Honors Chemistry Hour\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Dr. Wexler  
Balancing Equations: Algebraic Method  
Date:

Procedure:  
1. Set up coefficients  
2. Write an equation for each element  
3. Set one of the coefficients equal to 1 (usually a, but not always)  
4. Solve for the variables sequentially  
5. Multiply by the largest common denominator to convert to whole numbers

Example: NH3 + Br2 🡪N2 + NH4Br

Step 1. aNH3 + bBr2 🡪cN2 + dNH4Br

Step 2. N a = 2c + d

H 3a = 4d

Br 2b = d

Step 3. Set a = 1

Step 4. If a = 1, then 3(1) = 4d, so d = 3/4  
 If d = 3/4, then b = 3/4/2 = 3/8  
 c = (a-d)/2 = (1-3/4)/2 = 1/4/2 = 1/8

In summary: a = 1; b = 3/8; c = 1/8; d = 3/4

Step 5. Multiply by 8  
 a = 8; b = 3; c = 1; d = 6

The answer is therefore: 8NH3 + 3Br2 🡪N2 + 6NH4Br

Balance the following equations using the algebraic method. Show all work.

1. (Easy) Mg3N2 + H2O -> Mg(OH)2 + NH3
2. (Easy) C4H10 + O2 -> CO2 + H2O

3. (Not so easy) Cl2O + NH3 🡪 NH4Cl + N2 + H2O

4. (Challenging) CuSCN + KIO3 + HCl 🡪 CuSO4 + KCl + HCN + ICl + H2O