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ALGORITHMIC BASES OF TECHNOLOGY OF TEACHING ONE-DIGIT AND TWO-DIGIT DIVISION OF THREE-DIGIT NUMBERS IN PRIMARY SCHOOL

Summary

In the articleThe relevance of the study of methodological aspects of the teaching of three-digit numbers in primary and one-digit numbers in primary grades based on algorithmic bases is substantiated. The scientific interpretation of the technology of formation of practical application of the section algorithm of the educational process in students in accordance with the expansion of the range of natural numbers in educational units is reflected in the students.
Key words: *decimal composition of numbers, divisible, divisible fortune and balance, incompletely divisible, sequential exit, section algorithm, an open description of the algorithm, section into equal parts, component section, special fortunes*

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İbtidai məktəbdə üçrəqəmli ədədlərin birrəqəmli və ikirəqəmli bölünməsinin öyrədilməsi texnologiyasının alqoritmik əsasları

Xülasə

Məqalədə ibtidai siniflərdə üçrəqəmli ədədlərin bir və ikirəqəmli ədədə bölmə əməlinin alqoritmik əsaslara dayanılaraq tədrisinin metodik aspektlərinin araşdırılmasının aktuallığı əsaslandırılmışdır. İşdə tədris prosesinin bölmə alqoritminin əməli olaraq tətbiqi bacarıqlarının tədris vahidləri üzrə natual ədədlər dairəsinin genişləndiril məsinə adekvat şəkildə təhsilalanlarda formalaşdırılması texnologiyası-nın elmi şərhi öz əksini tapır.
Açar sözlər: *ədədlərin onluq tərkibi, bölünən, bölən qismət və qalıq, natamam bölünən, ardıcıl çıxma, bölmə alqoritmi, alqoritmin açıq formada təsviri, bərabər hissələrə bölmə, tərkibcə bölmə, xüsusi qismətlər*

The actuality of the subject. Improvement of the pedagogical process and its subsystems is one of the eternal problems of didactics. The development of algorith mic culture is the central link in these processes, because in these processes the men tal activity of students is controlled. Algorithms and algorithmic construction practi ces are irreplaceable in both analytical and heuristic types of mental activity. The implementation of the technology of teaching three-digit numbers in one and two-digit divisions in primary school on an algorithmic basis is an element related to the formation of students' algorithmic culture, in other words, didactics is a perennial problem (learning in cognitive management). Therefore, we claim the relevance of the research topic.

Methodological basis of the research: L. Bertalanf's idea of system analysis, a "system-structural" approach formed as a branch of dialectics.

Interpretation of the research work. The framework document of the National Curriculum of General Education in the Republic of Azerbaijan stipulates that through the teaching of mathematics, students in primary education are formed to perform arithmetic operations, master oral and written algorithms. (10; 55).

An analysis of the activities of primary school students related to the implementation of the section practice shows that many of them have difficulty mastering the algorithm for the implementation of this action. Of course, one of the reasons for this is the complexity of the section algorithm, while other reasons are due to the imperfect methodological work related to the mastery of the algorithm.

The process of mastering the skills of students to perform the necessary steps of the algorithm is a system with a complex structure, in general, "intellectual reflection is a complex process" (1; 64).

It is not difficult to see this in the clear form of the section algorithm below.

$F_n = x_1 x_2 x_3 \ldots x_n$-divisible, $Q = y_1 y_2 y_3 \ldots y_m$-divisible, $n \geq m$.

$F_1=x_1$, $F_2=x_1x_2$, $F_3=x_1 x_2 x_3 \ldots$ $F_n= x_1 x_2 x_3 \ldots x_n$

Let the numbers obtained by transferring the numbers after x_m (x_{m+1}) belonging to F_n to the difference used in the algorithm be: T_1, T_2, T_3 ...

1.If $F_m \geq Q$ is conditional, it is passed to point 3, if $F_m < Q$, it is passed to point 2.

2.The number F_{m+1} is separated and the process is carried out in accordance with paragraph 3, that is, it is passed to paragraph 3.

3.In F_m (F_{m+1}) it is determined how many times Q is located i.e. the first digit of the destiny is found and this number is multiplied by Q, the product obtained from F_m (F_{m+1}) is deducted and passed to the 4th point.

4.If $F_n = F_m$ ($F_n = F_{m+1}$), or if the difference specified in the third paragraph is equal to zero, and the numbers following F_n's numbers covered by F_m (F_{m+1}) are equal to zero, they are written in fate, in paragraph 9. otherwise it is passed to paragraph 5.

