Section 9-5   **Permutations** vs **Combinations**

A **permutation** is where the **order** or **arrangement** of elements is important.

A **combination** is where the order is NOT important.
Ex.   ABC ACB BAC BCA CAB CBA   1 combination of the letters ABC
                                                            but 6 permutations

Permutation   Combination

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

1. a) Out of 10 colleges, in how many orders can you visit 6 of them?

__ __ __ __ __ __   or $_nP_r$

b) Out of 10 colleges, if the order doesn't matter, how many ways can you visit 6 of them?

2. Before each Supreme Court session, each of the nine justices shakes hands with every other justice. How many handshakes take place?

3. A pizza restaurant offers 11 different toppings. Find the number of different kinds of pizza they could make using
   a)   3 toppings

   b)   5 toppings

   c)   3 toppings or 5 toppings

   d)   all 11 toppings

4. In a group of 15 people, 6 are left-handed and the rest are right-handed. If 7 people are selected at random from this group, find the probability that

   a) three are left-handed and four are right-handed

   b) all are right-handed

   c) all are left-handed

   d) Pam and Joe, two of the left-handers, are selected

   e) At least 5 people are left-handed