Binomial Theorem

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

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

$(x + y)^4 = x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$

$(x + y)^n = x^n + nx^{n-1}y + \frac{n(n-1)}{2!}x^{n-2}y^2 + \cdots + nxy^{n-1} + y^n$

$(x - y)^n = x^n - nx^{n-1}y + \frac{n(n-1)}{2!}x^{n-2}y^2 - \cdots \pm nxy^{n-1} \mp y^n$

$(x - y)^2 = x^2 - 2xy + y^2$

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

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

$$(x+y)^n = \binom{n}{n}x^n + \binom{n}{n-1}x^{n-1}y + \binom{n}{n-2}x^{n-2}y^2 + \cdots + \binom{n}{1}xy^{n-1} + \binom{n}{0}y^n$$

Pascal's Triangle: $\binom{n}{x}$

$x =$ 0, 1, 2, 3, 4, 5, 6, 7

$n =$

1

1: 1 1

2: 1 2 1

3: 1 3 3 1

4: 1 4 6 4 1

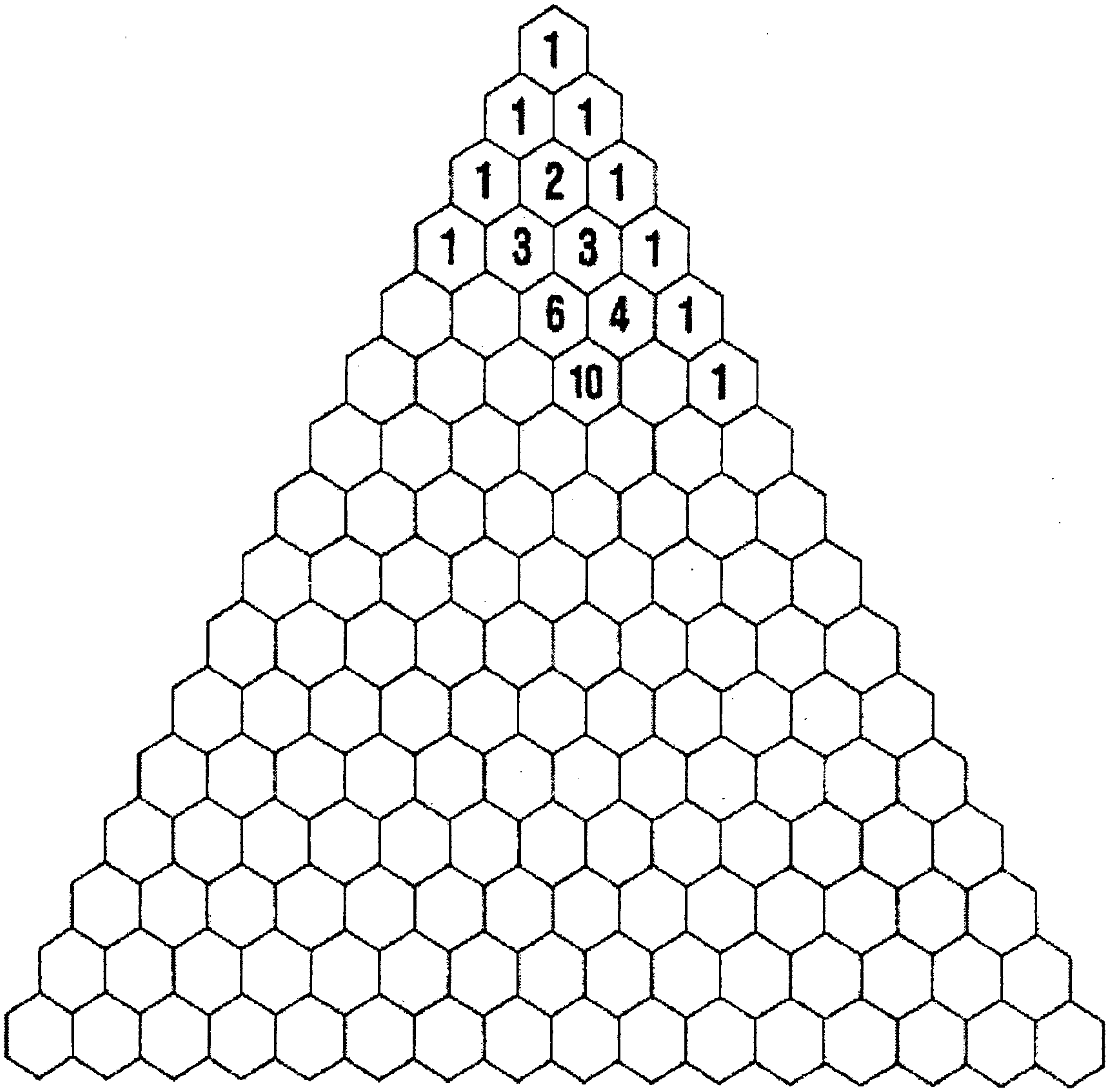
5: 1 5 10 10 5 1

6: 1 6 15 20 15 6 1

7: 1 7 21 35 35 21 7 1

$\binom{7}{0}$ $\binom{7}{1}$ $\binom{7}{2}$ $\binom{7}{3}$ $\binom{7}{4}$ $\binom{7}{5}$ $\binom{7}{6}$ $\binom{7}{7}$

etc.


1
1 1
1 2 1
1 3 3 1
6 4 1
10 1