5.To the right of the obtained difference the last digit of F_{m+1} (F_{m+2}) is transferred, in the number compiled by this rule - (in T_1) it is determined how many times the divisor-Q is located, ie the next digit of the destiny is found and this number is added to Q multiplied, the product obtained is subtracted from T_1, passed to item 6.

6.If $F_n = F_{m+1}$ ($F_n = F_{m+2}$), or if the difference specified in paragraph 5 is equal to zero, and the numbers following the numbers of F_n surrounded by F_{m+1} (F_{m+2}) are equal to zero, they is written in the destiny, otherwise it is passed to the 7th paragraph.

7.The last digit of F_{m+2} (F_{m+3}) is transferred to the end of the obtained number, the number T_2 is formed, how many times Q is located in T_2, ie the next digit of the destiny is determined, this number is multiplied by Q, the product is subtracted from T_2 , Is passed in paragraph 8.

8.A similar application of paragraphs 5, 6 and 7 continues until all the numbers of the process F_n are used.

9.The process ends, fate and balance are determined. (4; 93-94)

It is undeniable that a three-digit number in a one-digit number is one of the most important steps in mastering a unit. At this stage, it is necessary to separate the oral and written sections. Section practical skills require students to be able to analyze the composition of a number, as well as the ability to divide a number into components depending on the divisor. Also, a well-explained and well-thought-out oral section is a good preparation for a written section. In fact, there are many commonalities between these two images of the unit. It is necessary to move from the oral section to the written section so that students feel the commonalities that unite them, "see" the meaning of the section in the symbols of the written mechanism.

From the analysis of scientific sources, it is clear that a group of experts, based on the restoration of students' past experience in the field of numbers, considers the following option of teaching them the three-digit numbers of oral methods of division. (2; 149).

Tasks that serve restorative functions include:

1. The section deals with practical multiplication. Dividing 24 by 6 means finding a number that multiplies by 6 to get 24. So 24:6 = 4. So what does it mean to divide 36 by 4 and 100 by 25?

2. Check with the help of multiplication operation, is the division operation performed correctly?

96:6 = 16 150:3 = 50 360:6 = 60

3. Complete the schedule:

a	80		96		100
b	16	9		12	
$a:b$		4	16	6	4

1.How to find the unknown divisor?
Remember! To find the unknown divisor, you need to multiply the fortune by the divisor. See example: a:9 = 4; a = 9*4; a = 36.
2.How to find the unknown?
Remember! To find an unknown divisor, you need to divide the divisor by fate. See example:

28:b = 7; b=28:7; b=4.

After working on such tasks, students are introduced to the oral section by dividing the division into appropriate gatherings. For this purpose, the work continues as follows:

1.Complete the text: (600+60+6):6=600:6+ ...; (900+60+9):3=900:3 + ...

How to divide the total number?

2.Show the divisor as the sum of the floors and divide by the sum:

262:2 484:4 963:3 428:2
639:3 707:7 480:2 603:3

3.Show the division as the sum of the available sums and perform the division operation:

91:7 620:2 510:3 168:3 360:6
85:5 780:6 840:6 180:5 450:5

See example:

78:6 = (60 + 18):6 = 60:6 + 18:6 = 10 + 3 = 13

Further work is being done on the issue and miasl.

Here it is impossible not to see a very well-chosen sequence of oral section materials and solutions.

1.*Divide round hundreds, decimals, and single-digit numbers into single-digit numbers based on the ability to divide*, which are obtained by dividing a number into decimals, and the property of dividing the sum by the number is applied here:

2.*Dividing hundreds, tens, and ones (determined by dividing them into decimals) into single-digit numbers that are not divisible by a single-digit number, but can be divided into convenient aggregates.*

If students have difficulty mastering the algo rhythm of the verbal division of these two important groups of three-digit numbers, then it would be useful to dwell on the special cases in which the following sequence is also used:

1.Oral division of rounded hundreds or decimals resulting in a single-digit division;

(800:8; 8 hundred:8 = 1 hundred; 800:8 = 100)

2.Divide a number by hundreds and decimals (240:2; 300:3);

3.Divide hundreds and decimals into indivisible numbers (120:3; 360:9);

4.Divide round hundreds if the number of hundreds is not divisible and hundreds and tens are obtained (600:4; 900:6);

5.Divide a three-digit number by hundreds and tens;

In this case, both the hundreds and the tens of the three-digit number are not divisible, but the divisors of the three are evenly divisible (420:3; 560:4), where the two methods of division can be distinguished.

The first method. Divide the 420 numbers into 2 pieces, each divided by 3. These numbers are 300 and 120. Dividing each of them by 3, we get 100 + 40 = 140.

