

#6 ~ Sect. 6.7: Permutations & Combinations

Permutation: An arrangement of items in a particular order.

n Factorial: For any positive integer n , $n! = n \cdot (n-1) \cdot \dots \cdot 3 \cdot 2 \cdot 1$.

For $n = 0$, $n! = 1$.

(For use when all the items available in the set are being used.)

Number of Permutations: The number of permutations of n items of a set arranged r items at a time is ${}_n P_r$.

$${}_n P_r = \frac{n!}{(n-r)!} \quad \text{for } 0 \leq r \leq n$$

(For use when some the items available in the set are being used.)

Ex. 1: In how many orders can six people line up from left to right for a group photo?

Ex. 2:

a) How many 4-letter codes can be made if no letter can be used twice?

b) Ten yachts enter a race. First, second, and third places will be given to the three faster yachts. How many arrangements of first, second, and third places are possible with ten yachts?

Combination: An arrangement of items in which order does not matter.

Number of Combinations: The number of combinations of n items of a set chosen r items at a time is ${}_n C_r$.

$${}_n C_r = \frac{n!}{r!(n-r)!} \text{ for } 0 \leq r \leq n$$

Ex. 3: Evaluate

a) $7P_2$

b) $10C_4$

Ex. 4: A DJ wants to select songs from a new CD that contains 12 songs. How many 5-songs selections are possible?

Ex. 5: A pizza menu allows you to select 4 toppings at no extra charge from a list of 9 possible toppings. In how many ways can you select 4 or fewer toppings?