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AN ANALYSIS OF SOURCES ON THE HISTORY OF CENTRAL ASIA IN THE 9TH–13TH CENTURIES

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ABSTRACT

This article examines the life and scientific legacy of Muhammad al-Khwarizmi from a source studies perspective. The research analyzes his works in algebra, astronomy, and geography, their historical context, and their representation in written sources. Special attention is given to the portrayal of the scholar in Arabic and European sources, as well as their reliability and academic significance. The study highlights al-Khwarizmi's contribution to the development of world science and the influence of his works on later scholars.

Central Asia in the 9th-13th centuries influenced not only political and economic, but also world civilization. These periods are characterized by the complexity of socio-political processes, the expansion of interstate relations, the rise of science and culture, as well as the intensification of competition between different empires. It is associated with the Renaissance. The word Renaissance means "rebirth", "awakening". In Europe, this term is used for the 15th-16th centuries. However, in Central Asia, the Renaissance occurred much earlier, in the 9th-12th centuries. Therefore, we call it the "Eastern Renaissance" or "Central Asian Renaissance". It was one of the major figures of the 9th century, Muhammad al-Khwarizmi, a great scholar who made a huge contribution to the development of world science. His scientific work was mainly formed at the famous scientific center "Bayt ul-Hikma" in Baghdad, which served as an important center for the development of scientific thought at that time.

Al-Khwarizmi conducted fundamental research in the fields of mathematics, astronomy and geography, and especially laid the foundation for the formation of the science of algebra. His work "Al-jabr wal-muqabala" served as an important scientific bridge connecting the scientific traditions of the East and the West. As a result of the translation of this work into Latin, it can be observed that a new stage in European science began. The scientific significance of Al-Khwarizmi's legacy was highly appreciated not only by Eastern scientists, but also by Western researchers. In particular, George Sarton recognizes him as "one of the greatest mathematicians of his time" and emphasizes his role in the formation of the science of algebra. Carl Boyer also evaluates Al-Khwarizmi's scientific activity as an important stage in the

development of mathematics as an independent science. Florian Cajori, through the term “algorithm” associated with his name, notes how wide and deep the scientist’s influence on world science was.

Muhammad ibn Musa al-Khwarizmi (c. 780–850) was a mathematician active during the Islamic Golden Age, who produced works in Arabic on mathematics, astronomy, and geography. Around 820, he worked at The House of Wisdom (Bayt al-Hikma)in Baghdad, the current capital of the Abbasid Caliphate. One of the most prominent scholars of his time, his works greatly influenced later authors in both the Islamic world and Europe[1]. Al-Khwarizmi made a significant contribution to world science. He is credited with founding the science of algebra. The word “algebra” itself comes from his treatise “Al-Kitab al-Mukhtasar fi Hisab al-Jabr wa al-Muqabala”. His treatise on arithmetic, based on Indian numerals, was the basis for the decimal positional system of calculation we use today and the spread of operations in this system to Europe[2]. The scientist’s name gave rise to the English term ”algorithm”; the Spanish, Italian, and Portuguese terms “algoritmo” and the Spanish “guarismo”[3] and Portuguese “algarismo” mean “number”[4]. “Al-Kitab al-mukhtasar fi hisab al-jabr wa al-muqabala” was written in Baghdad around 820 and copied by **calligraphers on paper produced in Samarkand**. It is an Arabic mathematical treatise on algebra. Al-Jabr gave complete information on solving positive roots of polynomial equations up to the second degree[5]. It was the first text to teach elementary algebra, and the first to teach algebra itself. It also introduced fundamental concepts such as “reduction” and “balancing” (actually the term al-jabr was transferred to other sides of an equation), canceling like terms on opposite sides of an equation. Mathematical historian Victor J. Katz considers Al-Jabr to be the first true surviving algebra text. Translated into Latin by Robert Chester in 1145, it was used as a European reference book in the 16th century[6]. The treatise was published by several authors, including Abu Hanifa Dinari, Abu Kamil, Abu Muhammad al-Adli, Abu Yusuf al-Misshi, Abdul-Hamid ibn Turk, Sind ibn, Sakhri, Sakhri, and others. Sarafaddin al-Tushi also. The margins of the treatise are marked with **gold ink**. The text is written in black ink in the **naskh script**. Contents: The entire text uses only words to describe mathematical operations and concepts; it does not contain modern numerical symbols or algebraic symbols. No complete original copy of the treatise exists. Oxford, UK: Bodleian Library holds a rare Arabic copy, translated by