*The second method.*We look at 420 as 42 decimals. Divide 42 decimals by 3 and get 14 decimals or 140. This method of sectioning can be demonstrated by visual means - with the help of wand sets.

Both of these methods have the same degree of difficulty.

After studying each of these cases separately, it is useful to give students a variety of mixed-type exercises. (4; 108-109) Undoubtedly, at this stage of teaching, the main goal is to teach students to use oral division techniques; therefore, the teacher should not be content with getting answers from the students, but should ask them how they found the answer and, in this case, what methods and techniques the unit used.

In our opinion, what is said about the oral section is enough.

Based on these considerations, it would be logical to interpret the algorithmic basis of the written section of three-digit numbers. We believe that, as in the case of other acts, it is necessary to close the written section with the oral section, to arrange the various cases of the section on the condition that the difficulty increases. First, the section algorithm (in the case in question) is included directly in the process. It is announced that when the oral part is difficult, it is done in writing as follows:

```
 867 |3                 376 | 4
-6   | 289             -36  | 94
 26                      16
-24                     -16
  27                      0
 -27
   0
```

How the work is done is explained to the students as follows: The first incomplete divisor is 8 hundred, so there will be 3 numbers in the lot. Let's find out how many hundreds there will be in the destiny: Divide 8 by 3 and get 2. Let's find out how many hundred we divide: if we subtract 8 from 6, we get 2. When dividing two hundred by 3, you can't get a hundred, that is, we chose 2 digits correctly. Let's fix the second incomplete division: 2 hundred is 20 tens. Let's add 6 decimals to 20 decimals, we get 26 decimals. Let's find out how many decimals there will be. Students are encouraged to join in the process of continuing the explanation (starting with finding the decimal):

Continue the M-explanation yourself.

Explain how we divided the M-376 into 4.

After that, exercises are planned.

Mastering the mechanism of dividing a three-digit number by a one-digit number is a particularly important step in the development of the practice of division. [7; 115] In general, the "first millennium" concentrate provides a large base for mastering large numbers and arithmetic operations on them. In this concentration, children are prepared for the numbering process of numbers of any size, where many aspects of the numbering of 1st grade, ie the first millennium, are repeated, and students are prepared to move from verbal arithmetic to editing (written) methods.

In order to cover the case of getting zero at the end of the division and zero in the middle of the destiny, it is useful to place a job on the following required task.

Explain how the division operation is performed and how zero is obtained in the destiny.

```
 780 | 3                 432 | 4
-6   | 260              -4   | 108
 18                       32
-18                      -32
  0                        0
```

The work on the examples of tasks in scientific sources for teaching the division of named numbers (3, 105), as well as the mastery of the division algorithm can be concluded.

Assignment. 9 m 80 cm fabric was used to sew 7 aprons in the same way. In this case, what does the expression 9 m 80 cm: 7 show? Explain how the section operation is performed.

```
9 m 80 cm = 980 cm        980 | 7
                         -7   | 140
                          28
                         -28
                           0
```

We believe that three-digit numbers are not enough for students to master the written algorithm of a one-digit unit. They need to be completed and systematized.

The analysis of the research materials obtained shows that it is necessary to start with the image of the unit known to the students and move to the image that is unusual for them. We support the inclusion of three-digit single-digit unit exercises in the teaching process in the following consecutive cases:

1.Each floor of the divisor is completely divisible by the divisor (846:2; 936:3).

2.Hundreds are not completely divided, and the remainder must be broken down into singles (575:5).

3.Hundreds are not completely divided, and the remainder must be broken down into tens (728:4; 429:3).

4.The remnants of both hundreds and tens have to be crushed to the lower floors in succession (685:5).

5.When dividing three-digit numbers into single-digit numbers, a special two-digit destiny is obtained (168:2; 546:6).

6.In the more complicated form of the above special case, the decimals are not completely divided, and the remainder of the decimals must be broken down into singular ones (258:9; 450:6).

Undoubtedly, the most important thing is for students to consciously master the technique of performing a single-digit written unit. It is important that each student is able to perform the operation correctly and quickly in all possible situations when dividing a 3 (or more) digit number into a single-digit number.

Of course, the initial case should be accepted when all the floor units are divided into divisors, and experience shows that in this case, the division is performed by students without difficulty.

Other cases are a bit difficult to master. Therefore, in these cases, it is necessary to use visual aids effectively. It is possible to carry out the section first, using visual aids and past experience, and then move on to a written form appropriate to the judgment.

