Fill in the correct answer on the answer sheet.

$$= m / V \qquad N = N_A\, n \qquad N_A = 6.022 \times 10^{23}\ \text{mol}^{-1} \qquad C = n/V$$

$$\mathbf{M} = m / n \qquad aA + bB \rightarrow cC + dD : \quad n_A /a = n_B /b = n_C /c = n_D /d \qquad T_K/K = t_{\circ C}/^\circ C + 273.15$$

Be sure you <u>always</u> provide the proper units!

1) Which of the following statements is true about a scientific theory?

A) A theory must correspond to intuition about nature,
B) A theory must be first proven.
C) A theory is always tentative
D) A theory is predictive.
E) A theory must conform to other theories.
F) A theory can not be proven.

2) Which of the following statements is true about a scientific observation?

A) It must agree with prior observations
B) It must be repeatable.
C) It is tentative
D) It does not matter whether it is recorded or not.
E) It must be observed by a trained scientist
F) It must be independent of the observer

3) Covert the following to:
Scientific Notation:
A) 415
B) 0.00000829

Floating Point Notation:
C) 2.364758×10^6
D) 5.90×10^{-3}

4) Do the following operations and give the proper number of significant figures in the answer.

A) $6.6958 \times 10^2 \times 7.068 \times 10^{-3}$
B) $7.9835 \times 10^4 / 8.7309 \times 10^{-6}$

5) Do the following operations and give the proper number of significant figures in the answer.

A) $1.6885 \times 10^3 + 4.93 \times 10^4$
B) $2.72182 \times 10^2 - 3.480 \times 10^1$

6) The density of uranium is 19.140 g mL^{-1}. What is the volume of 10.7 g of uranium?

7) A) How many microjoules are there in 8.31×10^1 kJ?

    B) How many nanometers are there in 7.75×10^{-1} mm?

8) Which of the following compounds is a totally ionic compound? Circle the correct answer on the answer sheet.
    A) HCl **B)** NaNO$_3$ **C)** NaCl   **D)** CH$_4$ **E)** CH$_3$COOH

9) Which of the following compounds is a totally covalent compound? Circle the correct answer on the answer sheet.
    A) KCl **B)** UH$_3$ **C)** HCl   **D)** NaOH   **E)** KH

10) Complete the following reactions as Brønsted–Lowery acid–base reactions.
    $$HNO_3 + H_2O \rightarrow$$
    $$C_6H_5NH_2 + H_2O \rightarrow$$
    $$H_2O + HClO_3 \rightarrow$$
    $$CH_3NH_2 + HCl \rightarrow$$

11) How many molecules are there in 72.6 moles of NH$_3$?

12) How many grams are there in 1.02 mol of H$_2$CO$_3$?

13) How many grams are there in 2.48×10^{24} molecules of CH$_4$?

14) Calculate the percentage of each of the elements in the compound YPO$_4$.

15) What is the simplest (empirical) formula for a compound that is 23.3% Mg , 30.7% S and 46.0% O.

16) How much is 194.78 °C in kelvins?

17) How many grams of FeCl$_2$ are needed to create 28.0 mL of a 0.683 M solution?

18) How many milliliters of a 3.10 M solution can one make with 79.20 g of BaCl$_2$?

19) Label whether the following are an Arrhenius acid or whether it is an Arrhenius base.
    NaOH
    H$_3$PO$_4$
    HF
    NH$_3$
    Sr(OH)$_2$
    CH$_3$COOH

20) What state of matter retains its volume but conforms to the containers shape?

NAME

1)
A) A theory must correspond to intuition about nature,   **true**   **false**
B) A theory must be first proven.   **true**   **false**
C) A theory is always tentative   **true**   **false**
D) A theory is predictive.   **true**   **false**
E) A theory must conform to other theories.   **true**   **false**
F) A theory can not be proven.   **true**   **false**

2)
A) It must agree with prior observations   **true**   **false**
B) It must be repeatable.   **true**   **false**
C) It is tentative   **true**   **false**
D) It does not matter whether it is recorded or not.   **true**   **false**
E) It must be observed by a trained scientist   **true**   **false**
F) It must be independent of the observer   **true**   **false**

3)
Scientific Notation:

A) _____

B) _____

Floating Point Notation:

C) _____

D) _____

4)
A) _____

B) _____

5)
A) _____

B) _____

6) uranium density = _____ (units!)

7)
A) _____kJ

B) _____mm

NAME_____

8) **A   B   C   D   E**

9) **A   B   C   D   E**

10) A) $HNO_3 + H_2O \rightarrow$ _____

    B) $C_6H_5NH_2 + H_2O \rightarrow$

    C) $H_2O + HClO_3 \rightarrow$

    D) $CH_3NH_2 + HCl \rightarrow$

11) _____

12) _____

13) _____

14) Y = _____ P = _____ O = _____

15) Mg = _____ S = _____ O = _____

16) _____

17) _____

18) _____ **mL**

19)

    NaOH   **acid**   **base**

    H_3PO_4 **acid**   **base**

    HF   **acid**   **base**

    NH_3 **acid**   **base**

    $Sr(OH)_2$ **acid**   **base**

    CH_3COOH **acid**   **base**

20) _____

1)
A) false
B) false
C) true
D) true
E) false
F) true

2)
A) false
B) true
C) true
D) false
E) false
F) true

3)
A) 4.15×10^2
   8.29×10^{-6}
B) 2364758
   0.00590

4)
   A) 4.733×10^0
   B) 9.1439×10^9

5) A) 5.10×10^4
    B) 2.374×10^2

6) 0.559 mL

7) A) 8.31×10^{10}
    B) 7.75×10^5

8) **C)**

9) **C)**

10)
   $HNO_3 + H_2O \rightarrow H_3O^+ + NO_3^-$
   $C_6H_5NH_2 + H_2O \rightarrow C_6H_5NH_3^+ + OH^-$
   $H_2O + HClO_3 \rightarrow H_3O^+ + ClO_3^-$
   $CH_3NH_2 + HCl \rightarrow CH_3NH_3^+ + Cl^-$
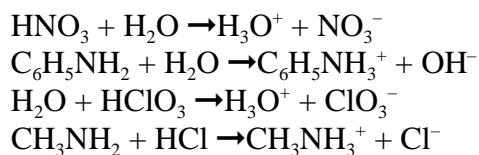
11) 4.37×10^{25}

12) 63.3 g63.271

13) 65.8 g65.781

14) Y = 48.4%   P = 16.8%   O = 34.8%

15) $MgSO_3$

16) 467.93 K

17) 2.42 g

18) 123 mL

19)

NaOH	=	base
H_3PO_4	=	acid
HF	=	acid
NH_3	=	base
$Sr(OH)_2$	=	base
CH_3COOH	=	acid

20) liquid