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]
(A. Series)

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

7.7 Pascal's Triangle and Binomial Expansions

Date: June 1/18

Ex.1 Expand and simplify each of the following:

$(a + b)^1$
$= a + b$

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

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

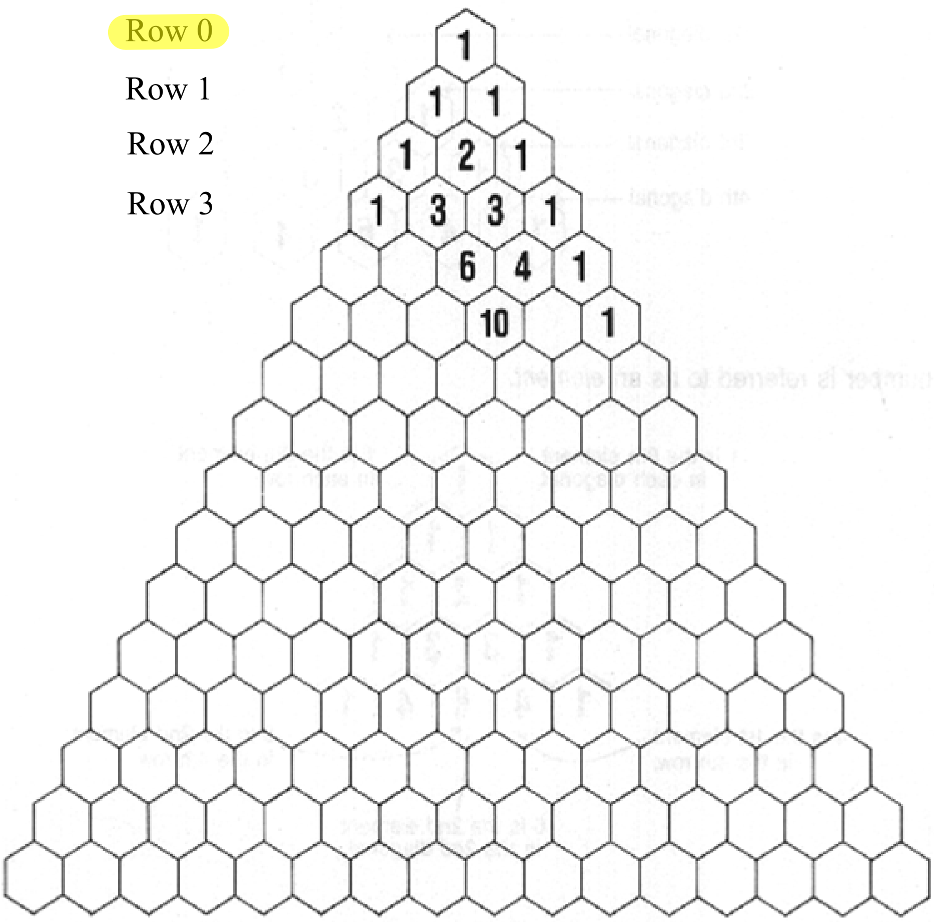
$= a^3 + 3a^2b + 3ab^2 + b^3$

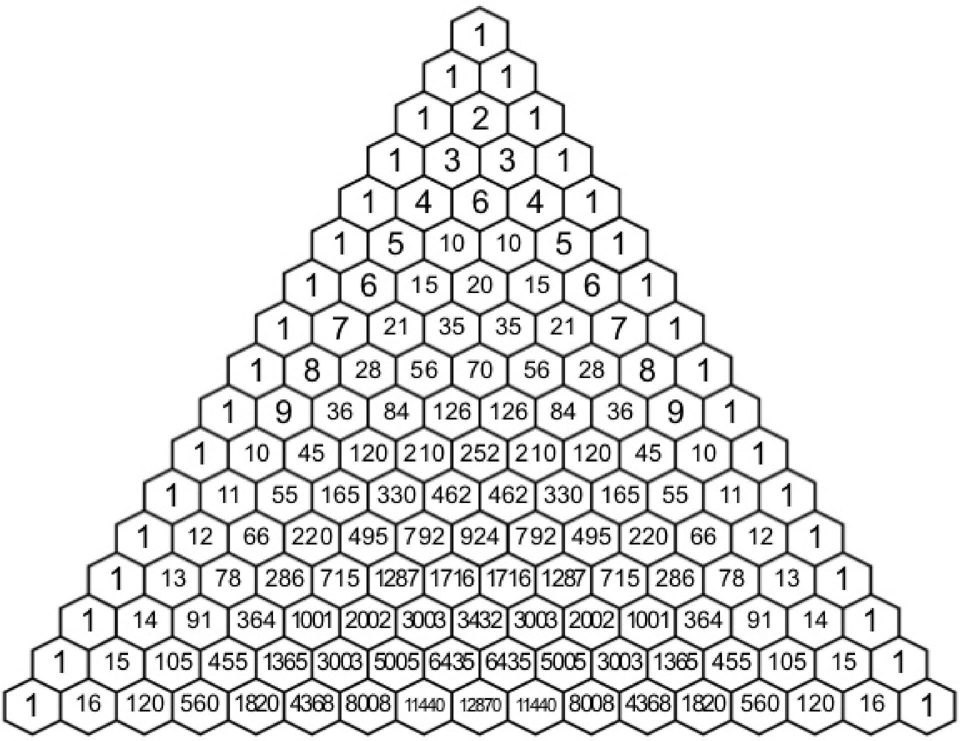
$(a + b)^4$
$= (a + b)(a^3 + 3a^2b + 3ab^2 + b^3)$
$= a^4 + 3a^3b + 3a^2b^2 + ab^3 + a^3b + 3a^2b^2 + 3ab^3 + b^4$
$= a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$
$= a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