For example, divide 346 by 2. Visibility can be ensured. "We take a set of three hundred sticks, four sets of sticks, six sticks. When you divide three hundred into two parts, one hundred is taken in each part and one hundred is left. We break it down into decimals and get 10 decimals, we get a total of 14 decimals. When you divide the decimals into two parts, each set has a set of 7 decimals. When the remaining loneliness is divided into 2 parts, 3 sticks fall on each part. Thus, each part has one hundred 7 tens 3 singles = 173 sticks. ”

Students need to be taught to make the following judgments in this process: “346 has 3 hundred. We divide 3 hundred into two equal parts, we get one hundred in each part. We divide 200 by 346. So the remainder is 346-200=146. We subtract 14 decimals from 146, that is, 140. The remainder is 6 loneliness. We divide this by 2 and get three.” Several examples are solved through judgment, the written form of which is taught to students. Here it is necessary to gradually move to the abbreviated form of notation, which can be considered an algorithm for the operation of division in three-digit single-digit numbers.

In Example 346: 2, the transition to the abbreviated form can be illustrated as follows:

I.	346 | 2	. 346 | 2	III. 346 | 2
	−200 | 1 hundred 7 decimal 3 loneliness = 173	200 | 173	−2 | 173
	146	146	14
	−140	−140	−14
	6	6	6
	−6	−6	−6
	0	0	0

In this process, students must learn that the division operation begins on the top floor, that each floor must be divided, and that when each floor is divided, the loneliness of that floor is taken.

When students complete the "thousandth" concentration, they should know that a three-digit one-digit unit consists of a system of necessary steps performed in the following sequence, and be able to perform it:

1.Divide a hundredth of a high-floor unit by a three-digit number and compare it with a divisor; if that floor unit is not smaller than the divisor, it must pass to point 2, otherwise to point 3.

2.It is necessary to determine how many times the divisor is located in the hundredth, that is, to determine the first digit of the destiny, to multiply it by the divisor, to get out of the hundredth floor unit, and to go to the 5th point.

3.It is necessary to determine how many decimals the three-digit number consists of, that is, to separate the first two floor units together, to pass to the 4th point.

4.Determine how many times the divisor is located in the number (F) formed on the basis of two separated numbers, ie in the number of decimals, ie determine the 1st digit-decimal of the part (the part will be a two-digit number) and multiply it by F (the number of decimals).) should go out, go to item 6).

5.If the decimal and singular floor units are equal to zero when dividing the remainder, the zeros corresponding to the decimal and singular floors must be transferred to the destiny and passed to point 10, otherwise it must be passed to point 7.

6.If the balance obtained and the last digit is zero, the last zero digit must be written in the destiny, it must pass to point 9, otherwise it must pass to point 10.

7.To the right of the difference, move the decimal unit, determine the number of times the divisor is in the number obtained (in T_1), ie determine the decimal of the destiny, multiply it by the divisor, subtract the product from T_1, and go to point 8.

8.If the last digit of the remainder is zero, it is written in one zero and must pass to point 10, otherwise it must pass to point 9.

9.To the right of the remainder, copy the last digit of the divisor, and in the resulting number - (T_2) determine how many times the divisor is located, ie determine the last digit of the destiny and multiply it by the divisor to get out of T_2.

10. He must check the correctness of the solution by comparing the result with the product of the divisor.

There is no doubt that mastering the mechanism of dividing a three-digit number into a one-digit number is a particularly important step in the development of the practice of division. In general, the "first millennium" concentrate provides a large base for mastering large numbers and arithmetic operations on them. In this concentration, children are prepared for the numbering process of numbers of any size, where many aspects of the numbering of 1st grade, ie the first millennium, are repeated, and students are prepared to move from verbal arithmetic to editing (written) methods.

Of course, at the end of a single-digit number, it is necessary to explain the state of the residual section. Experience shows that this process is not so difficult.

As you know, a multi-digit number is divided into two-digit numbers by dividing a three-digit number into two-digit numbers by taking a single-digit number. Therefore, if we want to give students a good habit of dividing a multi-digit number into a two-digit number, we must first give them the ability to divide a three-digit number into a two-digit number by being a single-digit number, or rather, try to form in them.

By mastering a sectional algorithm, we also mean that the necessary steps are elementary for students. Otherwise, the student will not be able to perform his algorithmic activity. (6; 119).

