1. $V = l \cdot w \cdot h$

$= (x+5)(x+1)(x)$

$(x+5)(x^2+x)$

$x^3 + x^2 + 5x^2 + 5x$

$x^3 + 6x^2 + 5x$

$(x+y+z)^2 = (x+y+z)(x+y+z)$

$2 \cdot 3^{yx}$

$3 \cdot 2^{xy}$

$x^2 = x \cdot x$

$5^2 = 5 \cdot 5$

$\cancel{x^2} + xy + \boxed{xz} + xy + \cancel{y^2} + yz$

$+ \boxed{xz} + yz + \cancel{z^2}$

$x^2 + y^2 + z^2 + 2xy + 2xz + 2yz$ ✓

2-2 Binomial Theorem

(Book 6-3 pgs. 341-344)

$(3x+1)^7$

Objectives:

I can apply the binomial theorem to expand binomials

I can calculate coefficients of a expanded binomials utilizing patterns from Pascal's triangle

Expand:

$(a+b)^n$ for n=1,2,3,4, and 5

See if you can discover and patterns for exponents and coefficients

$(a+b)^0 = 1$

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

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

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

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

$(a+b)^5 = 1a^5 b^0 + 5a^4b^1 + 10a^3b^2 + 10a^2b^3 + 5ab^4 + 1a^0b^5$

$(a+b)^6$

1 5 10 10 5 1

$1a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + 1b^6$

$(a+b)^7 =$

$1a^7 \quad 7a^6b \quad 21a^5b^2 \quad 35 \quad 35 \quad 21 \quad 7 \quad 1$

Identify the patterns in the expanded form of $(a+b)^n$.

The exponents of *a* start at n and [increase/decrease] by 1 each term.

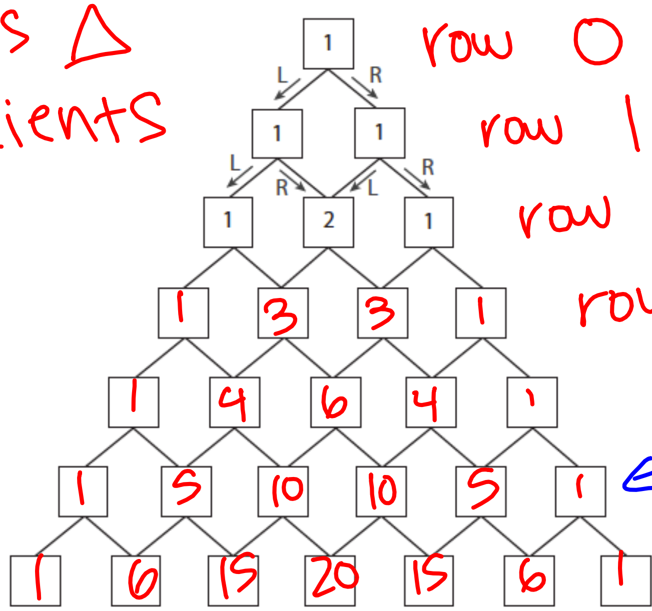
The exponents of *b* start at 0 and [increase/decrease] by 1 each term.

The sum of the exponents are n in each term.

The coefficients are the same as row n in Pascals triangle.

Pascal's △ Coefficients

Pg. 341



row 0

row 1

row 2

row 3

4

5

6

Coeffient 3rd term of $(x+y)^5$

10

Pg. 342

Row 0: ⟶ $_0C_0$

Row 1: ⟶ $_1C_0$ $_1C_1$

Row 2: ⟶ $_2C_0$ $_2C_1$ $_2C_2$

1st 2nd 3rd

Row 3: ⟶ $_3C_0$ $_3C_1$ $_3C_2$ $_3C_3$

Coeffient of 9th term of $(a+b)^{12}$

$_{12}C_8$

term −1

6th term of $(a+b)^9$

$_9C_5 = 126$

(6-1)

Calculator Short-cut:

Pg. 343

$(x+y)^7$

Step 1 Use a calculator to determine the values of ${}_7C_0$, ${}_7C_1$, ${}_7C_2$, ${}_7C_3$, ${}_7C_4$, ${}_7C_5$, ${}_7C_6$, and ${}_7C_7$.

Step 2 Expand the power as described by the Binomial Theorem, using the values of ${}_7C_0$, ${}_7C_1$, ${}_7C_2$, ${}_7C_3$, ${}_7C_4$, ${}_7C_5$, ${}_7C_6$, and ${}_7C_7$ as coefficients.

$$(x+y)^7 = \square x^{\square}y^{\square} + \square x^{\square}y^{\square} + \square x^{\square}y^{\square} + \square x^{\square}y^{\square}$$
$$+ \square x^{\square}y^{\square} + \square x^{\square}y^{\square} + \square x^{\square}y^{\square} + \square x^{\square}y^{\square}$$

Step 3 Simplify.

$$(x+y)^7 = x^{\square} + \square x^{\square}y + \square x^{\square}y^{\square} + \square x^{\square}y^{\square} + \square x^{\square}y^{\square}$$
$$+ \square x^{\square}y^{\square} + \square xy^{\square} + y^{\square}$$

Using Binomial Theorem to Expand pg. 343

$(x-2)^3$

Step 1 Identify the values in row 3 of Pascal's Triangle.

1, 3, 3, and 1

Step 2 Expand the power as described by the Binomial Theorem, using the values from Pascal's Triangle as coefficients.

$$(x-2)^3 = 1x^3(-2)^0 + 3x^2(-2)^1 + 3x^1(-2)^2 + 1x^0(-2)^3$$

Step 3 Simplify.

$$(x-2)^3 = x^3 - 6x^2 + 12x - 8$$

Use the Binomial Theorem to expand $(x-y)^4$.

Pg. 344

Use the binomial theorem to expand $(4x+3y)^6$

Pg 348 #14

Pascal Δ $\quad a=4x \quad b=3y \quad n=6$

$\cancel{1} \quad \cancel{6} \quad \cancel{15} \quad \cancel{20} \quad \cancel{15} \quad 6 \quad 1$

$1(4x)^6+6(4x)^5(3y)^1+15(4x)^4(3y)^2+20(4x)^3(3y)^3$

$+15(4x)^2(3y)^4+6(4x)(3y)^5+1(3y)^6$

$4096x^6+18432x^5y+34560x^4y^2$

$(4x)^3 = (4x)(4x)(4x) = 4^3 x^3$

$(4x)^6 = 4^6 \cdot x^6$

Pg 348 #18

Find the fifth term the expanded form of $(6x+8y)^7$

10. 3^{rd} $(3x-2y)^5$

$a = 3x$

$b = -2y$

$10(3x)^3(-2y)^2$

1st 2nd 3rd

5 4 3

$10 \cdot (27x^3)(4y^2)$

$\boxed{1080x^3y^2}$