NAME

Module 20 Solving Problems Using Probability, Statistics, and Discrete Math

Lesson 1 Finding Permutations and Combinations

guided notes

Lesson Objectives

- Use a tree diagram.
- Use the Fundamental Counting Principal.
- Evaluate factorials.
- Find permutations and combinations.

A tree diagram is a diagram that uses branches to show all the possible **arrangements** of objects in a set.

The **Fundamental Counting Principle** states if there are **m** ways to make the first choice, and **n** ways to make the second choice, then there are **$m \cdot n$** ways to make the two choices one after the other.

1 Suppose a meal consists of an appetizer, an entrée, and a dessert. Find the total number of different meals from which you can choose if there are five appetizers, three entrées, and six desserts.

90 meals

$n!$ is read as "n factorial." $n!$ = **$n(n-1)(n-2) \ldots (3)(2)(1)$**

A permutation is an arrangement where order **matters**.

The same two objects arranged in a different order is considered two different choices.

$_nP_r$ is read as, "the number of permutations of n different objects taken r at a time".

$$_nP_r = \frac{n!}{(n-r)!}$$

A combination is an arrangement where order **does not matter**.

The same two objects arranged in a different order is *not* considered two different choices.

$$_nC_r = \frac{n!}{r!(n-r)!}$$

2 A band director must choose five drummers, out of nine, to march in a parade. In how many different ways can the director line up the five drummers, choosing from nine drummers?

15,120 ways

3 The Mr. Smoothie's shop has five different types of fresh fruit available. A Supreme smoothie is a blend of three different fruits. How many different Supreme smoothies are possible?

10 Supreme smoothies