Task. How many combinations of 4 there are in numbers 1 to 15?

Solution. Let (a, b, c, d) be any combinations of distinct numbers from $\{1, 2, \ldots, 15\}$.

Notice that the first number a can be choosen from 15 numbers. Furhter, for every choice of a there remains 14 choices of b. Similarly, for any choice of a, b there remains 13 choices of c, and finally for any choice of a, b, c there remains 12 choices of d. Hence the number of combinations of 4 from $\{1, 2, \ldots, 15\}$ is equal to

$$15 * 14 * 13 * 12 = 32760.$$