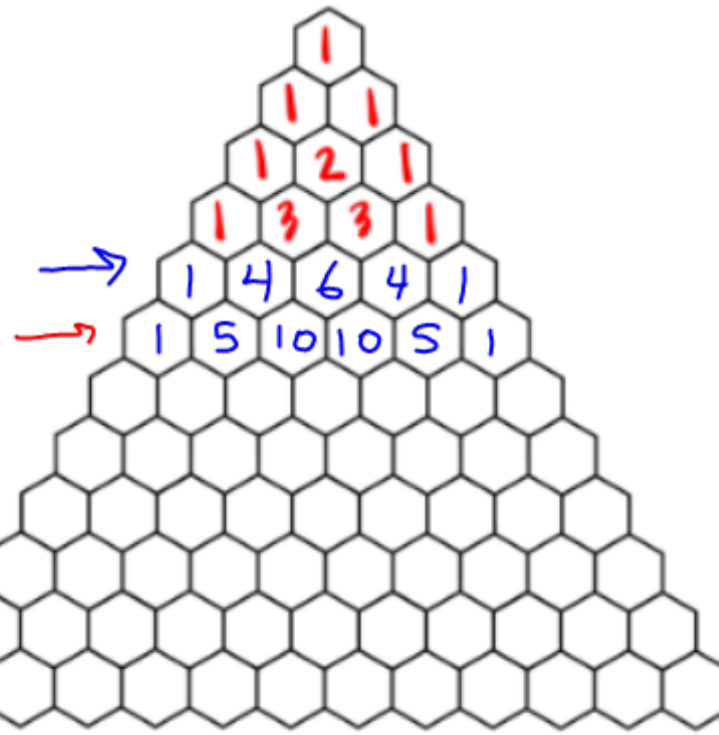


Pascal's Triangle

Use Pascal's Triangle to expand the following binomials:



$$1) (y + 1)^5$$

$$y^5 + 5y^4 + 10y^3 + 10y^2 + 5y + 1$$

$5y^4 \cdot 1$ $10y^3 \cdot 1^2$ $10y^2 \cdot 1^3$

$$2) (p + q)^4 = 1p^4 + 4p^3q + 6p^2q^2 + 4pq^3 + 1q^4$$

1) $(n+1)^3$

$$n^3 + 3n^2 + 3n + 1$$

2) $(x+1)^4$

$$x^4 + 4x^3 + 6x^2 + 4x + 1$$

3) $(n+1)^5$

$$n^5 + 5n^4 + 10n^3 + 10n^2 + 5n + 1$$

4) $(x+1)^6$

$$\underline{1}x^6 + \underline{6}x^5 + \underline{15}x^4 + \underline{20}x^3 + \underline{15}x^2 + \underline{6}x + \underline{1}$$

5) $(x+1)^7$

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

6) $(x+y)^4$

$$x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

7) $(x+y)^3$

$$x^3 + 3x^2y + 3xy^2 + y^3$$

9) $(a+b)^5$

10) $(n+m)^4$

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

$$n^4 + 4n^3m + 6n^2m^2 + 4nm^3 + m^4$$

11) $(x+y)^6$

$$x^6 + 6x^5y + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + y^6$$

Yesterday we practiced only
with **coefficients of 1.**

Today we will practice with
coefficients other than 1 to make
sure we can apply the Binomial
Theorem and Pascal's Triangle
together.

Let's apply that to when we have some values with coefficient's other than 1:

$$(x + 2)^3 = x^2 + 4x + 4$$

Diagram illustrating the expansion of $(x + 2)^3$ using the binomial theorem. The first term is x^2 (coefficient 1). The second term is $4x$ (coefficient 4). The third term is 4 (coefficient 4). The diagram shows the coefficients 1, 3, 3, 1 and the terms x^2 , x , and 1 being multiplied together to form the terms of the expansion.

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

Diagram illustrating the expansion of $(a + b)^3$ using the binomial theorem. The first term is a^2 (coefficient 1). The second term is $2ab$ (coefficient 2). The third term is b^2 (coefficient 1). The diagram shows the coefficients 1, 3, 3, 1 and the terms a^2 , a , and b being multiplied together to form the terms of the expansion.

$$(x + 2)^3 =$$

$$\begin{aligned} & \quad \quad \quad 3 \cdot 4 \\ & \underline{1}x^3 + \underline{3}x^2 \cdot \underline{2} + \underline{3}x \cdot \underline{2}^2 + \underline{1} \cdot \underline{2}^3 \\ & \underline{x^3} + \underline{6x^2} + \underline{12x} + \underline{8} \end{aligned}$$

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

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

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

$$1x^5 + 5x^4 \cdot 2^1 + 10x^3 \cdot 2^2 + 10x^2 \cdot 2^3 + 5x \cdot 2^4 + 1 \cdot 2^5$$

$$x^5 + 10x^4 + 40x^3 + 80x^2 + 80x + 32$$

Let's get a little more involved!!

$$(\boxed{2x} + \boxed{3y})^3 =$$

$$\begin{aligned} & 1(2x)^3 + 3(2x)^2(3y)^1 + 3(2x)^1(3y)^2 + 1(3y)^3 \\ & 1 \cdot 2^3 \cdot x^3 + 3 \cdot 2^2 \cdot x^2 \cdot 3 \cdot y + 3 \cdot 2 \cdot x \cdot 3^2 \cdot y^2 + 1 \cdot 3^3 \cdot y^3 \end{aligned}$$

$$8x^3 + 36x^2y + 54xy^2 + 27y^3$$

$$(3x + 2y)^4 =$$

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

$$81x^4 + 216x^3y + 216x^2y^2 + 96xy^3 + 16y^4$$

$$-2^2 = -1 \cdot 2^2$$

$$3 \cdot 2 \cdot (-2)^2$$

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

$$1(2x)^3 + \frac{3(2x)^2(-2y)}{\text{Neg}} + \frac{3(2x)(-2y)^2}{\text{Pos}} + \frac{1(-2y)^3}{\text{Neg}}$$

$$8x^3 - 24x^2y + 24xy^2 - 8y^3$$

$$-2^1$$

$$(-2)^5 = -32$$

$$(-2)^2 = 4$$

$$(-2)^6 = 64$$

$$(-2)^3 = -8$$

$$(-2)^4 = 16$$

$$(4a - 3b)^4 =$$

Binomial Expansion Activity!!

Homework #4: Binomial Expansion