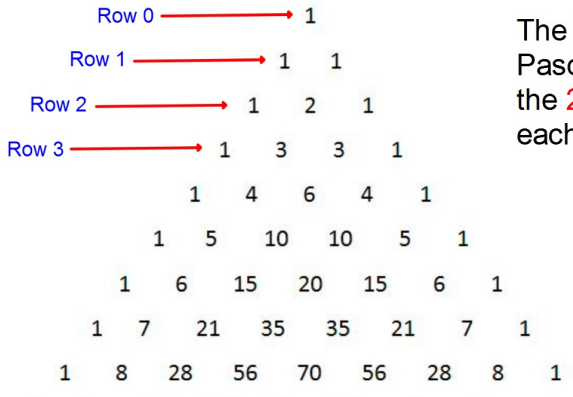


The Row Number in Pascal's Triangle is the 2nd Number in each row.

Do you see a connection to Pascal's Triangle and the results of expanding powers of (a + b) ?

$(a+b)^0 = 1 \longrightarrow 1$

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

$(a+b)^2 = a^2+2ab+b^2 \longrightarrow 1a^2+2ab+1b^2$

$(a+b)^3 = a^3+3a^2b+3ab^2+b^3 \longrightarrow 1a^3+3a^2b+3ab^2+1b^3$

The coefficients of each term are the numbers in the row of Pascal's Triangle that to corresponds to the exponent of (a + b).

Sec 6-8: The Binomial Theorem

Expand each. Write answers in Standard Form.

1. $(a+b)^0 =$ 1

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

3. $(a+b)^2 =$ $1a^2+2ab+1b^2$

4. $(a+b)^3 =$ $1a^3+3a^2b+3ab^2+1b^3$

Do you notice a pattern in the exponents?

$(a+b)^0 = 1$

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

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

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

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

Powers of a decrease from left to right

Powers of b decrease from right to left

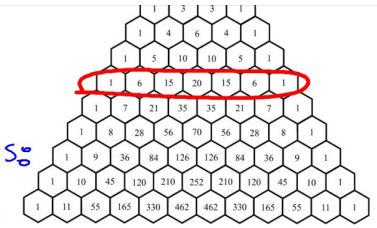
For each term the powers of a and b add to the exponent of (a + b)

What do you notice about how many terms each has?

$$(a+b)^0 = 1$$
$$(a+b)^1 = a+b$$
$$(a+b)^2 = a^2+2ab+b^2$$
$$(a+b)^3 = a^3+3a^2b+3ab^2+b^3$$
$$(a+b)^4 = a^4+4a^3b+6a^2b^2+4ab^3+b^4$$

The number of terms after expanding is one more then the power on (a + b).

Expand this: $(M+Q)^6$



exponent of 6 tells us:

- There will be 7 terms
- The coefficients will be the #'s in row 6 of Pascal's Δ.

$$1M^6 + 6M^5Q + 15M^4Q^2 + 20M^3Q^3 + 15M^2Q^4 + 6MQ^5 + 1Q^6$$

Do you notice a pattern with the signs?

$$(a-b)^6 = a^6 - 6a^5b + 15a^4b^2 - 20a^3b^3 + 15a^2b^4 - 6ab^5 + b^6$$

$$(a-b)^7 = a^7 - 7a^6b + 21a^5b^2 - 35a^4b^3 + 35a^3b^4 - 21a^2b^5 + 7ab^6 - b^7$$

when there is a minus in the middle of the binomial, the signs of the terms alternate, starting with a positive for the first term.

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

How would this expansion be different? $(a-b)^4$

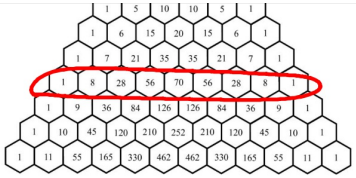
$$(a-b)^4 = a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4$$

Signs will alternate changing the two to subtraction

$(C - D)^8$

Coefficients are the numbers in Row 8.

Signs alternate starting with a positive for the first term.



$1C^8 - 8C^7D + 28C^6D^2 - 56C^5D^3 + 70C^4D^4$

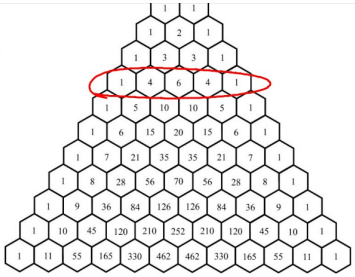
$- 56C^3D^5 + 28C^2D^6 - 8CD^7 + D^8$

Expand. Write answer in Standard Form.

