

Pascal's Triangle

A. Steps In Setting Up Triangle

<u>Rows</u>	<u>Coefficients</u>	
1.	1	$(a+b)^0$
2.	1 1 1+1	$(a+b)^1$
3.	1 <u>2</u> 1 1+2 1+2	$(a+b)^2$
4.	1 <u>3</u> <u>3</u> 1 1+3 3+3 3+1	$(a+b)^3$
5.	1 4 6 4 1	$(a+b)^4$

1. Start out without a triad of ones these are the first 2 rows.
2. Repeat the pair of one's without a space and add the two numbers above the empty space to get its value.
3. Repeat step 2 with an additional space for each row. (Each additional row adds another space starting after row 2.)

B. Interpreting the Triangle

Steps use $(2x + 4)^3$ as an example

1. Pick corresponding row this case $(a + b)^3$
2. Write down coefficients: 1 3 3 1
3. Write down variables with the highest corresponding exponent (3 in the example on each end. Then decrease 1 power as you go towards the center.

a's	3	2	1
b's	1	2	3

$1a^3$	$+ 3a^2b$	$+ 3a^1b^2$	$+ 1b^3$
↙			↓
Highest power of a then decrease by 1			Highest power of b then decrease by 1
power as you go to the right.			power as you go to the left.

4. By comparing similar equations, to figure out a and b values.

$$\begin{array}{l} (a + b)^3 \\ (2x + 4)^3 \end{array} \quad a = 2x \quad b = 4$$

5. Plug into expanded formula obtained from the triangle (step 3) values of a + b.

$$\begin{array}{ccccccc}
 & & 1a^3 & + & 3a^2b & + & 3a^1b^2 & + & b^3 \\
 & & \swarrow & & \swarrow & \searrow & \swarrow & \searrow & \swarrow \\
 a=2x & & (2x)^3 & + & 3(2x)^2(4) & + & 3(2x)(4)^2 & + & (4)^3 \\
 b=4 & & & & & & & & \\
 & & 8x^3 & + & 48x^2 & + & 96x & + & 64
 \end{array}$$

6. **SIMPLIFY!!!!!!!!!!!!!!**

Ex2: $(x - 2y)^4$

Steps corresponding to explanation.

1. Row 5: $(a + b)^4$

2. Coefficients: 1 4 6 4 1

3. Highest exponent on each end and decrease as you go inward.

$$\begin{array}{cccc}
 a^4 & a^3 & a^2 & a \\
 b & b^2 & b^3 & b^4
 \end{array}$$

Base eq: $\longrightarrow |a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4|$

4: Obtain A & B: $(x - 2y)^4 : (a + b)^4 : a = x \quad b = -2y$

5::Plug in: $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

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

6. Simplify: $x^4 - 8x^3y + 24x^2y^2 - 32xy^3 + 16y^4$