

Permutations-Part 2

Learning Goal

Example 1: Counting Arrangements

Consider the following example:

In how many ways can the starting order, for the NG track team, be posted in an 8-member relay if ...

- a) all 8 members will take part in the race?
- b) only 4 members, chosen from the 8, will take part?

Formulas for Permutations

The number of permutations of n objects, taken r at a time, and without repetition is given by:

$$P(n,r) = \frac{n!}{(n-r)!}, \quad 0 \leq r \leq n$$

Also...

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

$$P(n,n) = \frac{n!}{0!}$$

$$P(n,n) = \frac{n!}{1} \text{ where } 0! = 1$$

$$P(n,n) = n!$$

Example 2: Using Permutations to Solve Probability-related Problems

Re-consider the previous example:

In how many ways can the starting order, for the NG track team, be posted in an 8-member relay if ...

... *only 4 members, chosen from the 8, will take part?*

NOW...

Let's say that you'd like to know the probability that you and 3 of your friends (also on the track team) will form the starting order.

Determine this probability.

Example 3: Permutations with Identical Elements

List the permutations of the letters in the word, ROOM.

R O₁ O₂ M

Permutations with Identical Elements

When all objects are not distinct

The number of permutations of n objects, for which there are a identical elements, b identical elements, and so on..., the number of permutations is given by the following:

$$\frac{n!}{a!b!c!...}$$

E.g. 4., Determine the number of possible arrangements using the letters of the word, MINIMUM.

Practice Problem Set

p255 #4, 6, 7, 11, 12a, 16, 17