Section 9.2 Combinations

└→ arrangement where order does not matter

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

Think about: Students choose two letters from the list A, B, C

\# of arrangments: AB BA AC CA BC CB

Verify using permutations: ${}_3P_2 =$

order in which the letters are chosen is not important:

AB is same as BA
AC is same as CA
BC is same as CB

} each group of 2 permutations is just _______

\# of combinations:

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Example 1

In a lottery, six numbers from 1 to 49 are selected. A winning ticket must contain the same six numbers but they may be in any order.

Example 2

From 10 employees, in how many ways can you select a group of 4?

Example 3

If there are 78 handshakes in a room, and each person shook every other person's hand one time, how many people are in the room?

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Example 4

There are 12 females and 18 males in a grade 12 class. The principal wishes to meet with a group of 5 students to discuss graduation.

a) How many selections are possible?

b) How many selections are possible if the group consists of 2 females and three males?

c) One of the female students is named Dana. How many five member selections consisting of Dana and one other female and three males are possible?

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Example 5

The student council decides to form a sub-committee of 5 members to plan a concert. There are a total of 11 student members: 5 males and 6 females. Determine how many different ways the sub committee can consist of at least three females?

Example 6

a) Express as factorials and simplify: $\dfrac{{}_{n}C_{5}}{{}_{n-1}C_{3}}$

b) Solve for n: $2({}_{n}C_{2}) = {}_{n+1}C_{3}$

c) Solve for n: $720({}_{n}C_{5}) = {}_{n+1}P_{5}$

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