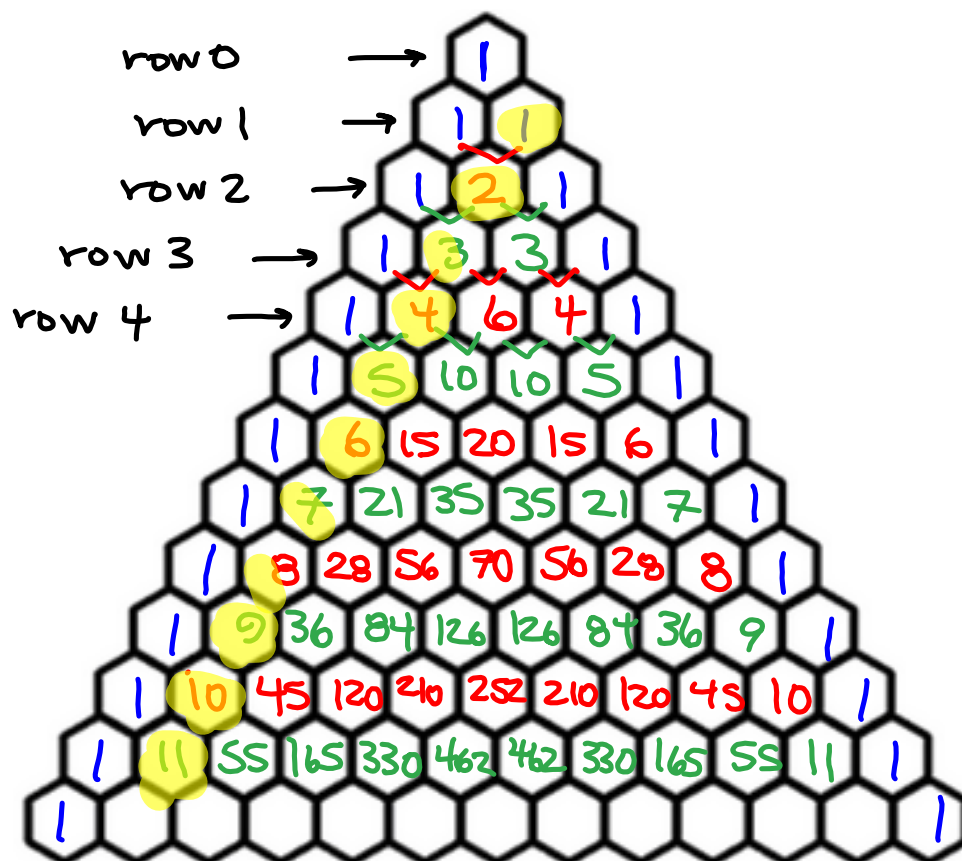


## 12.6 Part 2 Pascal's Triangle

We use Pascal's Triangle to help us find coefficients of expanding binomials. This helps us raise any binomial to a power easily!

### PASCAL'S TRIANGLE



Example 1 ~~1~~ ~~7~~ ~~21~~ ~~35~~ ~~35~~ ~~21~~ ~~7~~ 1

Find the expansion of  $(a - b)^{\textcircled{7}}$ .

$$1(a)^7(b)^0 - 7(a)^6(b)^1 + 21(a)^5(b)^2 - 35(a)^4(b)^3 + 35(a)^3(b)^4 - 21(a)^2(b)^5 + 7(a)^1(b)^6 - 1(a)^0(b)^7$$

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

Example 2 1 4 6 4 1

Find the expansion of  $(2 + 5x)^{\textcircled{4}}$ .

$$1(2)^4(5x)^0 + 4(2)^3(5x)^1 + 6(2)^2(5x)^2 + 4(2)^1(5x)^3 + 1(2)^0(5x)^4$$

$$\underline{1(16)(1)} + \underline{4(8)(5x)} + \underline{6(4)(25x^2)} + \underline{4(2)(125x^3)} + \underline{1(1)(625x^4)}$$

$$16 + 160x + 600x^2 + 1000x^3 + 625x^4$$

Example 3    1   6   15   20   15   6   1

Find the expansion of  $(4m - 7n)^6$ .

$$1(4m)^6(7n)^0 - 6(4m)^5(7n)^1 + 15(4m)^4(7n)^2 \\ - 20(4m)^3(7n)^3 + 15(4m)^2(7n)^4 - 6(4m)^1(7n)^5 + \\ 1(4m)^0(7n)^6$$

$$1(4096m^6)(1) - 6(1024m^5)(7n) + 15(256m^4)(49n^2) \\ - 20(64m^3)(343n^3) + 15(16m^2)(2401n^4) \\ - 6(4m)(16807n^5) + 1(1)(117,649n^6)$$

$$4096m^6 - 43008m^5n + 188,160m^4n^2 \\ - 439,040m^3n^3 + 576,240m^2n^4 \\ - 403,368mn^5 + 117,649n^6$$

Example 4    1   9   36   84   126   126   84   36   9   1

Find the expansion of  $(3y + 6z)^9$ .

$$1(3y)^9(6z)^0 + 9(3y)^8(6z)^1 + 36(3y)^7(6z)^2 + 84(3y)^6(6z)^3 + \\ 126(3y)^5(6z)^4 + 126(3y)^4(6z)^5 + 84(3y)^3(6z)^6 + 36(3y)^2(6z)^7 + \\ 9(3y)^1(6z)^8 + 1(3y)^0(6z)^9$$

$$1(19683y^9)(1) + 9(6561y^8)(6z) + 36(2187y^7)(36z^2) + \\ 84(729y^6)(216z^3) + 126(243y^5)(1296z^4) + 126(81y^4)(7776z^5) + \\ 84(27y^3)(46656z^6) + 36(9y^2)(279,936z^7) + \\ 9(3y)(1,679,616z^8) + 1(1)(10,077,696z^9)$$

$$19683y^9 + 354,294y^8z + 2834352y^7z^2 + 13226976y^6z^3 + \\ 39680928y^5z^4 + 79361856y^4z^5 + 105815808y^3z^6 + \\ 90699264y^2z^7 + 45349632yz^8 + 10,077,696z^9$$