# Balancing Equations

When balancing equations remember these simple rules:

1. Never touch the small numbers (the subscripts).
2. Only introduce coefficients (large numbers) to create, *for each element*, the same total number of atoms on each side of the arrow.
3. Each coefficient applies to every atom in the compound. Ex. 4 $HNO_3$ means there are 4 H's, 4 N's and 4(3) =12 O's.
4. For mass problems, the total mass of the reactants (left hand side) equals the total mass of the products.

Using example 4 from June 1998, $Fe_2O_3$ + C --> $CO_2$ + Fe:

The solution was 2 $Fe_2O_3$ + 3 C --> 3$CO_2$ + 4Fe

Notice that there were three O's on the left-hand side but only two on the right. A common multiple of 2 and 3 is 6. As a result we created 6 on each side by using coefficients of 2 and 3. But by doing so, we created 4 Fe's. So we had to fix the Fe on the right hand side by using a 4. Finally we balanced the carbons by placing a "3" in front of the carbon.

**Useful trick**: If there is an element in the equation, leave that to the end, because any coefficient you introduce in front of that element will only affect that element.