# Binomial Theorem (Part 2)

These notes are intended as a summary of section 8.6 (p. 738 – 742) in your workbook. You should also read the section for more complete explanations and additional examples.

**Method 2 — Binomial Theorem**

The coefficients of a binomial expansion are the combinations of the power beginning with $_nC_0$ and ending at $_nC_n$.

$$(x+y)^n = {_nC_0}x^n + {_nC_1}x^{n-1}y + {_nC_2}x^{n-2}y^2 + ... + {_nC_{n-2}}x^2 y^{n-2} + {_nC_{n-1}}xy^{n-1} + {_nC_n}y^n$$

Important Observations:

1. In any term of the expansion, the exponent of the second term ($y$) is the same as the number of objects being selected in the combination.

$$_nC_r x^{n-r} y^r$$

2. The exponent of the second term ($y$) in any term of the expansion is one less than the term position.

$$t_{k+1} = {_nC_k}x^{n-k}y^k$$

**Example (not in workbook)**

What is the third term in the expansion of $(x+y)^8$ ?

**Example 3 (sidebar p. 742)**

Determine the $9^{\text{th}}$ term in the expansion of $(x-2)^{10}$.

**Example (not in workbook)**

Write the expansion of $(x+y)^7$ using the binomial theorem.

**Example (not in workbook)**

Find the term containing $x^9$ in the expansion of $\left(3x^2 - \dfrac{2}{x}\right)^9$.

**Example (not in workbook)**

Find the constant term in the expansion of $\left( 5x^3 - \dfrac{2}{x} \right)^{12}$.

**Homework**: #5, 7, 9, 11 in the section 8.6 exercises (p. 743 – 749). Answers on p. 750.