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Short Article

If You Raise Zero to The Power of One

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Abstract

Zero holds a unique position in mathematics as a neutral number, representing both nonexistence and balance. Unlike positive or negative numbers, it has no sign, signifying its neutrality. This neutrality becomes pivotal in the realm of arithmetic and division. According to the logic of division, dividing by "nothing" translates into dividing by zero. This idea challenges conventional arithmetic, where division by zero is typically undefined. However, exploring zero through its abstract properties offers a novel perspective. In arithmetic, zero raised to the power of one reflects the concept of identity. If we consider this as , $a^1 = a$ the underlying structure suggests the power itself stems from subtraction: two minus one $a^{2-1} = a$. The resultant expression, when divided by zero, may appear paradoxical. Yet, by this reasoning, division by zero intriguingly loops back to zero. This interpretation, while unconventional, provokes thought about the nature of zero and its implications in mathematical logic. Rather than being undefined, zero, in its abstraction, reflects self-containment—a division that leads back to itself. While such concepts challenge traditional frameworks, they invite us to revisit foundational principles and expand our understanding of arithmetic laws and the philosophical essence of mathematics. Therefore, division by zero is equal to zero.

Keywords: Zero; Division; Multiplication; Sign; Power.

History

The notion of zero, which appears to be a straightforward idea, has had a profound impact on mathematics and our comprehension of numbers. Although it may appear self-evident to us in the present day, its trajectory from abstract ideas to indispensable mathematical resources is both captivating and intriguing.

The earliest use of a placeholder symbol resembling zero dates back to the Sumerians in Mesopotamia, around 3,000 BCE. This early form of zero was used in their positional number system but was not considered a number in itself. It served merely as a marker to distinguish between digits in specific positions (e.g. differentiating between 204 and 24). The Babylonians later refined this system around 300 BCE by introducing a symbol (a pair of wedge marks) to represent the empty column in their base-60 number system. Although the modern symbol for zero is relatively recent, the concept of "nothing" or "emptiness" has been contemplated by philosophers and mathematicians for centuries. The innovation of representing zero with a symbol originated from ancient India, where it was referred to as "shunya." This symbol was not only a placeholder but also a number that could be used in arithmetic operations. Aryabhata was one of the earliest Indian mathematicians to employ zero as a number, while Brahmagupta established rules for arithmetic operations involving zero, such as multiplication and division, in the 7th century. The transmission of the concept of zero, along with the Indian numeral system, to the Islamic world around the 8th century was a significant event in the history of mathematics. Indian mathematicians had already developed the concept of zero, which is the absence of any number, and the Indian numeral system, also known as the Hindu-Arabic numeral system. Islamic scholars, such as Al-Khwarizmi and Al-Kindi, expanded upon this knowledge and helped to popularize the concept of zero throughout the Middle East and North Africa. Al-Khwarizmi, in particular, made significant contributions to algebra and was instrumental in spreading the decimal positional system that included zero. The concept of zero, along with the Indian numeral system, gradually spread to other parts of the world, and Islamic scholars, particularly those in the 9th century, played a crucial role in transmitting this knowledge to the West. The Indian numeral system, including zero, eventually made its way to Europe, but its adoption was initially met with resistance due to the entrenched Roman numeral system, which lacked a symbol for zero. It was only in the 12th century that the Indian numeral system, often referred to as the "Hindu-Arabic numeral system," began to gain widespread acceptance in Europe, thanks to the work of mathematicians like Fibonacci. The introduction of zero had a profound impact on mathematics, enabling the development of more sophisticated mathematical systems, including algebra and calculus, which would have been impossible without zero.

Introduction

In mathematics, a number is typically understood to be a mathematical entity utilized for the purposes of counting, measuring, and describing various quantities. There exist a number of different types of numbers, each possessing its own unique characteristics and applications. Natural Numbers: The set of positive integers used for counting (e.g., 1, 2, 3,...). Integers: The set of whole numbers including positive and negative numbers, along with zero (e.g., -3, -2, -1, 0, 1, 2,...). Rational Numbers: Numbers can be expressed as the ratio of two integers (e.g., 1/2, 3/4, -5/2). Irrational Numbers: Numbers that cannot be expressed as the ratio of two integers, such as π or √2, with non-repeating, non-terminating decimal expansions. Real Numbers: All numbers on the number line, including both rational and irrational numbers.

While zero doesn't represent anything, it symbolizes non-existence. The number has no positive or negative sign, so adding it to a mathematical operation doesn't change it. Multiplying with it makes it zero. It's confusing if zero is in the denominator or exponent. The concept of zero as a number needs to be reconsidered, and I suggest calling it a neutral number instead.

Method

Mathematically, division is an arithmetic operation where a number, called the dividend, is separated into equal parts by another number, called the divisor. The result is the quotient. When you divide four apples between two people (4/2), it means each gets two apples. If you wanted to divide three apples between two people (3/2), each person would get one apple, and one would be left over. If you tried to divide nothing between two people (0/2), that would mean that each person would get nothing. If you wanted to divide two apples by nothing (2/0), the result would be nothing, and the two apples would be left over. This is the mathematical logic of division.

