

Binomials from $n = 0$ to $n = 20$

$$\boxed{0} \quad n = 0 \quad (x + y)^0 = 1$$

$$\boxed{1} \quad n = 1 \quad (x + y)^1 = x + y$$

$$\boxed{2} \quad n = 2 \quad (x + y)^2 = x^2 + 2xy + y^2$$

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

$$\boxed{4} \quad n = 4 \quad (x + y)^4 = x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

$$\boxed{5} \quad n = 5 \quad (x + y)^5 = x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5$$

$$\boxed{6} \quad n = 6 \quad (x + y)^6 = x^6 + 6x^5y + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + y^6$$

$$\boxed{7} \quad n = 7 \quad (x + y)^7 = x^7 + 7x^6y + 21x^5y^2 + 35x^4y^3 + 35x^3y^4 + 21x^2y^5 + 7xy^6 + y^7$$

$$\boxed{8} \quad n = 8 \quad (x + y)^8 = x^8 + 8x^7y + 28x^6y^2 + 56x^5y^3 + 70x^4y^4 + 56x^3y^5 + 28x^2y^6 + 8xy^7 + y^8$$

$$\boxed{9} \quad n = 9 \quad (x + y)^9 =$$

$$x^9 + 9x^8y + 36x^7y^2 + 84x^6y^3 + 126x^5y^4 + 126x^4y^5 + 84x^3y^6 + 36x^2y^7 + 9xy^8 + y^9$$

$$\boxed{10} \quad n = 10 \quad (x + y)^{10} =$$

$$x^{10} + 10x^9y + 45x^8y^2 + 120x^7y^3 + 210x^6y^4 + 252x^5y^5 + 210x^4y^6 + 120x^3y^7 + 45x^2y^8 + 10xy^9 + y^{10}$$

$$\boxed{11} \quad n = 11 \quad (x + y)^{11} =$$

$$x^{11} + 11x^{10}y + 55x^9y^2 + 165x^8y^3 + 330x^7y^4 + 462x^6y^5 + 462x^5y^6 + 330x^4y^7 + 165x^3y^8 + 55x^2y^9 + 11xy^{10} + y^{11}$$

$$\boxed{12} \quad n = 12 \quad (x + y)^{12} =$$

$$x^{12} + 12x^{11}y + 66x^{10}y^2 + 220x^9y^3 + 495x^8y^4 + 792x^7y^5 + 924x^6y^6 + 792x^5y^7 + 495x^4y^8 + 220x^3y^9 + 66x^2y^{10} + 12xy^{11} + y^{12}$$

$$\boxed{13} \quad n = 13 \quad (x + y)^{13} =$$

$$x^{13} + 13x^{12}y + 78x^{11}y^2 + 286x^{10}y^3 + 715x^9y^4 + 1287x^8y^5 + 1716x^7y^6 + 1716x^6y^7 + 1287x^5y^8 + 715x^4y^9 + 286x^3y^{10} + 78x^2y^{11} + 13xy^{12} + y^{13}$$

$$\boxed{14} \quad n = 14 \quad (x + y)^{14} =$$

$$x^{14} + 14x^{13}y + 91x^{12}y^2 + 364x^{11}y^3 + 1001x^{10}y^4 + 2002x^9y^5 + 3003x^8y^6 + 3432x^7y^7 + 3003x^6y^8 + 2002x^5y^9 + 1001x^4y^{10} + 364x^3y^{11} + 91x^2y^{12} + 14xy^{13} + y^{14}$$

$$\boxed{15} \quad n = 15 \quad (x + y)^{15} =$$

$$x^{15} + 15x^{14}y + 105x^{13}y^2 + 455x^{12}y^3 + 1365x^{11}y^4 + 3003x^{10}y^5 + 5005x^9y^6 + 6435x^8y^7 + 6435x^7y^8 + 5005x^6y^9 + 3003x^5y^{10} + 1365x^4y^{11} + 455x^3y^{12} + 105x^2y^{13} + 15xy^{14} + y^{15}$$

16 $n = 16$ $(x + y)^{16} =$

$$x^{16} + 16x^{15}y + 120x^{14}y^2 + 560x^{13}y^3 + 1820x^{12}y^4 + 4368x^{11}y^5 + 8008x^{10}y^6 + 11440x^9y^7 + 12870x^8y^8 + 11440x^7y^9 + 8008x^6y^{10} + 4368x^5y^{11} + 1820x^4y^{12} + 560x^3y^{13} + 120x^2y^{14} + 16xy^{15} + y^{16}$$

17 $n = 17$ $(x + y)^{17} =$

$$x^{17} + 17x^{16}y + 136x^{15}y^2 + 680x^{14}y^3 + 2380x^{13}y^4 + 6188x^{12}y^5 + 12376x^{11}y^6 + 19448x^{10}y^7 + 24310x^9y^8 + 24310x^8y^9 + 19448x^7y^{10} + 12376x^6y^{11} + 6188x^5y^{12} + 2380x^4y^{13} + 680x^3y^{14} + 136x^2y^{15} + 17xy^{16} + y^{17}$$

18 $n = 18$ $(x + y)^{18} =$

$$x^{18} + 18x^{17}y + 153x^{16}y^2 + 816x^{15}y^3 + 3060x^{14}y^4 + 8568x^{13}y^5 + 18564x^{12}y^6 + 31824x^{11}y^7 + 43758x^{10}y^8 + 48620x^9y^9 + 43758x^8y^{10} + 31824x^7y^{11} + 18564x^6y^{12} + 8568x^5y^{13} + 3060x^4y^{14} + 816x^3y^{15} + 153x^2y^{16} + 18xy^{17} + y^{18}$$

19 $n = 19$ $(x + y)^{19} =$

$$x^{19} + 19x^{18}y + 171x^{17}y^2 + 969x^{16}y^3 + 3876x^{15}y^4 + 11628x^{14}y^5 + 27132x^{13}y^6 + 50388x^{12}y^7 + 75582x^{11}y^8 + 92378x^{10}y^9 + 92378x^9y^{10} + 75582x^8y^{11} + 50388x^7y^{12} + 27132x^6y^{13} + 11628x^5y^{14} + 3876x^4y^{15} + 969x^3y^{16} + 171x^2y^{17} + 19xy^{18} + y^{19}$$

20 $n = 20$ $(x + y)^{20} =$

$$x^{20} + 20x^{19}y + 190x^{18}y^2 + 1140x^{17}y^3 + 4845x^{16}y^4 + 15504x^{15}y^5 + 38760x^{14}y^6 + 77520x^{13}y^7 + 125970x^{12}y^8 + 167960x^{11}y^9 + 184756x^{10}y^{10} + 167960x^9y^{11} + 125970x^8y^{12} + 77520x^7y^{13} + 38760x^6y^{14} + 15504x^5y^{15} + 4845x^4y^{16} + 1140x^3y^{17} + 190x^2y^{18} + 20xy^{19} + y^{20}$$

Formula of the Binomial Theorem $n = n$ $(x + y)^n$

$$x^n + nx^{n-1}y + \frac{n(n-1)}{2!}x^{n-2}y^2 + \dots + \frac{n(n-1)\dots(n-r+3)}{(r-2)!}x^{n-r+2}y^{r-2} + \frac{n(n-1)\dots(n-r+2)}{(r-1)!}x^{n-r+1}y^{r-1} + \dots + nxy^{n-1} + y^n$$