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Numbering method in solving combinatorial problems

AUTHOR(S): KHASANOV FAKHRIDDIN,
AND
GAFFAROV MUZAFFAR

Abstract

When solving combinatorial problems, it is easier to solve the problem by expressing the different situations that arise under the condition of the problem with different numbers. First of all, let's look at the solution of the problem of combinatorics with numbers, using the given numbers to generate numbers using the rules set in the problem condition.

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About Author

Author(s): **KHASANOV FAKHRIDDIN**

Teacher of Pedagogical Institute of Termez State University, Uzbekistan.

GAFFAROV MUZAFFAR

Teacher of Pedagogical Institute of Termez State University, Uzbekistan.

Issue 1. How many four-digit numbers can be formed using the numbers 1, 2, 3, 4, 5, 6?

Solution. We solve the problem for two cases. If the numbers are not repeated, the number sought is 6 * 5 * 4 * 3 = 360, if the numbers are repeated, 6 * 6 * 6 * 6 = 1296.

The above problem and other problems of generating numbers using similar numbers are easy to solve because the solution is easy to plan. It is possible to work on various combinatorial problems in a form similar to Problem 1. Below we will look at the solutions to some of the problems associated with the application of this method.

Issue 2. In how many ways can two postmen distribute 10 letters to 10 flats?

Solution. Ten apartments are located side by side, with one board in front of each apartment. Assuming that the flats are side by side, the boards are also side by side. Postmen should be numbered 1 and 2. If the postman brings the letter to the apartment, the number 1 is written on the board corresponding to that house. The number 2 is written on the board corresponding to the house to which the second postman brings the letter. Suppose all the letters were delivered to the flats by the 1st postman. In this case, the number 1 is written on the boards in front of all houses:

1111111111.

Or consider a situation where the second postman delivers the letters to apartments 1-5, and the first postman delivers the letters to the remaining apartments. In this case, the following entry will be displayed on the boards:

2222211111.

From the above considerations, it is sufficient to determine how many ten-digit numbers can be formed using the numbers 1 and 2 to find the number sought. According to the formula for finding the number of iterations, the number of methods sought is 2 ^ 10.

Issue 3. Each of the twenty communicators in one city is trying to connect with each of the ten communicators in another city. How many different options can there be?

Solution. Suppose City A has twenty liaison officers and their chief, and the chief has in his hand a table of one row. He records the results of the 1st communicator in city A in rooms 1-10 of the table. If the 1st communicator in city A can communicate with the 1st communicator in city B, in the 1st room of the table in the hands of the chief, the number 1, if he cannot communicate, is written 2. If the first communicator in city A can communicate with each of the 10 communicators in city B, the number 1 is written for all rooms 1-10. Record 1111112222 in cells 1-10 of the table indicates that the first communicator in city A was able to communicate with 6 communicators in city B, while 4 were unable to communicate. The results of the other communicators in city A are also shown in the table in the chief's hand as above. To record the results of each contact in city A, 10 rooms are allocated in the table. It follows that there are 200 rooms in a single-row table. Since only the numbers 1 and 2 are written in the table, it is enough to determine how many 200-digit numbers can be formed using the numbers 1 and 2. According to the formula for calculating the number of iterations, the number sought is 2 ^ 200.

Issue 4. In how many ways can six different building materials be distributed to the floors of a newly built five-story building?

Solution. Suppose there is sand, cement, lime, gravel, glass, and bricks in front of a five-story building under construction. Whichever floor a building material is taken on takes on a value equal to that floor number. This results in all building materials assuming values of 1-5 after distribution to the floors. This means that each method of laying building materials on the floor is represented by a six-digit number consisting of 5 digits. The first digit of the six-digit number is the number of the floor on which the building material was originally laid. For example, building materials were removed as follows: 1. Sand to the fifth floor. 2. Lime to the second floor. 3. Window to the first floor. 4. Sagal and brick to the fifth floor. 5. The cement was removed to the third floor. The corresponding number is 521553. The number of all methods is equal to the number of six-digit numbers that can be formed using five numbers: 5 ^ 6.

Issue 5. How many ways can six balls be placed in 9 boxes?

Solution. The main thing to consider when solving a problem is how many balls are placed in which box. Here, the number of six-digit numbers that can be generated using 9 numbers is not a solution to the problem. All numbers generated by the numbers 123456, 234516, 654321, and the like 1,2,3,4,5,6, etc., formed by the method described above, represent a single variant.

Here are some of the things you can do: 1) Put 6 balls in one box and no balls in the other. This

600000000
060000000
000006000

and so on. If we express 6 by six 1's, the numbers above look like this:

11111100000000
01111110000000
00000111111000

2) The first three boxes are filled with two balls. This

222000000 (1)

can be expressed as. If, as in the first case, we express the two by two, the above number looks like this:

11011011000000

this condition cannot be expressed as 11111100000 because this number represents 600000000 cases. To differentiate these cases, we write the 2s in (1) with 0s.

