LUMEN
ET VIRTUS

The mathematical legacy of cuneiform writing: Functional mathematics in Ancient Mesopotamia

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ABSTRACT

Tourism for the observation of large cats, such as the jaguar in the Brazilian Pantanal and the puma in Chilean Patagonia, has emerged as a powerful tool to promote biodiversity conservation and sustainable economic development. This article explores the opportunities and challenges associated with this form of tourism, highlighting best practices and strategies for maximizing benefits and mitigating negative impacts. The analysis reveals that big cat tourism can provide significant economic benefits to local communities, creating livelihoods and raising living standards. However, it is crucial to maintain a balance between economic benefits and ecological sustainability. Implementing capacity limits, strict regulations, and sustainable tourism practices are essential to prevent the degradation of natural habitats and animal stress. Tourism education plays a vital role in promoting responsible behaviors among visitors. Orientation programs and the presence of experienced guides help ensure that wildlife interactions are safe and informative. Additionally, collaborating with academic institutions to monitor and research the impact of tourism on feline populations and their habitats is critical for making informed decisions. The involvement of local communities is another critical aspect. Initiatives that ensure communities directly benefit from tourism strengthen local support for conservation efforts and create sustainable income streams. Habitat restoration projects and anti-poaching units, funded by tourism revenue, can promote ecological recovery and reduce threats to wildlife. Diversification of tourism activities is also recommended to distribute pressure on wildlife habitats and extend the stay of tourists. In addition to feline watching, cultural visits, ecological trails and other activities can promote conservation and environmental education. Jaguar and cougar sighting tourism presents a valuable opportunity to promote conservation and economic development. Adopting sustainable tourism practices, education, and community engagement are essential to ensure that this form of tourism continues to thrive, benefiting both wildlife and local communities.

Keywords: Wildlife tourism, Jaguar, Puma, Conservation, Sustainability.

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INTRODUCTION

The structure of the research work includes the exposition of significant elements about cuneiform writing, its historical evolution, the importance of its mathematical contributions and the progress of Babylonian society.

The study of the legacy of the cuneiform culture is based on the need to know the origins of the study of mathematics and its direct relationship with the current problems in the study of mathematics due to the poor understanding of algebraic expressions.

This proposal seeks to provide an answer to the question: Is the study of Algebra important? , it is from the compilation of the studies carried out where the different concepts and phenomena seen at that time that were recorded in tablets are manifested, to establish a base in areas of Arithmetic, Geometry, Trigonometry, Algebra and areas of science.

The study of cuneiform in mathematics aims to raise awareness of the importance and impact of the mathematical legacy left by ancient Mesopotamia and seeks to understand how they developed and applied mathematical concepts to solve practical problems, as well as to analyze the lasting influence of this legacy on the development of functional mathematics.

It is hoped that this work will contribute to cultural and mathematical enrichment, serving as a didactic resource in the learning process of future generations.

THEORETICAL OR CONCEPTUAL ELEMENTS

Ancient Mesopotamia, considered one of the cradles of civilization, bequeathed us a great cultural and scientific wealth. Among his notable contributions is the cuneiform writing system, which was used for more than 3,000 years and covered various aspects of everyday life, including mathematics.

The study of cuneiform mathematical texts has made it possible to analyze how the ancient Mesopotamians developed and applied mathematical concepts to solve practical problems.

One of the most fascinating aspects is the way in which the Mesopotamians used the sexagesimal numbering system, based on the figure 60, to perform calculations and measurements. This system, which influenced subsequent mathematical developments, allowed them to perform arithmetic and algebraic operations, as well as calculate areas, volumes and interest rates.

In the structure of this research work, significant elements about cuneiform writing are exposed, including its different phases of discovery, likewise, the influence of the cuneiform legacy in the field of Babylonian mathematics is examined, in addition to mentioning the categories of texts found that contain fundamental data to promote research in the progress of Mathematics and other scientific disciplines

The relevance of the historical evolution of cuneiform, its evolution and attributes, as well as the emergence of tablets that transformed the direction of established mathematics, as well as the importance of the mathematical contributions derived from cuneiform writing, are exposed.

By understanding the mathematical legacy of cuneiform writing, we can appreciate the importance and ingenuity of ancient Mesopotamian civilizations in the development of functional mathematics.

HISTORY OF CUNEIFORM CULTURE.

The cuneiform is a Writing System first developed by the ancient Sumerians of Mesopotamia around 3,500 B.C. It is considered the most important cultural contribution of the many they made The Sumerians, and the most important in the city Sumeriano f Uruk, which developed cuneiform writing around 3,200 B.C. and allowed the creation of the literature.

The name comes from the Latin word *cuneus* meaning wedge, due to the wedge-shaped style of this script. In cuneiform, a writing utensil cut in a specific way, called a stylus, is used to be pressed against the soft clay to create marks or notches that represent sign-words (pictograms), and later, phonograms or concept-words, more similar to what is understood today by "word". All major Mesopotamian civilizations used cuneiform until it was abandoned in favor of an alphabetic script sometime after 100 B.C., including: Sumer, Akkadian, Babylon, Elamite, Hatiana, Hittite, Assyrian, Hurrian.

Obviously, since it is such an old system that it ceased to be used over time, its study presents great difficulties. However, multiple tablets have been found, including one that tells the story of Noah's ark.

