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Modify The Number Whose Unit Place Is Zero To Be Divisible By 11, And Divisible By 9

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ABSTRACT

In this article, the numbers in which the first digit is zero were studied, and what results from the number when adding or subtracting a group of other its numbers to it, so by adding the digits of the number to the number whose first digit is zero, the result is a new number that is divisible by the number 11, and the result From dividing the number by the number 11 is the number that was added to the number, as well as from subtracting the digits of the number from the number whose first digit zero, the resulting number is divisible by the number 9, and the resulting number from the division is the same as the number that was subtracted, and what has been reached has been proven Mathematically.

KEYWORDS

Unit Place, Zero Number, Divisible By11, Divisible By9.

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INTRODUCTION

The study of numbers, including the numbers it contains, is considered one of the important priorities for scholars, students and those interested in mathematics, and from this emerges access to generalizations and theories that facilitate life matters and build a broad horizon in our material world, in addition to the technological applications that characterized this era and nations raced for advancement, investment in minds and innovation what's new The numbers? the numbers they consist of, and their features and qualities embody in their content the basis of computing and the digital economy, and leads us to further research to reach the secrets contained in these numbers, and put them in our educational institutions for use and research into their potential to reach new secrets. The beauty of these numbers and the use of them. In our current study, which focused on the numbers whose first digital is zero, Barrow [1], and what results from adding or subtracting the remainder of the number's digits to the number, and arriving at a theory that summarizes the results and supports them with examples and. proof.

Since ancient times, man has been interested in numbers and the numbers they consist of, with their various classifications, such as natural numbers, integers, real numbers, and so on, He classified what numbers included in a field he called number theory that is unique in the study of numbers and their divisibility, analysis and synthesis, to take an important field of mathematics that is in need of day after day, even in the era of technology and the rapid and tremendous development that we are witnessing today. The tremendous development of digital technology, digital economy and research is transforming the transition to digital in all areas of life [2].

The number zero is distinguished because of its many properties, it is the multiple of all numbers, it is the neutral element in the addition process, and it is the one who converts all numbers when it has an exponent except for the number one, and it is the one who converts the fraction to zero when it is its numerator, and makes it undefined When is the denominator, which does not change when multiplied by any amount in addition to several other properties. In the field of divisibility, researchers and specialists in the field of mathematics have identified the rules by which we can judge the divisibility of numbers, some of them easily, such as numbers 2,3,5,10, and some of them require multiple skills, such as numbers 9,11 [3], Since ancient times, man has been interested in numbers and the numbers they consist of, with their various classifications, such as natural numbers, integers, real numbers, and so on, He classified what numbers included in a field he called number theory that is unique in the study of numbers and their divisibility, analysis and synthesis, to take an important field of mathematics that is in need of day after day, even in the era of technology and the rapid and tremendous development that we are witnessing today. The tremendous development of digital technology, digital economy and research is transforming the transition to digital in all areas of life. The number zero is distinguished because of its many properties, it is the multiple of all numbers, it is the neutral element in the addition process, and it is the one who converts all numbers when it has an exponent except for the number one, and it is the one who converts the fraction to zero when it is its numerator, and makes it undefined When is the denominator, which does not change when multiplied by any amount in addition to several other properties. In the field of divisibility, researchers and specialists in the field of mathematics have identified [4]، the rules by which we can judge the divisibility of numbers, some of them easily, such as numbers 9,11 and some of them require multiple skills, such as numbers 9,11 Field of study Therefore, in response to the importance of the number zero and the importance of divisibility by two numbers, this study came to be the first of its kind at the global level, through which a new theory is presented in the field of number theory and what this theory will provide in terms of mathematical knowledge. Zero number is very important in the advancement the mathematics because it brought a new concept into the world. If zero were never then, it would be almost impossible to have development technologies and modern mathematical concepts [5].

