

COMBINATORICAL PROBLEMS

Kholikov Tolqin Boltaevich

Mathematics teacher of the Kashkadarya Academic Lyceum of the Ministry of Internal Affairs of the Republic of Uzbekistan

Annotation: *This article studies the calculation of combinatorics problems.*

Keywords: *option, combination, sum of numbers.*

Annotatsiya: *Ushbu maqolada kombinatorika masalalari hisoblashni o`rganiladi.*

Kalit so`zlar: *variant, kombinatsiya, raqamlar yig`indisi.*

Combinatorics problems related to the calculation of options The main question of combinatorics is “how many?”, and the main problem is to count various combinations of a given finite number of objects that are subject to one or another condition.

When calculating options one by one, it is advisable to follow the following two rules:

1. We denote combinations by a sequence of letters or numbers, while the designation must be single-valued.

2. Write down combinations in alphabetical order (if letters are used in the designation) or in ascending order of numbers.

In this case, no option is left out, and repetition of some options is not allowed.

Problem 1. Alisher wants to eat an apple, a quince, and a pomegranate. In how many ways can he do this?

Let's denote the fruits with letters: O–apple, B–quince, A–Pomegranate. In this case, for example, ABO–is the option for eating pomegranate first, then banana, and finally apple. We write down the options: ABO, AOB, BAO, BOA, OAB, OBA. In total, 6 ways were formed.

Problem 2. How many four-digit numbers are there whose sum of digits is less than 5

Write four-digit numbers whose sum is 1, 2, 3 and 4 in increasing order:

2. The sum is 1:

• Only option: 1000

3. The sum is 2:

• Options: 2000, 1100, 1010, 1001

4. The sum is 3:

• Options: 3000, 2100, 2010, 2001, 1200, 1110, 1101, 1020, 1011, 1002

5. The sum is 4:

• Options: 4000, 3100, 3010, 3001, 2200, 2110, 2101, 2020, 2011, 2002, 1300, 1210, 1201, 1120, 1111, 1102, 1030, 1021, 1012, 1003

Now we count the numbers in each case:

• Sum 1: 1

- Sum 2: 4
- Sum 3: 10
- Sum 4: 20

Total: $1 + 4 + 10 + 20 = 35$

Thus, the number of four-digit numbers whose sum is less than 5 is 35.

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