

## Section 10.3 Combinations

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In section 10.2 we learned that permutations are arrangements where:

1. no repetition
2. order is important

Combinations are arrangements where:

1. no repetition
2. order is NOT important

ex 1 (HW #1-8) Label the following as permutation or combination.

- a) Electing 2 senators from a list of 10  
Combination (bc order is not important)
- b) 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> place finishers of the Chicago marathon  
Permutation (bc order is important)
- c) choosing 6 volunteers for medical research  
Combination
- d) 2 card hand in blackjack  
Combination

- e) 8 character password  
Permutation order of characters is important
- f) batting order for 10 baseball players  
Permutation
- g) 4 families randomly selected to win a trip  
Combination
- h) 3 digit combination on a combination lock  
Permutation

The number of permutations of  $n$  total items grouped  $r$  at a time is:

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

Math  $\rightarrow$  PRB



2.  ${}_n P_r$

3.  ${}_n C_r$

4. !

$\nwarrow$  we won't use this. We will use  ${}_n P_r$  on calculator

The combinations are:

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

we will not use this part

ex2 (HW #9) In 6-card poker, each player is dealt 6 cards from a standard 52 card deck.

A total of  different hands can be dealt.

order of the 6 cards in your hand does not matter  $\Rightarrow$  combination

$$\begin{array}{ccccccc} \text{total} & n & C & r & = & 52 & C_6 = 52nC_r6 \\ \uparrow & & & \uparrow & & \text{use} & \text{how to} \\ & & & \text{group} & & \text{calc.} & \text{type it in} \\ & & & \text{size} & & & \end{array}$$

$$= \boxed{20,358,520}$$

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ex 3 (Hw #10) How many ways can a student pick 5 questions from an exam containing seven questions?

order doesn't matter  $\Rightarrow$  combination

$$nCr = 7C5 = \boxed{21}$$

use  
calc

Part 2: How many ways are there if he is required to answer the first and the last question?

Requiring the first and last removes these 2 choices from both the total and the group size.  $5-2$

So you are now picking 3 questions from 5 questions.

$$7-2$$

$$5C3 = \boxed{10}$$

use  
calc

ex 4 (Hw #11) Coca-Cola comes in 2 low calorie varieties: Diet Coke and Coke Zero. If a promoter has 9 cans of each, how many ways can she select 3 cans of each for a taste test?

$${}^9C_3 \cdot {}^9C_3$$

# ways to choose 3 cans of Diet Coke from 9      # ways to choose 3 cans of Coke Zero from 9

$$= 84 \cdot 84 = \boxed{7,056}$$

ex 5 (Hw #12) How many ways can 2 cars and 3 trucks be selected from 8 cars and 11 trucks?

$${}^8C_2 \cdot {}^{11}C_3$$

$$= 28 \cdot 165 = \boxed{4,620}$$