Concepts and Formulas

Pascal's Triangle for 1-12 :

Pascal's Triangle

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
1 9 36 84 126 126 84 36 9 1
1 10 45 120 210 252 210 120 45 10 1
1 11 55 165 330 462 462 330 165 55 11 1
1 12 66 220 495 792 924 792 495 220 66 12 1

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.

Tips and Tricks

1. Binomial theorem is a fundamental chapter that is used in many other chapters throughout the maths of class 11 and 12. So if you cover this throughly then it will help you in many situations.

2. Study class notes efficiently. Try to give more time to the concepts that are weak for you, and skim through strong concepts.

3. To be able to remember these binomial formulas and results practice their proof in notebook. Proofs give behind the scenes of these formulas, if you understand them they can help you in tough questions.

4. As always Practice lots of questions to understand the concepts.

5. See exemplar, and other problems section for practice questions related to this video's concepts.

6. Take mini tests from ncert(Exercise 8.1 for this video) or other reference books.