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THE ORIGINS OF ALGEBRA AND GEOMETRY

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Abstract: Algebra and geometry, two vital branches of mathematics, have deep historical roots, evolving through centuries of intellectual efforts by different civilizations. This article provides a brief and structured overview of their origins, key contributors, and practical applications. The origins of algebra and geometry date back to ancient civilizations. Algebra, meaning "reunion of broken parts" in Arabic, was systematically developed by the Persian mathematician Al-Khwarizmi in the 9th century. His work introduced foundational concepts in solving equations and symbolic representation.

Geometry, rooted in ancient Egypt and Mesopotamia, initially emerged to address practical problems like land division and construction. The Greeks, especially Euclid, advanced geometry significantly in the 3rd century BCE through his work *Elements*, which became a cornerstone for mathematical reasoning and proofs. These two fields have since become indispensable in mathematics and have profoundly influenced science, engineering, and technology, showcasing humanity's efforts to understand the natural and abstract worlds.

Keywords: algebra, geometry, Al-Khwarizmi, euclid, elements, ancient civilizations, mathematical foundations.

Annotatsiya: Matematikaning ikki muhim tarmog'i bo'lgan algebra va geometriya chuqur tarixiy ildizlarga ega bo'lib, turli sivilizatsiyalarning ko'p asrlik intellektual sa'y-harakatlari natijasida rivojlanadi. Ushbu maqolada ularning kelib chiqishi, asosiy hissa qo'shuvchilari va amaliy qo'llanilishi haqida qisqacha va tuzilgan. Algebra va geometriyaning kelib chiqishi qadimgi sivilizatsiyalarga borib taqaladi. Arabcha "buzilgan qismlarning birlashishi" ma'nosini bildiruvchi algebra IX asrda fors matematigi Al-Xorazmiy tomonidan tizimli ravishda ishlab chiqilgan. Uning ishi tenglamalar va ramziy tasvirni echishda asosiy tushunchalarni kiritdi.

Qadimgi Misr va Mesopotamiyadan kelib chiqqan geometriya dastlab erlarni taqsimlash va qurish kabi amaliy muammolarni hal qilish uchun paydo bo'lgan. Yunonlar, ayniqsa Evklid miloddan avvalgi 3-asrda o'zining "Elementlar" asari orqali geometriyani sezilarli darajada rivojlantirdi, bu matematik fikrlash va isbotlash uchun asos bo'ldi. O'shandan beri bu ikki soha matematikada ajralmas bo'lib qoldi va fan, muhandislik va texnologiyaga chuqur ta'sir ko'rsatdi. insoniyatning tabiiy va mavhum dunyoni tushunishga bo'lgan harakatlari.

Kalit so'zlar: algebra, geometriya, Al-Xorazmiy, evklid, elementlar, qadimgi sivilizatsiyalar, matematik asoslar.

Аннотация: Алгебра и геометрия, две жизненно важные отрасли математики, имеют глубокие исторические корни, развиваясь на протяжении столетий интеллектуальных усилий разных цивилизаций. В этой статье представлен краткий и структурированный обзор их происхождения, основных участников и практических приложений. Истоки алгебры и геометрии восходят к древним цивилизациям. Алгебра, что означает «воссоединение сломанных частей» на арабском языке, была систематически разработана персидским математиком Аль-Хорезми в IX веке. Его работа ввела основополагающие концепции решения уравнений и символического представления.

Геометрия, корни которой уходят в Древний Египет и Месопотамию, изначально возникла для решения практических задач, таких как разделение земли и строительство. Греки, особенно Евклид, значительно продвинули геометрию в III веке до н. э. благодаря своей работе «Начала», которая стала краеугольным камнем математических рассуждений и доказательств. С тех пор эти две области стали незаменимыми в математике и оказали глубокое влияние на науку, инженерию и технологии, демонстрируя усилия человечества по пониманию естественного и абстрактного миров.

Ключевые слова: алгебра, геометрия, Аль-Хорезми, Евклид, элементы, древние цивилизации, математические основы.

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Algebra: From Ancient Methods to Modern Symbolism

The development of algebra began with the ancient Babylonians around 2000 BCE. They used primitive methods to solve quadratic equations by relying on arithmetic procedures. Unlike today's symbolic approach, their techniques were more verbal and numeric.

Significant progress in algebra was made in the Islamic Golden Age. Al-Khwarizmi, a Persian scholar, wrote "Al-Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala", introducing systematic solutions for linear and quadratic equations. The term algebra itself is derived from the Arabic word al-jabr, meaning 'restoration.'

In the 12th century, Al-Khwarizmi's work was translated into Latin, influencing European scholars. Later, in the Renaissance period, symbolic algebra emerged, pioneered by François Viète and René Descartes. Their methods laid the groundwork for modern algebraic notation.

Key Historical Figures and Tools

- Babylonians: Early quadratic equation solvers.
- Al-Khwarizmi: The 'father of algebra,' known for his comprehensive treatise on algebraic methods.

- François Viète: Introduced symbolic representation of variables.

- René Descartes: Developed Cartesian geometry, bridging algebra and geometry.

Geometry: Practical Beginnings to Theoretical Foundations

Geometry's origins can be traced back to ancient Egypt and Mesopotamia, where it was initially used for practical purposes like measuring land and constructing buildings. The ancient Egyptians applied geometric rules in building pyramids, while the Mesopotamians created early geometric tables for measurement.

Greek scholars transformed geometry into a formal science. Around 300 BCE, Euclid authored 'Elements', a comprehensive compilation of geometric knowledge. His axiomatic approach, based on postulates and logical deductions, became the foundation of Euclidean geometry.

In later centuries, during the Islamic Golden Age, scholars such as Alhazen (Ibn al-Haytham) contributed to the field by applying geometric principles to optics. In the 19th century, the study of non-Euclidean geometry by mathematicians like Gauss, Lobachevsky, and Bolyai revolutionized the field and opened new

horizons for modern physics.

Key Historical Figures and Tools

- Egyptians: Pioneers in applied geometry.
- Euclid: Known as the 'father of geometry,' author of 'Elements.'
- Alhazen: Made significant contributions to geometric optics.
- Gauss & Lobachevsky: Founders of non-Euclidean geometry.

Conclusion

Algebra and geometry have evolved from practical tools to theoretical disciplines that are crucial for modern science and technology. Their rich histories highlight the intellectual progress of humanity and their application in various fields today, such as engineering, computer science, and physics.

REFERENCES USED

1. Katz, Victor J. A History of Mathematics: An Introduction. Addison-Wesley, 1998.
2. Boyer, Carl B. A History of Mathematics. Wiley, 1991.
3. Burton, David M. The History of Mathematics: An Introduction. McGraw-Hill, 2007.
4. Smith, D.E. History of Mathematics, Vol. 1 & 2. Dover Publications, 1958.
5. Al-Khwarizmi. Al-Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala, 9th century.
6. Bell, E.T. Men of Mathematics. Simon & Schuster, 1937.
7. Cajori, Florian. A History of Mathematics. Macmillan, 1894.
8. Stewart, Ian. The Story of Mathematics. Quercus, 2008.
9. Joseph, George Gheverghese. The Crest of the Peacock: Non-European Roots of Mathematics. Princeton University Press, 1991.
10. Kline, Morris. Mathematics: The Loss of Certainty. Oxford University Press, 1980.