

Combinations

When dealing with combinations, remember that order is not important. After something is combined, arranging them in a different way does not make them a new combination. For example, RED and DER would be considered the same combination of letters. They would be considered two different permutations. When combining some items of a given set, we use the nCr function. n = total amount in set, C = combinations and r = amount we are choosing from a given set. To solve using the nCr function, we must use the following formula:

$nCr = \frac{n!}{r!(n-r)!}$ Example: How many ways can you choose 3 people from a group of 7?

A. $nCr = \frac{n!}{r!(n-r)!}$ B. ${}^7C_3 = \frac{7!}{3!(7-3)!}$ C. ${}^7C_3 = \frac{7!}{3!(7-3)!}$ D. ${}^7C_3 = \frac{7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1 \times 4 \times 3 \times 2 \times 1}$

${}^7C_3 = \frac{7 \times \overset{2}{\cancel{6}} \times 5 \times \cancel{4} \times \cancel{3} \times \cancel{2} \times \cancel{1}}{\underset{1}{\cancel{3}} \times \cancel{2} \times \cancel{1} \times \cancel{4} \times \cancel{3} \times \cancel{2} \times \cancel{1}} = \frac{7 \times \cancel{2} \times 5}{\cancel{2}} = \frac{35}{1} = 35$ ways to form groups of 3 choosing from 7.

- 1) Adrian would like to buy subscriptions to 6 new magazines. However he can only afford 4. How many different groups of 4 magazines can he choose?

15 possible groups

- 2) Molly wants to participate in battle of the books. There are 12 books to choose from. Molly can only choose 3 books from the 12. How many different books can she choose from?

220 possible groups of 3

- 3) Out of 8 teachers, the principal can only select three to go to an education conference. How many possible groups of three can the principle choose?

56 possible groups

- 4) There were 9 people who applied for a job at a company. If the company can only hire 4 of the applicants, how many possible groups of four can they hire?

126 possible groups

- 5) A photographer is taking family portraits of a mother, father and their three kids. If the photographer takes a picture with just two family members at a time, how many combinations of two family members are possible?

10 combinations of 2

- 6) How many combinations of 4 letters are possible from the letters A B C D E?

5 combinations of 4 letters

- 7) There are 9 different colored M & M's in a hat. How many different ways can you choose 3 of them at once?

84 combinations of 3 M&M's

- 8) There are 18 people in Mr. Wright's class. If only three students from the class can be elected to the student council, how many possible groups of three can be chosen from the class?

816 combinations of 3 students

- 9) Emily, Lawrence and John all want to be chosen to help the teacher pass out papers. The teacher only chooses two of them. How many possible groups of two can be chosen?

3 combinations

- 10) How many ways can you combine three of these four items: Soda, chips, cake and vegetables? (vegetables are included with the POSSIBLE combinations!)

4 combinations