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

Click on the paperclip to learn about Pascal's Triangle.

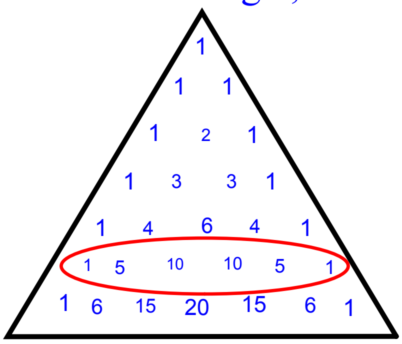
Pascal's Triangle




1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
1 9 36 84 126 126 84 36 9 1
1 10 45 120 210 252 210 120 45 10 1
1 11 55 165 330 462 462 330 165 55 11 1
1 12 66 220 495 792 924 792 495 220 66 12 1
1 13 78 286 715 1287 1716 1716 1287 715 286 78 13 1
1 14 91 364 1001 2002 3003 3432 3003 2002 1001 364 91 14 1
1 15 105 455 1365 3003 5005 6435 6435 5005 3003 1365 455 105 15 1
1 16 120 560 1820 4368 8008 11440 12870 11440 8008 4368 1820 560 120 16 1

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.

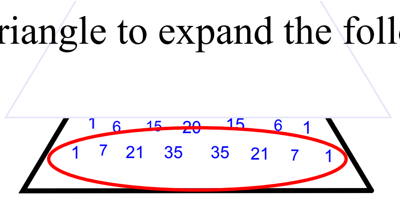
So for $(x + y)^5$, the coefficients are in the 5th row of Pascal's Triangle, so the expansion is:



$$(x + y)^5 = 1x^5y^0 + 5x^4y^1 + 10x^3y^2 + 10x^2y^3 + 5x^1y^4 + 1x^0y^5$$
$$= x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5$$

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

a) $(x + 3)^7$



$= 1x^7 + 7x^6y^1 + 21x^5y^2 + 35x^4y^3 + 35x^3y^4 + 21x^2y^5 + 7xy^6 + y^7$

$= x^7 + 7x^6(3) + 21x^5(3)^2 + 35x^4(3)^3 + 35x^3(3)^4 + 21x^2(3)^5 + 7x(3)^6 + (3)^7$

$= x^7 + 21x^6 + 189x^5 + 945x^4 + 2835x^3 + 5103x^2 + 5103x + 2187$

b) $(2x - 5y)^5$ (a = 2x, b = 5y) 1 5 10 10 5 1

$= a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$

$= (2x)^5 + 5(2x)^4(-5y) + 10(2x)^3(-5y)^2 + 10(2x)^2(-5y)^3 + 5(2x)(-5y)^4 + (-5y)^5$

$= 32x^5 - 400x^4y + 2000x^3y^2 - 5000x^2y^3 + 6250xy^4 - 3125y^5$

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

$(x - 1)^8$

$= 1x^8 - 8x^7y + 28x^6y^2 - 56x^5y^3 + 70x^4y^4 - 56x^3y^5 + 28x^2y^6 - 8xy^7 + y^8$

$= x^8 - 8x^7 + 28x^6 - 56x^5 + 70x^4 - 56x^3 + 28x^2 - 8x + 1$

Ex.4 $(x-3)^9$

$= 1x^9 + \frac{(1)(9)}{1}x^8(-3)^1 + \frac{(9)(8)}{2}x^7(-3)^2 + \frac{(36)(7)}{3}x^6(-3)^3$

$= x^9 + 9x^8(-3) + 36x^7(-3)^2 \ldots$

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