Combinations & Permutations (4.3.1)

February 26th, 2018

Vocabulary and Notation

*A <u>combination</u> is a subset of objects taken from a larger group where the order of the objects does not matter and the objects may be repeated. The combination of *r* objects chosen out of a larger group of *n* objects is given by

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

*A <u>permutation</u> is an arrangement of some or all of the objects in a group where the order of the objects matters and the objects may or may not be repeated. The number of permutations of *n* objects in *r* positions, without repeating any objects, is given by

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

*A factorial is the product of an integer and all of its preceding positive integers, represented by the ! symbol. Thus, 5!=(5)(4)(3)(2)(1).

To find the number of permutations of *r* objects by themselves, just use r! since if there are r choices for the first object, there will only be r-1 choices for the second object, and r-2 choices for the third object…

Ex. 1: (a)Jeremiah is taking a multiple-choice quiz with 10 questions that can each be answered A, B, C, or D. How many different answer variations are there for the quiz?

(b) Now assume he is taking a 10 question quiz with 10 possible answer choices, but each answer may only be used once. How many different answer variations are there for the new quiz?

Ex. 2:

(a) Mrs. MT is choosing 8 students from her class of 35 students to create a group presentation about statistics. How many possible groups can be selected?

(b) Mrs. MT is choosing 4 students from her class of 35 students to create a group presentation. Each chosen member will receive a role (materials, secretary, timer, presenter). How many variations of the group are there?