Finding Binomial Expansions:

A. Most of the time, problems of this type will ask for a simplified coefficient of a particular term of a binomial expansion. You will need to be familiar with combinations.

B. In general, a binomial expansion is expressed by:

$$(ax + by)^n = C(n,0)a^nx^n + C(n,1)a^{n-1}bx^{n-1}y +...+C(n,n-1)ab^{n-1}xy^{n-1} + C(n,n)b^ny^n$$

C. In general, if you have $(ax + by)^n$ and you want the rth term the formula is :

$$C(n,r-1) \text{ x } a^{[n-(r-1)]} \text{ x } b^{(r-1)}$$

Note: If we have $(ax - by)^n$, the formula remains the same except every even term is negative.

D. Examples:

Ex [1] The simplified coefficient of the 3rd term of $(2x + y)^6$ is ____?

    a. The first step is to find C(6,3-1) or C(6,2) = 15.
    b. Next, find $2^{6-(3-1)} = 2^4 = 16$.
    c. Next, find $1^{3-1} = 1$.
    d. The answer is 15 x 16 x 1 = 240. See *Multiplying By 15*.

Ex [2] The simplified coefficient of the x^3y term of $(x - 3y)^4$ is ____?

    a. The first step is to find what term we are looking for. Since the first term is x^4 and the second term is x^3y, etc, we can conclude we are looking for the 2nd term.
    b. Also, remember the term is going to be negative since we are subtracting and the term we are looking for is even.
    c. Find C(4,2-1) or C(4,1) = 4.
    d. Find $1^{4-(2-1)} = 1^3 = 1$.
    e. Find $3^{2-1} = 3$.
    f. The answer is -[4 x 1 x 3] = -12

Note: If a or b is 1, then you can ignore that step. In Ex [1] you can ignore step c, in Ex [2] you can ignore step d.