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Combinations Formulas

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List of 22 Combinations Formulas

Combinations

1) Maximum Value of nCr when N is Even

Open Calculator

fx $$C = C\left(n, \frac{n}{2}\right)$$

ex $$70 = C\left(8, \frac{8}{2}\right)$$

2) Maximum Value of nCr when N is Odd

Open Calculator

fx $$C = C\left(n_{Odd}, \frac{n_{Odd} + 1}{2}\right)$$

ex $$10 = C\left(5, \frac{5 + 1}{2}\right)$$

3) nCr or C(n,r)

Open Calculator

fx $$C = \frac{n!}{r! \cdot (n - r)!}$$

ex $$70 = \frac{8!}{4! \cdot (8 - 4)!}$$

4) No of Combinations of (P+Q) Things into Two Groups of P and Q Things

Open Calculator

fx $$C = \frac{(p+q)!}{(p!)\cdot(q!)}$$

ex $$1716 = \frac{(7+6)!}{(7!)\cdot(6!)}$$

5) No of Combinations of N Different Things taken Atleast One at once

Open Calculator

fx $$C = 2^n - 1$$

ex $$255 = 2^8 - 1$$

6) No of Combinations of N Different Things taken R at once

Open Calculator

fx $$C = C(n,r)$$

ex $$70 = C(8,4)$$

7) No of Combinations of N Different Things taken R at once and Repetition Allowed

Open Calculator

fx $$C = C((n+r-1),r)$$

ex $$330 = C((8+4-1),4)$$

8) No of Combinations of N Different Things taken R at once given M Specific Things Always Occur

Open Calculator

fx $$C = C\binom{n - m}{r - m}$$

ex $$5 = C\binom{8 - 3}{4 - 3}$$

9) No of Combinations of N Different Things taken R at once given M Specific Things Never Occur

Open Calculator

fx $$C = C((n - m), r)$$

ex $$5 = C((8 - 3), 4)$$

10) No of Combinations of N Different Things, P and Q Identical Things taken Atleast One at once

Open Calculator

fx $$C = (p + 1) \cdot (q + 1) \cdot (2^n) - 1$$

ex $$14335 = (7 + 1) \cdot (6 + 1) \cdot (2^8) - 1$$

11) No of Combinations of N Identical Things into R Different Groups if Empty Groups are Allowed

Open Calculator

fx $$C = C(n + r - 1, r - 1)$$

ex $$165 = C(8 + 4 - 1, 4 - 1)$$

12) No of Combinations of N Identical Things into R Different Groups if Empty Groups are Not Allowed

Open Calculator

fx $$\mathrm{C} = C(\mathrm{n}-1,\mathrm{r}-1)$$

ex $$35 = C(8-1,4-1)$$

13) No of Combinations of N Identical Things taken Zero or more at once

Open Calculator

fx $$\mathrm{C} = \mathrm{n}+1$$

ex $$9 = 8+1$$

14) Nth Catalan Number

Open Calculator

fx $$\mathrm{C_n} = \left(\frac{1}{\mathrm{n}+1}\right)\cdot C(2\cdot \mathrm{n},\mathrm{n})$$

ex $$1430 = \left(\frac{1}{8+1}\right)\cdot C(2\cdot 8,8)$$

Geometric Combinatorics

15) Number of Chords formed by joining N Points on Circle

Open Calculator

fx $$\mathrm{N_{Chords}} = C(\mathrm{n},2)$$

ex $$28 = C(8,2)$$

16) Number of Diagonals in N-Sided Polygon

Open Calculator

fx $$\mathrm{N_{Diagonals}} = C(\mathrm{n}, 2) - \mathrm{n}$$

ex $$20 = C(8, 2) - 8$$

17) Number of Rectangles formed by Number of Horizontal and Vertical Lines

Open Calculator

fx $$\mathrm{N_{Rectangles}} = C(\mathrm{N_{Horizontal\ Lines}}, 2) \cdot C(\mathrm{N_{Vertical\ Lines}}, 2)$$

ex $$1620 = C(10, 2) \cdot C(9, 2)$$

18) Number of Rectangles in Grid

Open Calculator

fx $$\mathrm{N_{Rectangles}} = C(\mathrm{N_{Horizontal\ Lines}} + 1, 2) \cdot C(\mathrm{N_{Vertical\ Lines}} + 1, 2)$$

ex $$2475 = C(10 + 1, 2) \cdot C(9 + 1, 2)$$

19) Number of Straight Lines formed by joining N Non-Collinear Points

Open Calculator

fx $$\mathrm{N_{Straight\ Lines}} = C(\mathrm{n}, 2)$$

ex $$28 = C(8, 2)$$

20) Number of Straight Lines formed by joining N Points out of which M are Collinear

Open Calculator

fx $$N_{\text{Straight Lines}} = C(n,2) - C(m,2) + 1$$

ex $$26 = C(8,2) - C(3,2) + 1$$

21) Number of Triangles formed by joining N Non-Collinear Points

Open Calculator

fx $$N_{\text{Triangles}} = C(n,3)$$

ex $$56 = C(8,3)$$

22) Number of Triangles formed by joining N Points out of which M are Collinear

Open Calculator

fx $$N_{\text{Triangles}} = C(n,3) - C(m,3)$$

ex $$55 = C(8,3) - C(3,3)$$

Variables Used

- **C** Number of Combinations
- **C_n** Nth Catalan Number
- **m** Value of M
- **n** Value of N
- **N_{Chords}** Number of Chords
- **$N_{Diagonals}$** Number of Diagonals
- **$N_{Horizontal\ Lines}$** Number of Horizontal Lines
- **n_{Odd}** Value of N (Odd)
- **$N_{Rectangles}$** Number of Rectangles
- **$N_{Straight\ Lines}$** Number of Straight Lines
- **$N_{Triangles}$** Number of Triangles
- **$N_{Vertical\ Lines}$** Number of Vertical Lines
- **p** Value of P
- **q** Value of Q
- **r** Value of R

Constants, Functions, Measurements used

- Function: **C**, C(n,k)
  Binomial coefficient function

Check other formula lists

- **Combinations Formulas**
- **Permutations Formulas**

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