$(x + 2)^4$

Coefficients are the numbers in Row 4

Signs are all positive



$1x^4 + 4x^3(2) + 6x^2(2)^2 + 4x(2)^3 + 1 \cdot 2^4$

$x^4 + 4x^3(2) + 6x^2(4) + 4x(8) + 16$

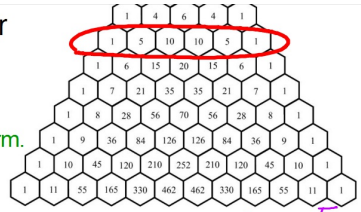
$= x^4 + 8x^3 + 24x^2 + 32x + 16$

Expand. Write answer in Standard Forr

$(2x - 3)^5$

Coefficients are the numbers in Row 5

Signs alternate starting with a positive for the 1st term.



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

$32x^5 - 5(16x^4)(3) + 10(8x^3)(9) - 10(4x^2)(27) + 5(2x)(81) - 243$

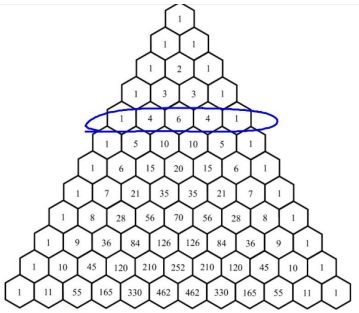
$32x^5 - 240x^4 + 720x^3 - 1080x^2 + 810x - 243$

Expand. Write answer in Standard Form.

$(4x - 5y)^4$

Coefficients are the numbers in Row 4

Signs alternate starting with a positive 1st term

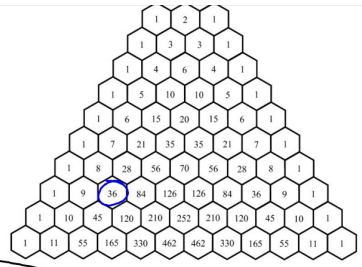


$1(4x)^4 - 4(4x)^3(5y) + 6(4x)^2(5y)^2 - 4(4x)(5y)^3 + 1(5y)^4$

$= 256x^4 - 4(64x^3)(5y) + 6(16x^2)(25y^2) - 4(4x)(125y^3) + 625y^4$

$= 256x^4 - 1280x^3y + 2400x^2y^2 - 2000xy^3 + 625y^4$

Find the 3rd term of $(g+5)^9$



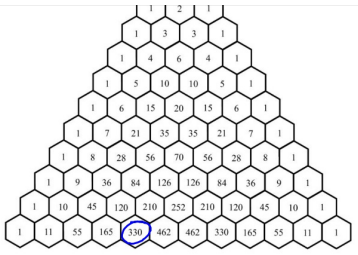
Coefficient is 3rd # in Row 9

$g^9 + g^8 + 36g^7(5)^2$ ← These add to 9

$= 36g^7(25)$

$= \boxed{900g^7}$

Find the 5th term of $(A-3)^{11}$



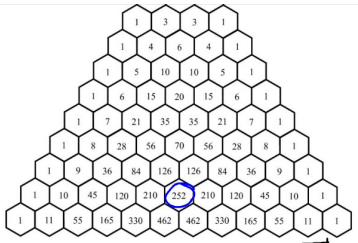
Coefficient is the 5th # in Row 11

$A^{11} - A^{10} + A^9 - A^8 + 330(A)^7(3)^4$ ← these add to 11

$+ 330A^7(81)$

$= \boxed{26730A^7}$

Find the 6th term of $(3g-2)^{10}$



6 coeff is 6th # in row 10.

$(3g)^{10} - {}^{9} + {}^{8} - {}^{7} + {}^{6} - 252(3g)^5(2)^5$ ← These add to 10

$-252(243g^5)(32)$

$= \boxed{-1959552g^5}$

You can now finish Hwk #29 Sec 6-8

Page 356 Show Work to get credit!

Problems 18, 34, 36, 40, 48, 54

Due tomorrow

This concludes Chapter 6!!!!