Suppose that in nines such as 600000000, 222000000 all numbers are separated by commas and written as follows:

6,0,0,0,0,0,0,0,0
2,2,2,0,0,0,0,0,0

To ensure the generality of the expression of any situation using 1 and 0, we introduce the following rule: in the transition from nine to fourteen, 0 is written instead of one of the vegulas separating the numbers other than zero.

0,0,1,0,0,3,0,2,0

Let's convert nine to fourteen using the above rule. Substituting 0 for one of the three commas between 1 and 3, and one of the two commas between 3 and 2, the nine can be represented as a 14-digit number consisting of 1 and 0:

00100011100110.

It follows from the above considerations that to find the number sought, it suffices to determine how many different 14-digit numbers or 14 talismans can be formed using six 1's and eight 0's. J: 14! / (6! * 8!).

Issue 6. The six balls in Problem 5 must be placed in 9 boxes so that no more than one ball is placed in any of the boxes. Calculate the total number of options.

Solution. Let's look at some of the options we may encounter. Each option leaves three boxes blank.

Boxes 1, 4, 6 should be empty. This can be illustrated by numbers:

0 1 1 0 1 0 1 1 1.

Boxes 7, 8, 9 should be empty:

1 1 1 1 1 1 0 0 0.

From the above considerations, it is sufficient to calculate how many different nines can be formed using three 0's and six 1's. Number of options searched

9! / (3! * 6!) = 42 ta.

Issue 7. The equation has several solutions in the set of non-negative integers

x + y + z + m + n = 10?

Solution. We use the solution of the fifth problem. Suppose there are 5 boxes with 10 balls in them. Box 1 contains x, box 2 contains y, etc. Box 5 contains n balls. So the condition of the seventh problem can be interpreted as follows: How many ways can ten balls be placed in 5 boxes? According to the previous problem, the number of options searched is 14! / (10! * 4!) = 1001.

Issue 8. An elevator with 9 passengers can stop on each of the ten floors. Passengers get off in groups of two, three and four. How many ways can this happen? None of the three groups of passengers will be on the same floor.

Solution. If we match the number A to 10, as in the 16-digit number system in computer science, the floors where the elevator should stop represent three-digit numbers whose numbers cannot be repeated using 10 digits. The number of floors that can accommodate groups of passengers is 10! / 3! ga teng. Dividing 9 passengers into groups of 2, 3 and 4 people can be done by the method 9! / (2! * 7!) * 7! / (3! * 4!) * 4! / (4! * 1!). This results in the number of all options searched for:

10! / 3! * 9! / (2! * 7!) * 7! / (3! * 4!) * 4! / (4! * 1!) = 18 289 152 000.

Now let's look at how the numbering method can be used to solve a probability problem.

Issue 9. Find the probability that the number 3 falls 15 times when the game is thrown 60 times.

Solution. Suppose a game is thrown 60 times and all the results are shown in the table. The result of each throw is expressed using one of the numbers 1,2,3,4,5,6. So, 60 numbers are written in a single-line table. If we assume that all the numbers form a single number, then the number of all 60-digit numbers that can be formed is 6 ^ 60 according to the formula for calculating the number of repeated placements. The condition of the problem is that of all these numbers, 15 must be 3. We divide 15 of the 60 rooms by the number 3, which can be done by the 60! / (15! * 45!) Method. The numbers 1,2,4,5,6 will be written in the remaining 45 rooms. We can think of this as creating a 45-digit number using the numbers 1,2,4,5,6. All such numbers are 5 ^ 45. So 15-digit 60-digit numbers are $\frac{60!}{15!*45!}*5^{45}$. The probability sought from this $\frac{\frac{60!}{15!*45!}*5^{45}}{6^{60}}$.

References

A.M.Pishkalo, P.P.Stoylova "Sbornik sadach po matematike", Moscow, "Enlightenment" -1979 y.

Khudoiberganov "Mathematics", Textbook, Tashkent, "Teacher" -1980.

J. Ikramov "Language of school mathematics", Tashkent, "Teacher" -1992.

LP Stoylova, AM Pishkalo "Fundamentals of the course of elementary mathematics", Textbook, Tashkent, "Teacher" -1991.

N.Ya. Vilenkin et al. "Mathematics", Moscow, "Enlightenment" -1977.

N.Ya. Vilenkin and others "Task practitioner in mathematics", Textbook, Moscow, Prosvesheniya -1977

P. Ibragimov "Collection of problems in mathematics", Textbook, Tashkent, "Teacher" - 1995.

P.Azimov, H.Sherboyev, Sh.Mirkhamidov, A.Karimova "Mathematics", Study Manual, Tashkent, "Teacher" -1992.

P.P.Stoylova, N.Ya.Vilenin "Seliye neotritsatelniye chisla", Moscow, "Enlightenment" -1986

T.Yakubov, S.Kallibekov "Elements of mathematical logic", Tashkent, Teacher, 1996.

T. Yakubov "Elements of mathematical logic", Tashkent, "Teacher" -1983.

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