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BALANCE BETWEEN RAPID LEARNING OF MULTIPLICATION FACTS AND CONCEPTUAL UNDERSTANDING

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ABSTRACT: *The difference between memorization and comprehension, and the corresponding learning paths for students. Explores how visual and manipulative tools transform the concept of multiplication in the classroom.*
KEYWORDS: *multiplication, visual modeling, conceptual understanding, fact, conceptual understanding, learning approach.*

This article is about one of the methods that is dedicated to convenient methods of calculation, the Trakhtenberg method. Trakhtenberg methods may be just the thing for you! Developed by the famous engineer Yakov Trakhtenberg, these methods help speed up division, multiplication, and addition to quickly calculate large numbers. We will explain what the Trakhtenberg method is, how it was developed, and how to use it in multi-digit problems.

The Trachtenberg method is a mental math system that helps solve problems without paper. Since Trachtenberg did not have paper and pencil at hand, he had to do all the calculations in his head. The Trachtenberg technique can be used for addition, multiplication, or division.

Here are some methods of multiplication using the Trachtenberg method.

To perform the multiplication operation on a given number, each digit of this number (starting from the digit in the units place) is worked out. In this, neighboring digits are used in different ways. We agree that the number to the right of the number being worked on is called the "neighboring" digit in a number. For a number in the units place, the "neighboring" digit is zero, and the leftmost digit is the neighboring digit for the imaginary zero written in front of the number. Multiplication rules:

Multiply by 11. Add each number to its neighbor.

1. 2534*11.

We will work out the digits of the multiplier starting from the unit number:

Add its neighbor, i.e. zero, to 4, we get 4. The next number to work with is 3. Add 4 to it, we get 7. Then add its neighbor, i.e. 3, to 5, we get 8. Add 5 to 2, we get 7. Finally, add its neighbor, 2, to zero (imaginarily written in front of the multiplier). We get 2. Thus, we have formed all the digits of the number that will be formed in the answer. Answer: 27874.

When performing multiplication according to the specified rule, we perform all calculations orally and write the result in one go.

If adding two numbers results in a number greater than ten, for example, 12, then we proceed as usual: we write down 2 and memorize 1.

Multiply by 12. Double the number and add the next one.

Example: 231*12.

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We work out the digits of the multiplier, i.e. 1, 3, 2, one after the other. We double 1 and add zero, which gives us 2. We double 3 and add 1, which gives us 7. We double 2 and add 3, which gives us 7. We double the zero that is written in front of the multiplier and add its neighbor, i.e. 2, which gives us 2. Thus, the result is 2772.

Note: In the following rules for multiplying by 6, 7, and 5, you will need to find half of a single-digit number. We find half of an even number as usual, and if it is an odd number, we take the whole part of the resulting number as half. For example, half of nine is 4, half of seven is 3, etc.

Multiply by 6. Add half of the adjacent number and, if the number being worked on is odd, 5 as well.

Example: 2328*6.

We work out all the digits of the multiplier one by one: add half of its neighbor zero to 8, that is, zero, to get 8. Add half of 8 to 2, that is, 6. Add half of 2 and 5 to 3, that is, 9. Add half of 3 to 2, that is, 1, to get 3.

Add half of 2 to zero, that is, 1.

The answer will consist of the found digits: 13968.

Multiply by 7. Double the number and add half of its neighbor.

If the number being worked on is odd, add another 5.

Multiply by 5. Take half of the adjacent number, if the number being worked on is odd, add another 5.

In conclusion, it can be said that organizing the calculation process in non-traditional ways creates significant advantages for teachers in engaging school students in mathematics. Since students are naturally playful, it is necessary to teach calculations in various interesting, interactive and practical forms. Such an approach not only attracts attention, but also deepens concepts, develops the ability to research and independently solve problems. For example, games, visual aids, simple programming projects, real-life examples and collaborative work in groups can be used. Such methods can also help to plan lessons more effectively, evaluate results and increase student satisfaction. Therefore, it is important to try non-traditional methods and adapt them to the needs of students and local conditions.

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