Arrangements

Flip 6 coins. How many possible outcomes?

A security code of 4 letters. How many possible ‘codes’?

5 books in a display. How many possible ‘displays’?

A menu of 3 entrées, 4 mains & 5 desserts. How many possible ‘meals’

To find the total number of outcomes: MULTIPLY

1\textsuperscript{st} choice AND 2\textsuperscript{nd} choice AND 3\textsuperscript{rd} choice

Number of ways to arrange ‘n’ items eg 5 items = 5 \times 4 \times 3 \times 2 \times 1
= 5! (5 factorial)

n! = n \times (n - 1) \times (n - 2) \times (n - 3) \times (n - 4)\ldots \times 2 \times 1

NOTE: 0! = 1
Permutations Introduction

10 people go to a movie. How many seating arrangements are possible?

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7 people go to a movie from a group of 10 people. How many seating arrangements are possible?

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5 people go to a movie from a group of 37 people. How many seating arrangements are possible?

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A group of ‘r’ is selected from a group of ‘n’ people. How many different ARRANGEMENTS are possible?
Bad Jelly wants to permutate her hair. She has 10 potions to choose from, and applies 3 potions in order for a particularly hideous hairstyle. How many ‘hairstyles’ are possible?

**Permutations**

= particular ORDER important

\[ \binom{n}{r} = \frac{n!}{(n-r)!} \]

= how many ARRANGEMENTS

Selecting ‘r’ items from a group of ‘n’ items

eg 4 spell incantations can be selected from a list of 12 incantations (no repeats). How many different ‘spells’ are possible?

eg. 3 spell incantations can be used. How many different ‘spells’ are possible?
Combinations Introduction

7 people go to a movie.
How many seating arrangements are possible? (Arrangement)

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4 people go to a movie from a group of 7 people.
How many seating arrangements are possible? (Permutation)

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4 people are chosen for a team from a group of 7 people.
How many different ‘teams’ are possible? (Combination)

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A group of ‘r’ is selected from a group of ‘n’ people.
How many different GROUPS are possible?
Bad Jelly wants to combine 4 of her potion ingredients together. She has 10 ingredients to choose from. How many ingredient groups are possible? (order not important)

**Combinations = order NOT important**

\[ nC_r = \frac{n!}{(n-r)! \cdot r!} \]

= how many GROUPS

**Selecting ‘r’ items from a group of ‘n’ items**

**We divide out the number of ways the ‘r’ items can be rearranged.**

eg. Bad Jelly selects 5 cards from her ‘reading the future’ card pack of 37 cards. How many card ‘hands’ are possible?

eg. From a club of 12 members, how many ways are there of selecting a committee of three?