In my research, I used the principles of mathematics, that is to say that any number whose exponent is 1 in the normal state and any number whose exponent is 0 is equal to 1 according to the following proof:

$$3^0 = 3^{1-1} = \frac{3}{3} = 1 \tag{1}$$

Mathematicians agree that adding 0 to a mathematical operation will not affect it.

$$1 + 1 + 0 = 2 \tag{2}$$

But by referring to the basic principles of mathematics, this mathematical operation is incomplete because:

$$1 + 1 + 0 = 1 + 1 + 0^1 = 1 + 1 + 0^{2-1} = 1 + 1 + \frac{0^2}{0} \tag{3}$$

Additionally, this mathematical axiom, if zero exists, causes a problem according to the basic laws of arithmetic:

$$1 - 1 = 0 = 0^{2-1} = \frac{0^2}{0} \tag{4}$$

And also:

$$1 \times 0 = 0 = 0^{2-1} = \frac{0^2}{0} \tag{5}$$

Mathematicians still maintain that division by zero is an undefined value, so if zero occurs in any mathematical operation, equation, or other area of mathematics, it will cause a mathematical problem.

In accordance with the law of mathematics:

$$a^1 = a \tag{6}$$

The abstract zero can be represented by the expression '0 divided by 0'.

$$0^1 = 0^{2-1} = \frac{0^2}{0} \tag{7}$$

According to mathematicians, zero divided by 1 equal zero, but in reality, it is division by zero.

$$\frac{0}{1} = \frac{0^{2-1}}{1} = \frac{0^2}{1 \times 0} \tag{8}$$

Also, dividing any number by zero is dividing zero by zero:

$$\frac{n}{0} = \frac{n}{0^{2-1}} = \frac{n \times 0}{0^2} \tag{9}$$

Because mathematicians assume division by zero is an infinite subtraction or undefined, they use the method that if the number closest to zero is in the denominator, the division will be large. However, dividing by a number close to zero is one thing, while dividing by zero is completely different. For example, dividing by 3 is different from dividing by 2.99. Dividing by zero equals zero is a simple mathematical method, but we must know the wrong method.

$$\frac{c}{d} = \frac{a}{b} \;\Rightarrow\; c \times b = d \times a \tag{10}$$

Mathematicians commonly use cross-multiplication to solve systems of equations. There are, however, some limitations to this method and it may not be appropriate in all circumstances. One of the main reasons why cross multiplication is considered wrong is because one is not equal to zero. As shown in equation 11.

$$\frac{1}{0} = \frac{x}{1} \;\Rightarrow\; 1 \times 1 = 0 \times x \tag{11}$$

There is a mathematical operation that must be performed before the cross-multiplication process. As shown in equation 12.

$$\frac{1}{0} = \frac{x}{1} \Rightarrow \frac{1}{0^{2-1}} = \frac{x}{1} \Rightarrow \frac{1 \times 0}{0^2} = \frac{x}{1} \Rightarrow 1 \times 1 \times 0 = 0 \times x \tag{12}$$

Now, the equation has both sides equal to zero, but what is the value of x? This equation confirms that the meaning of zero is nothing, so whatever the value of x is nothing, because it is multiplied by zero. Since this equation is of the form 'zero equals zero,' it essentially represents nothing equaling nothing. Therefore, it is assumed not to exist, as zero signifies non-existence. If it were to be treated differently, it would behave like any other number. The best example of zero in a mathematical problem, whether multiplication or division, is similar to a black hole astronomy. The zero root is not known mathematically.

$$\sqrt[0]{n} \tag{13}$$

But as I mentioned earlier, the solution is one according to equation 14.

$$\sqrt[0]{n} \Rightarrow (n)^{\frac{1}{0}} \Rightarrow (n)^{\frac{1}{0^{2-1}}} \Rightarrow (n)^{\frac{1\times 0}{0^2}} \Rightarrow \left(n^{\frac{1}{0}}\right)^0 = 1 \tag{14}$$

I found these solutions only when I rewrote zero as zero to the power of one, according to the basic laws of mathematics.

Conclusion

"*The point about zero is that we do not need to use it in the operations of daily life. No one goes out to buy zero fish. It is in a way the most civilized of all the cardinals, and its use is only forced on us by the needs of cultivated modes of thought.*" Alfred North Whitehead Mathematics treats zero as a number, whereas it is a symbol that represents non-existence, does not possess a sign, and does not obey some of the laws of mathematics. By using simple mathematics, it has been demonstrated that division by zero equals zero. It is recommended that mathematics scholars should rid themselves of complicated mathematics and not let their imaginations go too far by considering zero a number, instead returning to the logic of division, which is that division by nothing equals nothing [1-4].

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