The main difficulty in the section is to choose and find the numbers of destiny. If the students are good at this, they will not face great difficulties later. By taking a one-digit number in a fraction, you need to do a series of exercises to master the process of dividing a three-digit number into a two-digit number. The following methodology of this work is of interest:

a) 480:60 and 488:61 section exercises;

b) 416:52 type section exercises;

c) The figure found for luck is not a loneliness, but a section of exercises related to the reduction of several loneliness and the selection of the appropriate optimal path;

d) exercises related to the residual section. (11; 230-231)

As a result of the above-mentioned work, students are prepared to divide any multi-digit number into two-digit numbers: students learn the principle of gradual division of numbers, starting from the upper floors, and learn to find the number of fate by experiment; which is enough to get a new habit.

The three-digit two-digit number section is intended to be taught in the 3rd grade, within the "thousandth" concentration. In our opinion, a three-digit two-digit section should be included in the teaching process on the basis of an appropriate explanation. In our opinion, it may be acceptable to start this work with an explanation of dividing 488 by 61. In this case, the explanation is as follows: “To select the numbers of the part, we first round the divisor to get 60, then divide 488 by 60; To do this, we divide 48 by 6 and get 8, the number 8 is not the last, it is a test number, we need to divide the number 488 by 61 instead of 60. You need to check this number. Multiplying 61 by 8, we get 488. So, the number 8 is true. "

After strengthening the mastery of the algorithmic steps, which are reflected in the explanation of the implementation of examples of this type, it is intended to include exercises related to the acquisition of two-digit numbers. (4; 117)

For this purpose, it is useful to suggest the following type of task.

Task: Explain how to perform a division operation on a two-digit number.

```
 441 | 21            384 | 12
−42  | 21           −36  | 32
  21                  24
 −21                 −24
   0                    0
```

1) Say the first incomplete divisor;
2) Tell how the first number of the part was found;
3) Say the second incomplete divisor;
4) Tell how the second number of the destiny was found;
5) How to check the accuracy of the calculation?

It is important to consider the special circumstances that may arise in connection with the discovery of fate. (11; 264-265)

Often the first number found for luck does not work, it needs to be changed. For example, let's say we need to divide 168 by 28: let's check the number 8 (16: 2), it doesn't work. Let's check the number 7, but it's also big. The number 6 is useful because 28*6=168. In this case, we got the correct number for fate after three checks. (3; 199-200)

In our opinion, students should be involved in the process of simplifying the process. Students should know that when the numbers 8 and 9 are at the end of the division, the division must be completed by rounding the division to a larger round number: 39 can be rounded to 40, and the number 28:4=7 can be found quickly in section 283: 39. (4; 110)

As you know, a multi-digit number is divided into two-digit numbers by dividing a three-digit number into two-digit numbers by taking a single-digit number. Therefore, if we want to give students a good habit of dividing a multi-digit number into a two-digit number, we must first give them the ability to divide a three-digit number into a two-digit number by being a single-digit number, or rather, try to form in them. (9; 47)

By mastering a sectional algorithm, we also mean that the necessary steps are elementary for students. Otherwise, the student will not be able to perform his algorithmic activity. The main difficulty in the section is to choose and find the numbers of destiny. If the students are good at this, they will not face great difficulties later. By taking a one-digit number in a fraction, you need to do a series of exercises to master the process of dividing a three-digit number into a two-digit number. (8; 121)

Therefore, in order to teach students the algorithm for dividing any multi-digit number into two-digit numbers and to form their habit of using this algorithm quickly and without mistakes, it is necessary to teach them to divide by numbers or round decimals expressed in singles and zeros. (8; 121) 10-a. a section can be considered both as a section of equal parts and as a composite section. Taking this section as a division into 10 equal parts, we say that dividing each decimal by 10 gives a singularity. Explaining this division operation as a subdivision, we say how many times there are 10 (divisors) in a given number (divisor). It is useful to teach Section 10 methodology to students in both full and residual sections.

The division into round decimals is, after all, nothing more than the division of two-digit and three-digit numbers into round decimals. Therefore, it is natural to start this state of the unit without dividing it into three-digit round decimals with one-digit numbers. Many exercises need to be done for students to master the method of finding the number of a destiny by dividing the number of decimals by the number of decimals. You can then move on to the general form of the division into multi-digit round decimals.

Scientific innovation. The technology of realization of implementation of three-digit numbers in one and two-digit number division operations in primary grades on the basis of expectation of elementary steps of the section algorithm has been developed.

*Practical significance.*The development of technology for the implementation of the teaching of three-digit numbers in one and two-digit numbers in primary school based on the expectation of the elementary steps of the section algorithm will have a positive impact on the formation of an environment for practical educators to eliminate possible errors in teaching.

*The result.*The application of implementation technology based on the expectation of the elementary steps of the section algorithm for teaching three- and one-digit number operations on natural numbers in primary school is a more effective methodological approach in terms of forming students' algorithmic culture and improving learning quality.

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