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What's what PSPM

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FACTORIAL!

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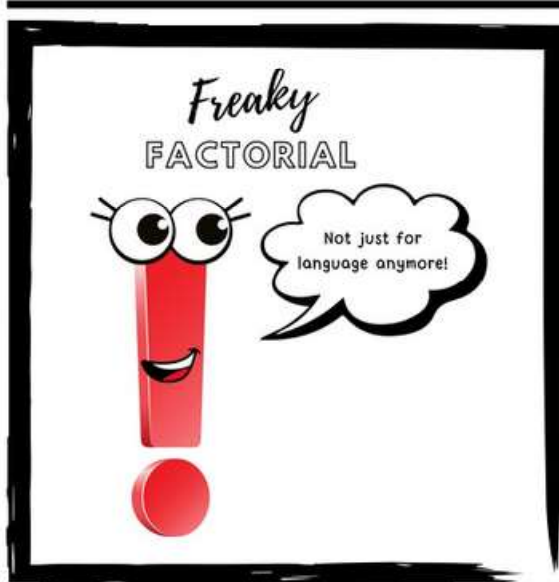


FACTORIAL!

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WHAT IS *factorial!* ?

Factorial is a mathematical operation that computes the product of all positive integers from 1 to a given non-negative integer. It is represented by the symbol “!”. The factorial of a non-negative integer n , denoted by $n!$, is the product of all positive integers that is less than or equal to n .

Mathematically, the factorial of “ n ” is defined as:

$$\begin{aligned}n! &= n \times (n-1) \times (n-2) \times \dots \times 3 \times 2 \times 1 \\ &= n \times (n-1)!\end{aligned}$$

FACTORIAL *facts*

Factorials are used to find the number of ways objects can be arranged, known as permutation and combination. It is a permutation when the order of each element matters such as the password of a lockbox, but it is a combination when the order does not matter, such as forming a soccer team from many players.

For instance, if we want to know the number of combinations that can be made from the three-digit number 215, we can find the factorial of 3, that is

$$3! = 3 \times 2 \times 1 = 6.$$

It means, six combinations of numbers can be made with the number 215, which is 215, 251, 512, 521, 125, 152.

$$\begin{aligned}0! &= 1 \\ 8! &= 40320 \\ 10! &= 3628800 \\ 30! &= 265252859812191058636308480000000\end{aligned}$$

So, can you compute for 15!?



APPLICATIONS *in real life*

Factorial can expand significantly as n increases. Factorial computations become computationally expensive for large values of n . Specialized approaches and algorithms such as Stirling's approximation or logarithmic method can be employed to handle large factorials [1].



➤➤➤ ECONOMICS AND BUSINESS

Factorials may be used in economic modelling and game theory to analyze decision-making scenarios.

➤➤➤ CRYPTOGRAPHY

In cryptography and encryption algorithms, factorials may be used to determine the number of possible encryption keys or permutations.



➤➤➤ ARRANGEMENTS AND PERMUTATIONS

In scheduling and arranging events or tasks, factorials help determine the number of possible orders or sequences.

Factorials are essential for counting the number of permutations and combinations. For example, when ordering a pizza, it doesn't matter whether you order it with pepperoni, mushrooms, and cheese or cheese, mushrooms, and pepperoni.

➤➤➤ COMBINATORICS AND PROBABILITY



➤➤➤ GENETICS AND BIOLOGY

In genetics, factorials are used to calculate the number of possible genetic outcomes when considering different gene combinations.

REFERENCES

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