[1] O’Connor, John J. and Robertson, Edmund F. Abū Kāmil Shujā' ibn Aslam. MacTutor History of Mathematics Archive, University of St Andrews, p. 5.
[2] N.A.Jumayeva. “Sharq allomalarining ilmiy merosi”. Buxoro-2022.:O‘quv qo‘llanma.b.21
[3] Knuth D. Algorithms in Modern Mathematics and Computer Science. – Springer-Verlag. 1979. p. 3
[4] Gandz, Solomon (1926). “The Origin of the Term “Algebra””. The American Mathematical Monthly. 33 (9):.pp. 437-440.
[5] Boyer, Carl B. (1991). “The Arabic Hegemony”. A History of Mathematics (Second ed.). John Wiley & Sons, Inc. pp. 228–229
[6] San José State University (2024) SJSU ScholarWorks. Available at: https://scholarworks.sjsu.edu/2024.html (Accessed: 4 December 2025).

Frederick Rosen in 1831. Berlin, Germany: Staatsbibliothek (State Library) holds another Arabic manuscript copy. Latin translations of the work are held in:

- Paris, France: Bibliothèque Mazarine.
- Madrid, Spain: Biblioteca Nacional.
- Chartres, France: Bibliothèque publique.

New York, USA: A complete copy of the Latin manuscript was also found in the library of the Hispanic Society of America. Al-Khwarizmi's algorithms were used for almost three centuries, replaced by Al-Euclid's pen-and-paper algorithms[7]. Al-Khwarizmi's "Zij as-Sindhind" is a work of approximately 37 chapters on calendrical and astronomical calculations, as well as information on astronomy. As a table of sine values. This is the first of many Arabic zijs based on Indian astronomical methods, known as sindhind, and a table of sine, cosine, and tangent values in Arabic [8]. Tables for the movements of the sun, moon, and five known planets. The original Arabic copy is missing. However, a copy by the Spanish astronomer Maslama al-Majriti (c. 1000) was translated into Latin, probably by Adelard of Bath[9] (26 January 1126). Four surviving manuscripts of the Latin translation are in the Bibliothèque publique (Chartres), the Bibliothèque Mazarine (Paris), the Bibliothèque Nacional (Madrid), and the Bodleian Library (Oxford). The original Arabic version was written around 820, during the Golden Age of Islam. His work was mainly carried out between 813 and 833. It was written in Baghdad, in the "House of Wisdom", where al-Khwarizmi worked as a scholar and astronomer under the Caliph al-Ma'mun. Earlier methods sometimes involved the use of a dust board (thon) for calculations, but later manuscripts used pen and paper. As is known, scientific notation had not yet been invented today, so al-Khwarizmi used plain text to describe problems and their solutions, rather than modern mathematical notation.

References:

1. Boyer, C.B. (1991) *A History of Mathematics*. 2nd edn. New York: John Wiley & Sons, Inc., p. 736.
2. Kennedy, E.S. (1956) 'A Survey of Islamic Astronomical Tables', *Transactions of the American Philosophical Society*, p. 46. Available at: https://scholarworks.sjsu.edu/2024.html (Accessed: 4 December 2025).

[7] Van Brummelen, Glen (2017), "Arithmetic", in Thomas F. Glick (ed.), Routledge Revivals: Medieval Science, Technology and Medicine (2006): An Encyclopedia, Taylor & Francis, archived from the original on 28 March 2023, retrieved 5 May 2019. pp. 46-47

[8] Kennedy, E. S. (1956). "A Survey of Islamic Astronomical Tables". Transactions of the American Philosophical Society. p.46.

[9] Kennedy E. S. Al-Khwarizmi // Dictionary of Scientific Biography. – New York: Charles Scribner's Sons, 1970-1980. – Vol. 7. – P. 358–365.

3. Van Brummelen, G. (2017) 'Arithmetic', in Glick, T.F. (ed.) *Routledge Revivals: Medieval Science, Technology and Medicine (2006): An Encyclopedia*. Taylor & Francis, pp. 46–47.
4. O'Connor, J.J. and Robertson, E.F. (n.d.) 'Abū Kāmil Shujā' ibn Aslam', *MacTutor History of Mathematics Archive*, University of St Andrews, p. 5.
5. Jumayeva, N.A. (2022) *Sharq allomalarining ilmiy merosi: O'quv qo'llanma*. Buxoro, p. 21.
6. Knuth, D. (1979) *Algorithms in Modern Mathematics and Computer Science*. Springer-Verlag, p. 3.
7. Gandz, S. (1926) 'The Origin of the Term "Algebra"', *The American Mathematical Monthly*, 33(9), pp. 437–440.
8. Kennedy, E.S. (1970–1980) 'Al-Khwarizmi', in *Dictionary of Scientific Biography*. New York: Charles Scribner's Sons, Vol. 7, pp. 358–365.