General Assembly

STUDY GUIDE

COMBINATIONS AND PERMUTATIONS

Key Terms & Definitions

» **Counting Principle/Fundamental Theorem of Counting**: Formally states that if a job consists of k separate tasks and there are n_1 ways of doing the first task, n_2 ways of doing the second task, and so on, then there are $n_1 \times n_2 \times \ldots n_k$ ways of completing the entire job.

» **Factorial**: Denoted by an exclamation point !, this is the number of ways to list a set of n objects. It is found by multiplying a number by every number between itself and 1, such that $n! = n \times (n-1) \times \ldots \times 2 \times 1$.

» **Permutation**: An arrangement of objects without repetition in which order matters.

- Formula: , where n is the number of possible options and k is the number of options we want to choose.

» **Combination**: An arrangement of objects without repetition in which order *does not* matter and therefore all possible cases must be taken into account.

- Formula: , where n is the number of possible options and k is the number of options we want to choose.

Guiding Questions

1) Name a few situations in which order would matter — and a few in which it wouldn't — in choosing sets of objects or outcomes.
2) Why is it more complicated to calculate arrangements in which order does not matter?
3) Why do we need combinations and permutations to calculate probability? Why can't we just take the ratio of that type of event/object on its own?

Additional Resources

1. Easy Permutations and Combinations

» A straightforward, simple explanation of the differences between permutations and combinations.

2. Combinations and Permutations

» Another simple explanation of the difference with more mathematical emphasis.

3. Khan Academy

» Khan Academy's unit on probability using combinations and permutations.