**U5LM1 WS Balancing Reactions** **Name: _____KEY_____**

**Part I - Balance the following chemical equations.**

1. $CH_4(g)+ \mathbf{2}\ O_2(g) \rightarrow CO_2(g) + \mathbf{2}\ H_2O(g)$
   A balanced equation has equal numbers of each element on both the reactant and product side of the equation. Remember that you can only adjust the *coeffiecients* in front of each compound to change the quantity of each compound. Changing the *subscripts* changes the identity of a compound and is NOT allowed.
2. $\mathbf{4}\ Fe(s) + \mathbf{3}\ O_2(g) \rightarrow \mathbf{2}\ Fe_2O_3(s)$
3. $\mathbf{2}\ Na(s) + \mathbf{2}\ H_2O(l) \rightarrow \mathbf{2}\ NaOH(aq) + H_2(g)$
4. $\mathbf{2}\ C_4H_{10}(g) + \mathbf{13}\ O_2(g) \rightarrow \mathbf{8}\ CO_2(g) + \mathbf{10}\ H_2O(g)$
5. $C_6H_{12}O_6(g) + \mathbf{6}\ O_2(g) \rightarrow \mathbf{6}\ CO_2(g) + \mathbf{6}\ H_2O(g)$
6. $B_2H_6(g) + \mathbf{6}\ H_2O(l) \rightarrow \mathbf{2}\ H_3BO_3(aq) + \mathbf{6}\ H_2(g)$
7. $\mathbf{2}\ NaOH(aq) + H_2SO_4(aq) \rightarrow \mathbf{2}\ H_2O(l) + Na_2SO_4(aq)$
8. $\mathbf{2}\ HNO_3(aq) + Ca(OH)_2(aq) \rightarrow Ca(NO_3)_2 + \mathbf{2}\ H_2O(l)$
9. $\mathbf{2}\ NH_4Br(aq) + Pb(C_2H_3O_2)_2(aq) \rightarrow \mathbf{2}\ NH_4C_2H_3O_2(aq) + PbBr_2(s)$
10. $Co_2S_3(s) + \mathbf{3}\ H_2(g) \rightarrow \mathbf{2}\ Co(s) + \mathbf{3}\ H_2S(g)$

**Part II – Write a balanced chemical equation to describe each of the following.**

This requires that you write chemical formulas from names, apply solubility rules, and mass-balance the equations.

1. Calcium carbonate decomposes into calcium oxide and carbon dioxide.
   **$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$**

2. Sodium reacts with oxygen to give sodium oxide.
   **$4\ Na(s) + O_2(g) \rightarrow 2\ Na_2O(s)$**

3. Magnesium nitride reacts with water to give magnesium hydroxide and ammonia ($NH_3$).
   **$Mg_3N_2(s) + 6\ H_2O(l) \rightarrow 3\ Mg(OH)_2(aq) + 2\ NH_3(aq)$**

4. An aqueous phosphoric acid solution reacts with an aqueous calcium hydroxide solution to produce water and solid calcium phosphate.
   **$H_3PO_4(aq) + Ca(OH)_2(aq) \rightarrow H_2O(l) + Ca_3(PO_4)_2(aq)$**

5. Magnesium dissolves in an aqueous chromium(III) nitrate solution to form chromium and the soluble magnesium nitrate salt.
   **$3\ Mg(s) + 2\ Cr(NO_3)_3(aq) \rightarrow 2\ Cr(s) + 3\ Mg(NO_3)_2(aq)$**

6. The complete combustion of octane produces carbon dioxide and water.
   **$2\ C_8H_{18}(l) + 25\ O_2(g) \rightarrow 16\ CO_2(g) + 18\ H_2O(l)$**