The Role Of Interesting Problems In Teaching Students Mathematics

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ABSTRACT

In this article, the role of interesting tasks in teaching students mathematical operations in mathematics lessons is to stimulate at least a slight interest in mathematics among students. As a result, the level of students' mathematical knowledge increases, and they begin to study all topics of mathematics more deeply.

Keywords: *monotone, convex, section, polynomial, root, logical thinking, development, ability to think, creativity.*

Algebra is often called the "Arithmetic of Seven Operations." This adds three new operations of exponentiation and two inverse operations to the four operations of ordinary mathematics.

Our algebra conversations begin with the "fifth operation" of scaling.

Is the need for this new awareness caused by practical life? Certainly, we encounter it many times in life. Let us recall cases of raising numbers to the second and third powers, common in calculating surfaces and areas. Then: gravity. Electrostatic and magnetic interactions, light, sound weaken proportionally to the second power of distance. The times of rotation of planets around the Sun (and satellites around planets) are proportional to the distances from the center of rotation to them.

Practice confronts us with the second or third level, and one should not think that higher levels exist only in exercises in algebra problem books. In durability calculations, an engineer always calculates with the fourth power, and in other calculations (for example, when calculating the diameter of steam pipes) he works even with the sixth power.

Studying how a stone is carried away by the force of flowing water, a hydraulic engineer also encounters the sixth degree of connection. If the speed of water in one river is four times greater than in another, then the fast-flowing river will turn over in its bed 46 times, i.e. 4096 times, heavier stones than the slow-flowing river.

We encounter even higher levels when studying the temperature dependence of the brightness of heated objects - for example, the filament of an electric lamp. The overall brightness increases by one-thirtieth of the temperature (the "absolute" temperature, that is, the temperature calculated from minus 2730) when white light is heated. When this body is heated from 20,000 to 40,000 (absolute temperature), it heats up twice as much, by 212 times, in other words, closer to 4000 times. We will talk about the importance of this special compound in the technology of making light bulbs elsewhere.

Three with two

Probably everyone knows that three numbers should be written so that they represent the largest possible number. Take three nines and arrange them as follows

$$9^{9^{9}}$$

that is, it is necessary to write the third “higher level” out of 9.

This is such a frighteningly huge number that no comparison can help to imagine its enormity. Compared to this, the number of electrons in the ascending universe is insignificant. This is mentioned in many literary sources. I return to this question because I want to propose another similar question.

Write the largest possible number with three twos without using any operations.

Solution: With the new impression of placing three nines, you are probably ready to place two in the same way:

$$2^{2^{2}}$$

However, this time the expected result did not happen. The number written is small, even less than 222. In fact, we wrote only 24, that is, 16.

In fact, the largest number consisting of three twos is not 222, and not 222 (i.e. 484), but

222=4194304.

The problem is very instructive. He showed that the practice of analogy (anology) from mathematics is dangerous: it can easily lead to erroneous conclusions.

Three by three

Masala: Now, you may be enthusiastic about taking on this challenge.

Write the largest possible number without using the symbols for operations with three threes.

Solution: The three-storey arrangement does not bring the expected effect here either, because

$3^{3^{3}}$, that is, the number 327 is less than the number 33 3.

The last location is the answer to the problematic question.

Three by four

Masala: Write the largest possible number with three fours without using action symbols.

Solution: If in this case we act as in the two previous questions, then

444

If you answer incorrectly. Because this time it's an indoor location

$$4^{4^{4}}$$

Considering the expected large number. In fact, 44 = 256, and 4256 is greater than 444.

With three identical numbers

We'll try to dig deeper into the situation that creates this problem and why some numbers when added together generate gigantic numbers and some don't. Let's look at the general situation.

Express the largest possible number using three identical numbers without using operation symbols.

Number *à* we express by letter

This,

$2^{22}, 3^{33}, 4^{44}$ calm down a^{11a} the letter is suitable.

Three-storey layout in general

$$a^{a^{a}}$$

described in the presentation.

*A*at what value will we find that the last position represents a larger number than the first position.

Since both expressions represent the same base level of integers, a larger exponent corresponds to a larger magnitude when

$a^{a} > 11a$

will

Inequality has two sides a we divide by and

$a^{a-1} > 11$

we get it It's easy to see a^{a-1} magnitude is greater than 11 only if a is greater than 3, because

$4^{4-1} > 11,$

However, 3^2 And 2^1 degrees less than 11.

Now the coincidences we encountered when solving the previous problems are clear. For twos and threes, you should get the same place, and for fours and more, another.

Four to one. M a s a l a.

When the ratio is four to one, write down the largest possible number without using mathematical symbols.

Solution. Naturally, the problem 1111 that comes to mind does not meet the condition, because 1111 is a very large number. This numberup to 11It is unlikely that any person could withstand counting by ten times.

But its size can be estimated using a logarithmic table.

This number is greater than 285 billion and therefore 25 million times greater than 1111.

Four with two. Masa la.

Let's take the next step to identify the type of problems we are dealing with and ask our own question about the four twos.

Four is the largest number in any two positions.

Solution. There are 8 possible combinations.

2222, 2222, 2222, 222

$$22^{2^2}, 2^{22^2}, 2^{2^{22}}, 2^{2^{2^2}},$$

Which of these numbers is the largest?

First, let's deal with the top row, that is, the layout of the double floor with numbers.

The first number, 222, is less than the other three numbers. The next two numbers

2222 and 2222

We study the second one for comparison.

222=2222*11=(2222)11=48411.

Other hip2222 habecause the base and exponent of 48411 degrees are greater than those of 2222.

Now compare the first line of the number 2222 with the fourth number 2222. Replace 2222 with the larger number 3222 and see that the value of this larger number in the expression is less than 2222.

From the truth

$$32^{22} = (2^5)^{22} = 2^{110},$$

Number at this level 2^{222}, less than

Thus, the largest number of the top row is 2^{222}, Now we need to compare five numbers with the number we just got and the next four numbers.

$$22^{2^2}, 2^{22^2}, 2^{2^{22}}, 2^{2^{2^2}}.$$

Last 2^{16}, The number equal to , immediately left the competition. Then it is the first number of the series 22^4 equally and 32^4 or 2^{20} is less than any subsequent number. Now we need to compare three numbers that are powers of 2. Obviously, between powers of 2, the pointer is greater. But three pointers

222,484 And

$$2^{20+2}\left(= 2^{10\cdot 2}\cdot 2^2 \approx 10^6\cdot 4\right)$$

The latter is clearly larger than .

therefore, the largest number that can be represented by four twos is

$$2^{2^{22}},$$

Without referring to the logarithmic table, we can roughly imagine the magnitude of this number. To do this, we will use the following approximate equality.

$$2^{22} = 2^{20}\cdot 2^2 \approx 4\cdot 10^6;$$

$$2^{2^{22}} \approx 2^{4000000} > 10^{1200000}.$$

This means that there are more than a million numbers in this number.

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