

Pre-Calculus CP 1 – Section 9.5 Homework
 Pascal's Triangle & The Binomial Theorem

Name: KEY

Use Pascal's Triangle and The Binomial Theorem to expand and find information about the following. Show all work, including work you may enter in your calculator.

- 1) Use Pascal's Triangle (or your calculator) to find the 6th term in the 9th row.

$${}^9 C_5 = \boxed{126}$$

- 2) Use Pascal's Triangle (or your calculator) to find the 10th term in the 18th row.

$${}_{18} C_9 = \boxed{48,620}$$

- 3) Expand $(2x+5)^6$ using Pascal's Triangle and the Binomial Theorem.

$$\begin{aligned} &= {}^6 C_0 (2x)^6 + {}^6 C_1 (2x)^5 (5) + {}^6 C_2 (2x)^4 (5)^2 + {}^6 C_3 (2x)^3 (5)^3 + {}^6 C_4 (2x)^2 (5)^4 + {}^6 C_5 (2x) (5)^5 + {}^6 C_6 (5)^6 \\ &= 1 \cdot 64x^6 + 6 \cdot 32x^5 \cdot 5 + 15 \cdot 16x^4 \cdot 25 + 20 \cdot 8x^3 \cdot 125 + 15 \cdot 4x^2 \cdot 625 + 6 \cdot 2x \cdot 3125 + 1 \cdot 15,625 \\ &= \boxed{64x^6 + 960x^5 + 6000x^4 + 20,000x^3 + 37,500x^2 + 37,500x + 15,625} \end{aligned}$$

- 4) Expand $(3x-4y)^5$ using Pascal's Triangle and the Binomial Theorem.

$$\begin{aligned} &= {}^5 C_0 (3x)^5 + {}^5 C_1 (3x)^4 (-4y) + {}^5 C_2 (3x)^3 (-4y)^2 + {}^5 C_3 (3x)^2 (-4y)^3 + {}^5 C_4 (3x) (-4y)^4 + {}^5 C_5 (-4y)^5 \\ &= 243x^5 + 5 \cdot 81x^4 (-4)y + 10 \cdot 27x^3 \cdot 16y^2 + 10(9x^2)(-64y^3) + 5 \cdot 3x \cdot 256y^4 + -1024y^5 \\ &= \boxed{243x^5 - 1620x^4y + 4320x^3y^2 - 5760x^2y^3 + 3840xy^4 - 1024y^5} \end{aligned}$$

- 5) Find the term containing x^3 in the expansion of $(6x+2)^{10}$ using Pascal's Triangle and the Binomial Theorem.

\leftarrow 11 terms
 $x^3 y^7 \leftarrow$ 8th Term

$${}_{10}C_7 (6x)^3 (2)^7 = 120 \cdot 216 x^3 \cdot 128 = \boxed{3,317,760 x^3}$$

- 6) Find the **coefficient** (not just found by the triangle: think of all the parts that contribute to the coefficient) of the fifth term in the expansion of $(-2x+3y)^{12}$ using Pascal's Triangle and the Binomial Theorem.

$${}_{12}C_4 (-2x)^8 (3y)^4 = 495 (256 x^8) (81 y^4)$$

$$= \boxed{10,264,320} x^8 y^4$$