

Date: _____

Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) understand the pattern in Pascal's triangle.
- b) use Pascal's triangle to expand binomials efficiently.

2 classes ago's work: pp. 452-453 #(1 – 7)ace, 11, 13 [15,16]

Last day's work: pp. 459-461 #(1 – 6)ace, 9, 11, 13 [16,18]

7.7 Pascal's Triangle and Binomial Expansions

Ex.1 Expand and simplify each of the following:

Date: June 2/17

$$(a + b)^1$$

$$= a + b$$

$$(a + b)^2$$

$$= a^2 + 2ab + b^2$$

$$(a + b)^3$$

$$= (a + b)(a^2 + 2ab + b^2)$$

$$= a^3 + 2a^2b + ab^2 + a^2b + 2ab^2 + b^3$$

$$= a^3 + 3a^2b + 3ab^2 + b^3$$

$$(a + b)^4$$

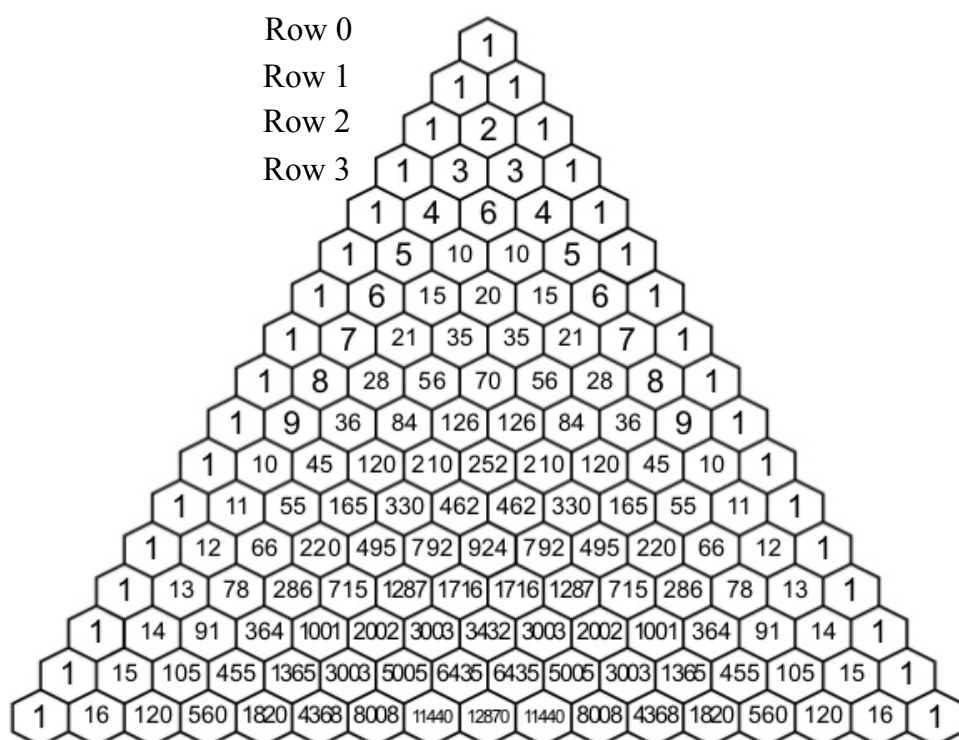
$$= (a + b)(a^3 + 3a^2b + 3ab^2 + b^3)$$

$$= a^4 + 3a^3b + 3a^2b^2 + ab^3 + a^3b + 3a^2b^2 + 3ab^3 + b^4$$

$$= a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$

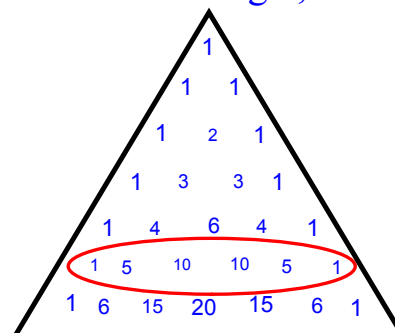
Before continuing, let's explore Pascal's Triangle!

Pascal's Triangle



The *coefficients* for a binomial expansion are found in **Pascal's Triangle**!!
 The exponent on the x begins with the exponent of the binomial and progressively decreases to zero; the exponent on the y begins at zero and progresses to equal the exponent on the binomial.

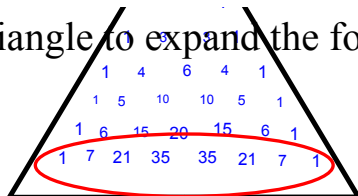
So for $(x + y)^5$, the coefficients are in the 5th row of Pascal's Triangle, so the expansion is:



$$\begin{aligned}(x + y)^5 &= 1x^5y^0 + 5x^4y^1 + 10x^3y^2 + 10x^2y^3 + 5x^1y^4 + 1x^0y^5 \\ &= x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5\end{aligned}$$

Ex.2 Use Pascal's triangle to expand the following:

a) $(x + 3)^7$



$$\begin{aligned}
 &= x^7 + 7x^6y + 21x^5y^2 + 35x^4y^3 + 35x^3y^4 + 21x^2y^5 + 7xy^6 + y^7 \\
 &= x^7 + 7x^6(3) + 21x^5(3)^2 + 35x^4(3)^3 + 35x^3(3)^4 + 21x^2(3)^5 + 7x(3)^6 + (3)^7 \\
 &= x^7 + 21x^6 + 189x^5 + 945x^4 + 2835x^3 + 5103x^2 + 5103x + 2187
 \end{aligned}$$

b) $(2x - 5y)^5$

$$\begin{aligned}
 &= (2x)^5 + 5(2x)^4(-5y) + 10(2x)^3(-5y)^2 + 10(2x)^2(-5y)^3 + 5(2x)(-5y)^4 + 1(-5y)^5 \\
 &= 32x^5 + 5(16x^4)(-5y) + 10(8x^3)(25y^2) + 10(4x^2)(-125y^3) + 5(2x)(625y^4) + (-3125y^5) \\
 &= 32x^5 - 400x^4y + 2000x^3y^2 - 5000x^2y^3 + 6250xy^4 - 3125y^5
 \end{aligned}$$

Ex.3 If time, show "my" patterning method.

$(x - 1)^8$

$$\begin{aligned}
 &= x^8 + 8x^7(-1) + 28x^6(-1)^2 + 56x^5(-1)^3 + 70x^4(-1)^4 + 56x^3(-1)^5 \\
 &\quad + 28x^2(-1)^6
 \end{aligned}$$

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 459-461 #(1 – 6)ace, 9, 11, 13 [16,18]

Today's Homework Practice includes:

p. 466 #1 – 3, (4 – 5)ace, 6, 8, 10
& Begin Review

Attachments

PascalsTriangle.notebook