Preliminary

The rules of zero show for the first time in Brahmagupta's book. Here Brahmagupta considers not only zero, but negative numbers, and the algebraic rules for the elementary operations of arithmetic with such numbers. In some instances, his rules differ from the modern standard. Here are the rules of Brahmagupta:

1. Sum of zero and a negative number is negative number.
2. Sum of zero and a positive number is positive number [6].
3. Sum of zero and zero is zero number.
4. Sum of a positive and a negative is their difference; or, if their absolute values are equal, zero number.
5. positive or negative number when divided by zero is a fraction with the zero as denominator.
6. Zero divided by a negative or positive number is either zero or is expressed as a fraction with zero as numerator and the finite quantity as denominator.
7. Zero divided by zero is zero [7].

Also, the number 0 is neither positive nor negative, and is usually displayed as the central in a number line. It is neither a prime number nor a composite number. It cannot be a prime because it has an infinite number of factors, and cannot be composite because it cannot be expressed as a product of prime numbers [8].

The following are some main rules the number 0. These rules apply for any real or complex number x, unless otherwise advertised.

1. In Addition operation: $x + 0 = 0 + x = x$. That is, 0 is an identity element with respect to addition.
2. In Subtraction operation: $x - 0 = x$ and $0 - x = -x$.
3. In Multiplication operation: $x \cdot 0 = 0 \cdot x = 0$.
4. In Division operation: $0/x = 0$, for nonzero x. But $x/0$ is undefined
5. Exponentiation: $x^0 = x/x = 1$, except $x = 0$
6. In set theory, 0 is the cardinality of the empty set, in certain axiomatic developments of mathematics from set theory, 0 is defined to be the empty set. When this is done, the empty set is the von Neumann cardinal assignment for a set with no elements, which is the empty set. The cardinality function, applied to the empty set, returns the empty set as a value, thereby assigning it 0 elements.
7. Also in set theory, 0 is the lowest ordinal number, congruent to the empty set viewed as a well-ordered set.
8. In propositional logic, 0 may be used to assign the truth value false.

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9. In abstract algebra, 0 is jointly used to assign a zero element, which is a neutral element for addition.

10. In lattice theory, 0 symbolize to the lower element of a bounded lattice.

11. In category theory, 0 is used to assign an initial object of a category [9].

Difintion1 A divisibility rule is a way of determining if given number is divisible by a fixed divisor without using the division, usually done by testing its digits.

Rule1 Add the last digit to the hundreds place (add 10 times the last digit to the rest). The result must be divisible by 11.

Rule2 Sum the digits number and the sum must be divisible by 9.

The result

The article applied a set of numerical examples, which are illustrated by the following

Any number has zero in the first digit:

A) if we added it another numbers of it, it become divisible by the number 11, and the result of this operation will be the added number.

Example 1

1230 number has zero in first digit

1230 + 123 (added number) = 1353 added number

1353 ÷ 11 = 123

123 is added number

Example2

- 54670 number has zero in first digit

54670 + 5467 (added number) = 60137

60137 ÷ 11 = 5467

5467 is added number

After applying the examples, the researcher noticed that there is same result for each of the two case Which note in the following

The researcher used mathematical proof to prove each of the two cases

Proof

Any number contains n digits and when it has in the first digit zero is write by the form

$a_n\, a_{n-1}a_{n-2}a_{n-3}\ldots\ldots a_1 0$

$a_n a_{n-1}a_{n-2}a_{n-3}\ \ldots\ldots a_1 0\ _+\ a_n a_{n-1}a_{n-2}a_{n-3}\ldots . a_1 = a_n (a_n+a_{n-1})(a_{n-1}+a_{n-2})\ldots .(a_3+a_2)(a_2+a_3)(a_2+a_1)$, by analysis method is write the form : $a_1+10(a_1+a_2)+10^2(a_2+a_3)\ +10^3(a_3+a_4)\ +\ldots .+10^{n-1}(a_{n-1}+a_n)\ +10^n a_n =a_1+10a_1+10a_2+10^2a_2+10^2a_3+\ldots .+10^{n-1}a_{n-1}+10^{n-1}a_n+10^n a_n=11a_1+(11)(10)\, a_2+(11)(10)^2a_3+\ldots$

$_+\ (11)(10)^{n-1}a_n=11(a_{1+}10a_{2+}10^2a_{3+}\ldots{}_+10^{n-1}a_n)$ it divisible by 11 that clear bellow:

$11(a_{1+}10a_{2+}10^2a_{3+}\ldots{}_+10^{n-1}a_n) \div 11=a_1+10a_{2+}10^2a_{3+}\ldots{}_+10^{n-1}a_n=a_n a_{n-1}a_{n-2}a_{n-3}\ldots a_1$ it is added number

B) if we subscript it another numbers of it, it become divisible by the number 9, and the result of this operation will be the added number.

