The Binomial Theorem

Expansion, the boring and tedious way:

$(a+b)^0$ =
$(a+b)^1$ =
$(a+b)^2$ =
$(a+b)^3$ =
$(a+b)^4$ =
$(a+b)^5$ =

The AMAZING Binomial Theorem:

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^{n-k} b^k$$

where $\binom{n}{k}$ is said "n choose k" and represents the number of ways to select k things from n.

where $\binom{n}{k} = {}_nC_k = \frac{n!}{k!(n-k)!}$ and $n! = n(n-1)(n-2)\ldots(2)1$

EXAMPLES:

Evaluate: $\binom{5}{3}$ $\binom{7}{2}$ $\binom{7}{5}$

Binomial Expansion, using the amazing Binomial Theorem: $(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^{n-k} b^k$

$(a + b)^3$

$(2x - 3y)^3$

You try! Expand completely.

$(5x + 3y)^4$

Write your questions and thoughts here!

Pascal's Triangle	
$(a+b)^0$ = $(a+b)^1$ = $(a+b)^2$ = $(a+b)^3$ = $(a+b)^4$ = $(a+b)^5$ = ⋮	1 $1a + 1b$ $1a^2 + 2ab + 1b^2$ $1a^3 + 3a^2b + 3ab^2 + 1b^2$ $1a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + 1b^4$ $1a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + 1b^5$ ⋮
Looking at just the coefficients:	1 1 1 1 2 1 1 3 3 1 1 4 6 4 1 1 5 10 10 5 1 ⋮
Which happens to be the same as:	${}_0C_0$ ${}_1C_0$ ${}_1C_1$ ${}_2C_0$ ${}_2C_1$ ${}_2C_2$ ${}_3C_0$ ${}_3C_1$ ${}_3C_2$ ${}_3C_3$ ${}_4C_0$ ${}_4C_1$ ${}_4C_2$ ${}_4C_3$ ${}_4C_4$ ${}_5C_0$ ${}_5C_1$ ${}_5C_2$ ${}_5C_3$ ${}_5C_4$ ${}_5C_5$ ⋮

EXAMPLES:

Find each term described.

1. The third term in the expansion $(y + 5)^4$

2. The third term in the expansion $(2x - 3)^6$

Expand completely.

3. $(2 + 3y)^4$

Now summarize what you learned!