

## Binomial Expansion Theorem

If  $n$  is any positive integer,

$$(a + b)^n = \sum_{i=0}^n \binom{n}{i} a^{n-i} b^i$$
$$= a^n + na^{n-1}b + \frac{n(n-1)}{2!}a^{n-2}b^2 + \dots + nab^{n-1} + b^n$$

where

$$\binom{n}{i} = \frac{n(n-1)(n-2)\cdots(n-i+1)}{i!} \quad i = 1, 2, 3, \dots, n$$
$$\binom{n}{0} = 1$$

Use the Binomial Expansion Theorem to expand the expressions.

1.  $(x + 5)^3$

2.  $(2a - 3)^6$

3.  $(x + 4y)^5$