

In General

k -permutation

The number of k -element sequences of distinct symbols from a universe of n symbols is:

$$P(n, k) = n \cdot (n - 1) \cdots (n - k + 1) = \frac{n!}{(n - k)!}$$

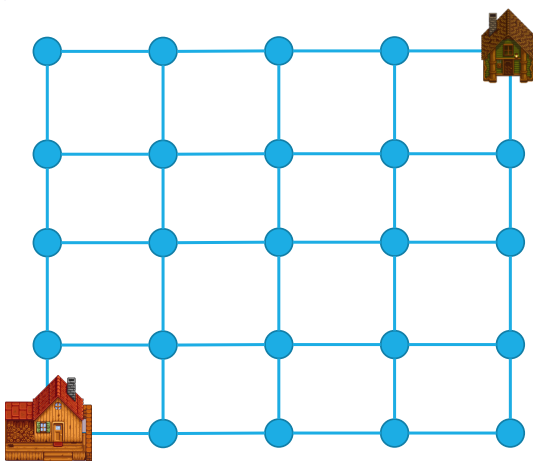
k -combination

The number of k -element subsets from a set of n symbols is:

$$C(n, k) = \frac{P(n, k)}{k!} = \frac{n!}{k! (n - k)!}$$

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Path Counting



We're at our farm in the lower-left corner and want to get to the Adventure's Guild in the upper-right corner.

We're only going to go right and up.

How many different paths are there?

A. 2^8


B. $P(8, 4)$

C. $\binom{8}{4}$

D. Something else

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Overcounting

How many anagrams are there of RHUBARB 
 (an anagram is a rearrangement of letters).

It's not 7! That counts RHUBARB and RHUBARB as different things!
 I swapped the Rs (or maybe the Bs)

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Pascal's Rule: $\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-1}{k}$

You and $n - 1$ other people are trying out for a k person team. How many possible teams are there?

Way 1: There are n people total, of which we're choosing k (and since it's a team order doesn't matter) $\binom{n}{k}$.

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