Catalan numbers is a sequence of positive integers where the nth term, Cn is defined using following recursive formula:

**Cn=(2n)!/(n+1)!(n)!**

The first few Catalan numbers for n = 0, 1, 2, 3, … are 1, 1, 2, 5, 14, 42, 132, 429, 1430, 4862, …

**Applications** :

1. Number of possible Binary Search Trees with n keys.
2. Number of expressions containing n pairs of parentheses which are correctly matched. For n = 3, possible expressions are ((())), ()(()), ()()(), (())(), (()()).
3. Number of ways a convex polygon of n+2 sides can split into triangles by connecting vertices.
4. Number of full binary trees (A rooted binary tree is full if every vertex has either two children or no children) with n+1 leaves
5. Number of different unlabeled Binary Trees can be there with n nodes.
6. The number of paths with 2n steps on a rectangular grid from bottom left, i.e., (n-1, 0) to top right (0, n-1) that do not cross above the main diagonal.
7. Number of Dyck words of length 2n. A Dyck word is a string consisting of n X’s and n Y’s such that no initial segment of the string has more Y’s than X’s. For example, the following are the Dyck words of length 6: XXXYYY XYXXYY XYXYXY XXYYXY XXYXYY.