The story matches what can be found today in the Bible. It would not be possible to know this impressive information, if it were not for experts who have dedicated their lives to the study of the cuneiform system.

HISTORICAL EVOLUTION OF CUNEIFORM.

Despite being considered the oldest writing system, this does not imply that it has not evolved. The earliest records are known as proto-cuneiform and consisted of pictorial writing. They were used to represent natural phenomena or situations such as battles. Little by little it evolved into a more complex system of representation.

For this reason, the Sumerians began to write about topics such as deities, feelings, among others. Over time, however, representations became more simplified, because there was already a faster understanding of meanings, and therefore symbols could denote more and more concrete concepts. For example, addresses. At this point, the system already allowed communication with a

high level of clarity. By about 2,250 B.C., the cuneiform system was already developed enough to express emotions and feelings. For this reason, they were used by poets of the time. (August Escoffier, 1902)

The use of cuneiform began to weaken along with the fall of Assyria and Babylon. Therefore, it was quickly extinguished. Over the years, cultures with cuneiform writing have been lost since, when they stopped using the system, their memory was lost.

APPEARANCE OF CUNEIFORM TABLETS.

Cuneiform writing, a system of graphic representation developed by ancient Mesopotamian civilizations, not only left a cultural and linguistic legacy, but also made a significant and lasting contribution to the field of mathematics.

Through inscriptions on clay tablets, this writing system captured numerical concepts, calculations, and mathematical problems that offered a glimpse into the mathematical skills of the time and laid the groundwork for later advances in this discipline. The mathematical contributions of cuneiform transcended the frontiers of time and left a mark on the history of mathematics that deserves detailed exploration.

Cuneiform influenced the way we approach and understand numbers, operations, and mathematical problem solving, unraveling the importance of this ancient form of writing in the context of mathematics and its influence on the development of numerical and logical thinking.

SCIENTIFIC ADVANCES THANKS TO THE CONTRIBUTION OF CUNEIFORM.

One of the oldest forms of written communication, cuneiform writing is not only a testament to the creativity and ingenuity of ancient civilizations, but it has also left a profound mark on the history of human knowledge.

Beyond its use to record commercial transactions and everyday events, cuneiform has offered valuable contributions in various areas of knowledge, from mathematics to astronomy and literature.

Unique contributions that cuneiform writing has made to the development of humanity. From the way it has passed on mathematical concepts to its ability to record astronomical observations and literary texts, cuneiform stands as a bridge between ancient cultures and our understanding today.

Cuneiform has transcended time and how its contributions have influenced various disciplines, often laying the groundwork for future advances. Cuneiform writing reveals how human beings have sought to capture, understand and communicate the world around them, leaving an indelible mark on the path of knowledge and cultural evolution.

DESCRIPTION

The elaboration of this research work is based on a requirement to opt for the degree of Bachelor of Mathematics from the National University of Panama and was prepared with the collaboration of Professor Alcibiades Medina, Professor Eliecer Cedeño and Professor Narciso Galástica, professors of the University of Panama. They are elaborated in chapters that represent the most relevant aspects of the cuneiform legacy in mathematical development, such as its historical evolution, decipherment of mathematical contributions made by Babylonians and a wide relevance to the great scientific contribution and culture of these regions to our society.

The limitations presented in the research of the topic presented was the verification of the source of research, since some of them were found in a very scarce way of information in addition to the little existence in some cases of translations of cuneiform texts that have not been deciphered at present and can represent great contributions to the development of Mathematics as other sciences.

FINAL THOUGHTS

Through the cuneiform writing system, the ancient Mesopotamians developed a set of mathematical knowledge that ranged from simple arithmetic calculations to geometry problems and advanced algebra. Their sexagesimal numbering system, based on the number 60, allowed them to perform complex operations and solve practical problems of everyday life.

Mesopotamian mathematics was applied in various fields, such as administration, architecture, commerce, and astronomical measurements. His hands-on approach and ability to solve concrete problems demonstrate his deep understanding of mathematical concepts and his ability to apply them effectively.

In addition, the Mesopotamian mathematical legacy influenced later civilizations, such as ancient Greece and Egypt, and laid the foundation for the development of mathematics in the Western world. Concepts such as proportions, the rule of three, and solving systems of linear and quadratic equations have their roots in the mathematical contributions of ancient Mesopotamia.

The cuneiform script, through its mathematical tablets and academic texts, has provided us with a unique window into exploring the functional mathematics of ancient Mesopotamia. Their legacy invites us to appreciate the importance of this civilization in the development of mathematics and to recognize its lasting influence on our modern understanding of this discipline.

As a recommendation, I consider that the understanding of the sexagesimal numbering system used in cuneiform writing and how it was applied in calculations and measurements should be deepened, in addition to exploring and analyzing specific cuneiform texts that contain mathematical records, such as clay tablets that document mathematical operations, geometric formulas or applied mathematics problems.

In the study of cuneiform writing we can develop themes focused on the discovery of clay tablets that allow us to continue discovering great contributions made by ancient civilizations through the development of transversal axes. Linguistic approaches to analyze the grammar, syntax, and lexicon of cuneiform writing, which can provide information on language structure and cultural aspects reflected in the text related to mathematics and science.

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