11.1 The Fundamental Counting Principle

# Objective: Use the fundamental counting principle to determine the number of possible outcomes in a given situation

The number of ways in which a series of successive things can occur is found by multiplying the number of ways in which each thing can occur.

**THE FUNDAMENTAL COUNTING PRINCIPLE WITH TWO GROUPS OF ITEMS**

If one item is chosen from a group of *M* items, and a second item for a group of *N* items, then the total number of two-item choices is

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**THE FUNDAMENTAL COUNTING PRINCIPLE WITH MORE THAN TWO GROUPS OF ITEMS**

If one item is chosen from a group of *M* items, a second item for a group of *N* items, and a third item from a group of *P* items, then the total number of three-item choices is

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This procedure can be extended to any number of groups.

Note that a group may be a single item with multiple options, such as a whether or not a car has air-conditioning. In this case, the group is air-conditioning, and there are two items, yes and no.

**THE FUNDAMENTAL COUNTING PRINCIPLE WITH SAME-SIZE GROUPS**

In a situation where there are *G* groups, each with *N* choices, the multiplication in the fundamental counting principle can be replaced with an exponent. The number of possible options will be

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