3.4 – Counting Principles

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Permutation:** an ordered arrangement of objects **ORDER MATTERS**

$$\_{n}P\_{r}=\frac{n!}{(n-r)!}, where r\leq n.$$

**Combinations:** a selected number of objects from a group **ORDER DOES NOT MATTER**

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

**Factorial:** n! (read *n factorial*) is defined as: $n!=n(n-1)(n-2)\*\*\*3\*2\*1$

0! = 1 (by definition)

**\*You will find permutation and combination under *Math - PRB***

- When doing these problems always determine whether or not order matters. Then find *n* (total number of things) and find *r* (how many you want). Use the calculator to evaluate.

1) Find the number of ways 2 captains can be selected from a team of 28 field hockey players.

2) The number of four-letter passwords that can be selected when no letter can be repeated.

3) The number of ways 15 people can line up in a row for a concert.

4) A lottery has 52 numbers. In how many different ways can 6 of the number be selected? (Assume that order is not important).

5) A landscaper wants to plant four oak trees, eight maple trees, and six poplar trees along the border of a lawn. The trees are to be spaced evenly apart. In how many distinguishable ways can they be planted?

6) A pizza shop offers nine toppings. No topping is used more than once. What is the probability that the toppings on a pizza are pepperoni, onions, and mushroom (if you could only choose 3 toppings)?

7) The offices of president, vice president, secretary, and treasurer for an environmental club will be filled from a pool of 14 candidates. Six of the candidates are members of the debate team.

a) What is the probability that all of the offices are filled by members of the debate team?

b) What is the probability that none of the offices are filled by members of the debate team?