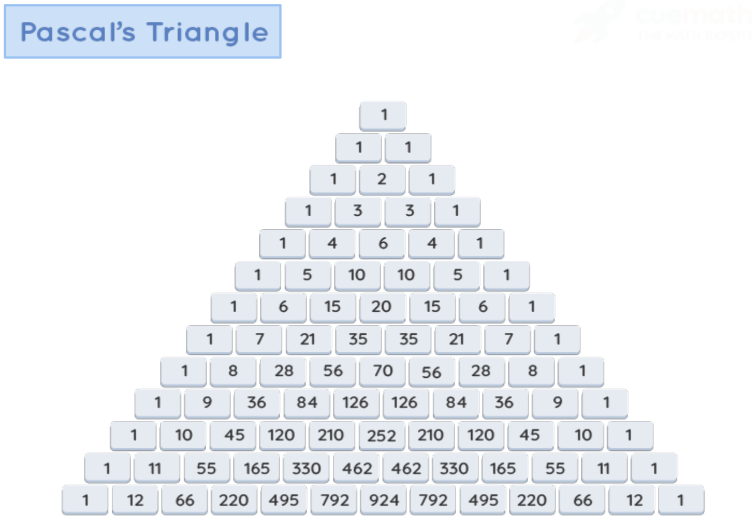
Concepts and Formulas

Pascal's Triangle for 1-12 :



With practice you should be able to remember some of the top pascal triangle results, these kind of minor things save time and that time can be used on other tough questions.

Binomial theorem for any positive integer n:

$$(a+b)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1} b + {}^nC_2 a^{n-2} b^2 + \ldots + {}^nC_{n-1} a.b^{n-1} + {}^nC_n b^n$$

OR

$$(a+b)^n = \sum_{k=0}^{n} {}^nC_k \, a^{n-k} b^k$$

Important Points:

1. This result can be proved using mathemtical induction.

2. The coefficients ${}^nC_r$ occuring in the binomial theorem are known as binomial coefficients.

3. There are (n+1) terms in the expression of $(a+b)^n$.

4. In the successive terms of the expansion the index of a goes on decreasing by unity. It is n in the first term, (n-1) in the second term, and so on ending with zero in the last term. At the same time the index of b increases by unity, starting with zero in the first term, 1 in the second and so on ending with n in the last term.

Special Cases:

Case–1: Taking a = x and b = – y,

$$\begin{aligned}(x - y)^n &= [x + (-y)]^n \\ &= {}^nC_0x^n + {}^nC_1x^{n-1}(-y) + {}^nC_2x^{n-2}(-y)^2 + {}^nC_3x^{n-3}(-y)^3 + \ldots + {}^nC_n\,(-y)^n \\ &= {}^nC_0x^n - {}^nC_1x^{n-1}y + {}^nC_2x^{n-2}y^2 - {}^nC_3x^{n-3}y^3 + \ldots + (-1)^n\,{}^nC_n\,y^n\end{aligned}$$

Case–2: Taking a = 1, b = x,

$$\begin{aligned}(1 + x)^n &= {}^nC_0(1)^n + {}^nC_1(1)^{n-1}x + {}^nC_2(1)^{n-2}x^2 + \ldots + {}^nC_nx^n \\ &= \underline{{}^nC_0 + {}^nC_1x + {}^nC_2x^2 + {}^nC_3x^3 + \ldots + {}^nC_nx^n}\end{aligned}$$

Note that we just have to put values to get results for special cases, so it is not that important. But I still recommend that you at least keep in mind the second case, it helps a lot in questions and saves time.