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The Use of Mental Arithmetic to Root a Square of 8-Digit Numbers

Aytmuratova Sarbinaz Elmurat qizi [1]

[1] Nukus Youth Technopark Mentor

Abstract: This article demonstrates how to mentally multiply eight-digit numbers to the square root. Additionally, arguments and viewpoints regarding the value of employing mental arithmetic in math lessons are supported by scientific research.

Keywords: Mathematics, a mathematical program, number, abacus, mental arithmetic, square, cube, and square root.

The study of numbers and operations (addition, subtraction, multiplication, and division) delivered in groups of numbers is known as arithmetic (Latin: arithmos, meaning "number"). The term "arithmetic" describes the creation and growth of the concept of number, the development of mathematical techniques and instruments, and a variety of numbers. It is understood how to do mathematical procedures.

Mental arithmetic is a method of simultaneously developing intellectual and creative skills that aids in the development of both in children. The human brain becomes more active when we learn new information already known to us. The connection between the right and left hemispheres of the brain gets increasingly active as we exercise it. Science has shown that the human brain develops most rapidly between the ages of 4 and 12 years, which coincides to this period.It is rapid and simple to learn new information throughout this age range, and it is kept for a long time. An "abacus," which is described as an ancient version of the contemporary calculator, is utilized when performing mental arithmetic calculations in the beginning [1]. Children eventually simulate arithmetic on the abacus in their minds, or do so.

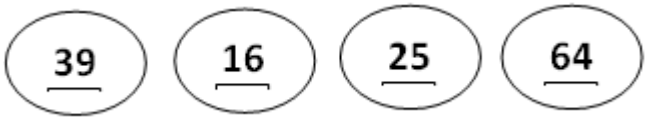
Currently, one of the biggest issues with teaching mathematics in schools is the absence of activities that help kids increase their intelligence while they learn how to calculate. It is required to carry out additional brain-strengthening exercises during the session in order to educate the students mathematical operations and formulas. When teaching mathematics to students in schools, it is extremely convenient to employ "mental arithmetic" tasks. The findings demonstrate a number of benefits of mental arithmetic based on global experiences. An investigation involving kids aged 7 to 11 was carried out in 2007 by British universities [2].The study's findings indicate that mental arithmetic considerably enhances children's performance across the board, not only in mathematics. Videos and intellectual exercises that foster consciousness and inventiveness, as well as group and individual exercises designed to promote proper right and left brain function, are the key benefits of mental arithmetic exercises. Children's intellectual development lays a strong basis for proficient reading and the growth of mental potential.

Mathematical education is currently of utmost importance. Along with engaged, capable pupils during the study session, there are also students who are less motivated to learn and need more work. Making students interested in reading and teaching subjects successfully without taxing students' brains are still among the teacher's real challenges. One of the top concerns is still education. In this case, the teacher employs a variety of techniques. Exercises in mental arithmetic should be employed during the class as one of these techniques.It's crucial to conduct theoretical research on the reading process while instructing students in mathematics utilizing mental arithmetic. because not every

mental arithmetic practice may be included in mathematics instruction. Because of this, it's critical to first analyze these activities and develop a solid theory. To focus students' attention and pique their interest in the lesson, it can be claimed from the perspective of practical application that mental arithmetic is very important and valuable for mathematics teachers. If teachers treat mental arithmetic as a separate subject, they can make mental arithmetic more significant and relevant while also connecting it to mathematics in general.

Therefore, we shall learn to calculate the square root of 8-digit values using "mental arithmetic." For instance, 39162564 =? we get Square roots are computed in three steps.

One is grouping. First, we arrange the numbers into a 2-digit group starting from the right. The number under the square root appears like this after grouping.



Group 1 – 39, Group 2 – 16, Group 3 – 25, Group 4 – 64.

We have 4 groups, so the answer is a 4-digit number.

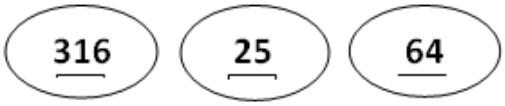
x_1	x_2	x_3		x_4

Now we get an unsigned number x_1, let the square of this number be less than or equal to the number in group 1. x_1≤39. We use the square table to find the number x.

Table of squares.

$1^2=1$	$2^2=2$	$3^2=9$	$4^2=16$	$5^2=25$
$6^2=36$	$7^2=49$	$8^2=64$	$9^2=81$	$10^2=100$

$x_1 = 6$ we get. $x_1 = 6$ We square it and subtract it from the number in group 1. 〖39-x〗_1^2=3. The remainder is treated as the same number as the number in the next group. So we are left with 3 groups:



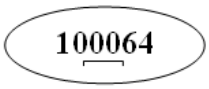
2. Multiply by 2. $x_1 \times 2 = 12$. Now, let's find the unknown number x_2, the result is $(12x\_2)\overline{\ }\times(x\_2)\overline{\ }\leq 316$. x_2=2. From this, $316-(12x\_2)\overline{\ }\times(x\_2)\overline{\ }=316-244=72$. We now have 2 groups left:

3. Finding unsigned numbers $x_3, x_4, x_5, \ldots, x_n$

$\overline{x_1 x_2} \times 2 = 124$.

$\overline{124x_3} \times \overline{x_3} \leq 7225$. From, $x_3 = 5$.

$7225 - 124x_3 \times \overline{x_3} = 7225 - 6225 = 1000$. Now we have left 1 group:



Finding x_4

$\overline{x_1 x_2 x_3} \times 2 = 625 \times 2 = 1250$. $\overline{1250x_4} \times \overline{x_4} \leq 100064$. from, $x_4 = 8$.

So, $\sqrt{39162564} = \overline{x_1 x_2 x_3 x_4} = 6258$.

Answer: 6258.

The above-described technique works with all numbers to get a square root. Working with negative numbers and extracting square and cube roots of numbers, as well as splitting remainders, can all be done mentally. The techniques for finding the cube root of a number, for instance, are similar to the one we stated earlier. However, it is essential to arrange the numbers into groups of three.

The child starts out by using an abacus when learning mental arithmetic. The pupil eventually learns to count by envisioning an abacus rather than using an actual abacus. In mental arithmetic, mathematical calculations are verbally done. The instructor in this instance gives the examples verbally. Additionally, while they listen to the numbers, the kids retain the order of the actions. Verbal calculation aids in the student's growth of logical reasoning as well as his development of mathematical observance, intelligence, and agility. [8]. Verbal calculation techniques are based on numbers, the outcomes of mathematical operations, and relationships between components, with the understanding that the result varies depending on how one of the components is changed. The practical benefit of oral calculation is that it allows for quick and precise computation even when working with written mathematical computations is not an option. Throughout the completion of several tasks, students' experience grows. Such activities will encourage the child's brain activity and teach them how to make rapid, informed decisions.

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