

Lesson 3 Permutations of Different Objects

To permute a set of objects means to arrange them.

A permutation is an arrangement of objects in a definite order (order is important)

$n!$ represents the number of permutations of n different/distinct objects

Ex. 1) Given the word PHONE, determine how many 5-letter permutations of these letters can be created.

The number of permutations of n distinct objects taken r at a time is:

$${}_n P_r = \frac{n!}{(n-r)!}, n \geq r$$

Ex. 2) Evaluate ${}_9 P_4$.

“Permutation of 9 objects, selecting only 4 at a time”

Ex. 3) Given the word WINTER, determine how many permutations of three letters are possible.

Ex. 4) Given eight students are competing in a 200 m race, determine how many ways the students can finish 1st, 2nd and 3rd.

Ex. 5) Erin, Jill, Chris, Krista, and Larissa are off to Silver City. Just prior to heading out, Krista and Larissa have a falling out over a math problem! Determine how many ways can the girls can sit in a row at the movie if Krista and Larissa refuse to sit next to each other.

Ex. 6) Determine how many ways can four girls and three boys be arranged in a row if

- a) a boy must be at each end of the row.

- b) the boys must be together.

- c) the girls must be together.

- d) the ends of the row must be either both boys or both girls.

Ex. 7) Solve for n .

$${}_n P_2 = 56$$

Ex. 8) Solve for r .

$${}_5 P_r = 20$$

Ex. 9) A book collector has 5 Italian, 3 Spanish and 3 Greek books. Determine how many ways he can arrange these 11 books if the books of the same language must be kept together.