Example 1

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1230 number has zero in first digit

1230 -123(subscript number) =1107

1107÷ 9 =123 it subscript number

Example2

7890560 number has zero in first digit

7890560 -789056 (subscript number) =7101504

7101504÷9 =789056 its subscript number

Proof

Any number contains n digits and when it has in the first digit zero is write by the form

$a_n\, a_{n-1}\, a_{n-2}\, a_{n-3} \ldots\ldots\ldots\ldots\ldots\ldots\ldots \; a_1 0$

$a_n\, a_{n-1}\, a_{n-2}\, a_{n-3} \ldots\ldots a_1 0 - a_n\, a_{n-1}\, a_{n-2}\, a_{n-3} \ldots\ldots a_1 =$

we write two number by analytic methods

$0+10a_1+10^2 a_2+10^3 a_3+\ldots+10^{n-1}a_{n-1}+10^n a_n$ original number

$a_1+10a_2+10^2 a_3+10^3 a_4+\ldots+10^{n-2}a_{n-1}+10^{n-1}a_n$ subscript number

$(0+10a_1+10^2 a_2+10^3 a_3+\ldots{}_+10^{n-1}a_{n-1}+10^n a_n) - (a_1+10a_2+10^2 a_3+10^3 a_4+\ldots+10^{n-2}a_{n-1}+10^{n-1}a_n)$

$= (10-1)\, a_1+ (10^2-10)\, a_2+ (10^3-10^2)\, a_3+\ldots + (10^{n-1}-10^{n-2}a)_{n-1}+ (10^n-10^{n-1})\, a_n=$

$9a_1+9(10)\, a_2+9(10)^2 a_3+\ldots 9(10)^{n-2}a_{n-1+}9(10^{n-1})\, a_n$ it is divisible by 9

the result of the division process $a_1+10a_2+10^2 a_3+\ldots 10^{n-2}a_{n-1}+10^{n-1}a_n$ it the number that was subtracted

CONCLUSIONS

The theory leads the subject of the study to the following:

1) Identify the properties of a number whose one place is zero.
2) Determine if the number whose units place is zero, and if it is divisible by the two numbers 9, 11
3) The possibility of determining whether any number is divisible by two numbers9 ,11
4) Opening the way for researchers and scholars to develop the theory and apply it in various fields
5) Opening the way for companies of interest to benefit from the theory and its various applications.

Conflicts of Interest

The authors declare no conflict of interest

REFERENCES

1. Barrow, John d. (2001) The Book of Nothing, vintage. ISBN 0-09-928845-1.
2. David M Burton. Elementary Number Theory. Tata McGraw-HillEducation,2006.
3. David M Burton. The History of Mathematics: An Introduction, volume 10. McGraw-Hill Science/Engineering/ Math,2010.8.
4. Kaplan, Roper t.(2000) The Nothing That Is: A Natural History of Zero, Oxford: Oxford University Press.
5. Aljohani, Sarah (2016) The Zero Number, International Journal of Scientific & Engineering Research, Volume 7, Issue4, P96 ,http://www.ijser.org.
6. http://thepowerofzero.weebly.com/rules-of-zero.html#: Accessed on 4/2/2021

7. Diehl, Richard A.(2004) The Olmecs: America's First Civilization, Thames &Hudson, London.
8. Joseph, G. G. (2008). A Brief History of Zero. Iranian journal for the history of science, 6, pp. 37-48.
9. https://en.wikipedia.org/Wiki/0: Accessed on 3/6/2021
10. Kisačanin, Branislav (1998). Mathematical problems and proofs: combinatorics, number theory, and geometry. Plenum Press. ISBN 978-0-306-45967-2
11. Richmond, Bettina; Richmond, Thomas (2009). A Discrete Transition to Advanced Mathematics. Pure and Applied Undergraduate Texts. **3.** American Mathematical Soc. ISBN 978-0-8218-4789-3