in exponential notation.

    ___ A. $7.84 > 10^6$

    ___ B. $7.84 > 10^8$

    ___ C. $78.4 > 10^7$

    ___ D. $784 > 10^6$

    ___ E. $784 > 10^7$

5. A scientist obtains the number 1250.37986 on a calculator. If this number actually has four (4) significant figures, how should it be written?

    ___ A. 1251

    ___ B. 1250.3799

    ___ C. 1250.4

    ___ D. $1.250 > 10^3$

    ___ E. $1.250 > 10^{-3}$

6. How many significant figures are there in the number 0.0322?

   __ A. 3

   __ B. 5

   __ C. 4

   __ D. 2

   __ E. 0

7. A piece of indium with a mass of 16.6 g is submerged in 46.3 cm^3 of water in a graduated cylinder. The water level increases to 48.6 cm^3. The correct value for the density of indium from these data is:

   __ A. 7.217 g/cm^3

   __ B. 7.2 g/cm^3

   __ C. 0.14 g/cm^3

   __ D. 0.138 g/cm^3

   __ E. more than 0.1 g/cm^3 away from any of these values.

8. Express 0.000543 in exponential notation.

   __ A. $5.43 > 10^{-4}$

   __ B. $5.43 > 10^{-6}$

   __ C. $54.3 > 10^{-5}$

   __ D. $54.3 > 10^{-3}$

   __ E. $543 > 10^{-3}$

9. Using the rules of significant figures, calculate the following:

$$\frac{6.167+83}{5.10}$$

   __ A. 17.5

   __ B. 18

   __ C. 17

   __ D. 20

   __ E. 17.48

10. Convert 974036 mm to km.

   __ A. 9744036 km

   __ B. 974.036 km

   __ C. 974036000 km

   __ D. 0.000974036 km

   __ E. 0.974036 km

11. 100 seconds contain this many nanoseconds.

    ___ A. $1 > 10^7$

    ___ B. $1 > 10^{11}$

    ___ C. $1 > 10^{10}$

    ___ D. $1 > 10^{12}$

    ___ E. $1 > 10^8$

12. Convert 4301 mL to qts. (1 L = 1.06 qt)

    ___ A.   4559 qts

    ___ B.   4.058 qts

    ___ C. $4058 > 10^{-3}$ qts

    ___ D.   4058 qts

    ___ E.   4.559 qts

13. Convert 761 mi to km. (1 m = 1.094 yds, 1 mi = 1760 yds)

    ___ A.   832 km

    ___ B.   1470 km

    ___ C. $1.22 > 10^9$ km

    ___ D.   696 km

    ___ E.   1220 km

14. Convert 0.092 ft^3 to L. (2.54 cm = 1 in., 1 L = 1 dm^3)

    ___ A.   26 L

    ___ B.   2.6 L

    ___ C. $3.2 > 10^{-3}$ L

    ___ D.   1.8 L

    ___ E.   0.40 L

15. 423 Kelvin equals

    ___ A.   150. °F

    ___ B.   273. °F

    ___ C.   696. °F

    ___ D.   150. °C

    ___ E.   696. °C

16. Manganese makes up 1.3×10^{-4} percent by mass of the elements found in a normal healthy body. How many grams of manganese would be found in the body of a person weighing 183 lb? (2.2 lb = 1.0 kg)

    ___ A.   1100 g

    ___ B.   0.11 g

    ___ C.   11 g

    ___ D.   0.24 g

    ___ E.   none of these is correct

17. The melting point of indium is 156.2°C. At 323°F, what is the physical state of indium?
    ($T_F = T_C \times (9°F/5°C) + 32°F$)

    ___ A.   solid

    ___ B.   liquid

    ___ C.   gas

    ___ D.   not enough information

    ___ E.   At 323°F, the indium is partially solid and partially liquid; there is an equilibrium between the two states.

18. A monolayer containing 3.20×10^{-6} g of oleic acid has an area of 20.0 cm^2. The density of oleic acid is 0.895 g/mL. What is the thickness of the monolayer (the length of an oleic acid molecule)?

    ___ A. 2.86×10^{-6} cm

    ___ B. 3.58×10^{-6} cm

    ___ C. 5.59×10^{-6} cm

    ___ D. 1.79×10^{-7} cm

    ___ E. 1.43×10^{-7} cm

19. A 20.0-mL sample of glycerol has a mass of 25.2 grams. What is the density of glycerol in ounces/quart? (1.00 ounce = 28.4 grams, and 1.00 liter = 1.06 quarts)

20. Convert 0.7891 L to cL.

    ___ A.   0.007891 cL

    ___ B.   789.1 cL

    ___ C.   78.91 cL

    ___ D.   0.07891 cL

    ___ E.   7.891 cL

Answer Key

1. A

2. D

3. C

4. B

5. D

6. A

7. B

8. A

9. C

10. E

11. B

12. E

13. E

14. B

15. D

16. B

17. D

18. D

19. (25.2 g/20.0 mL) (10^3 mL/1 L) (1 L/1.06 qt) (1 oz/28.4 g) = 41.9 oz/qt

20. C