Lowell Milken Center for Unsung Heroes
ARTEFFECT

Impact Statement

Moheb Asimi, Grade 12.
***Completing the Square*,** 2024.
Pen, marker, watercolor on paper, 12 x 12 inches.
Savannah Arts Academy, Savannah, GA
Unsung Hero: Muhammad ibn Musa Al-Khwarizmi

The Unsung Hero that I chose for my project was Persian polymath Muhammad ibn Musa Al-Khwarizmi, also known as the “Father of Algebra.” I chose Al-Khwarizmi for my Unsung Hero project because the topic of Algebra, specifically in terms of how it has been developed and applied over time, is largely overlooked. Algebra in general, typically reminds someone of simply a class they took in school or just a topic that involves vain manipulation of complex letters and numbers. What I sought to introduce and emphasize in this project, however, was a way of visualizing Algebra, most specifically in light of Al-Khwarizmi’s contributions and conceptual developments. He spent much of his career in the House of Wisdom (an intellectual center/public library developed under the Abbasid Caliphate; it was, as its name suggests, a house of wisdom, a place where wisdom merged together) translating older scientific manuscripts—the majority of which were in Greek and Sanskrit—into Arabic, while also publishing original work. One of his most influential works was his Al-Jabr which laid out much of the fundamental theorems that form algebra, including solutions of linear and quadratic equations and the idea of completing the square.

The algebra that is taught in schools today is largely abstract, yet much of the abstract letters and numbers used in algebra essentially represent the fundamental geometry that was used to derive them. When learning how to “complete the square,” for example, students generally learn it in terms of letters and numbers in the form of quadratic equations, yet these equations are derived from an underlying geometric problem where you literally have to complete one missing piece of a square with another smaller square, a topic that Al-Khwarizmi thoroughly goes over step-by-step in his Al-Jabr. My project is essentially meant to creatively emphasize the geometric aspect of “completing the square” as a means of visualizing its abstract counterpart—in other words, my project seeks to visualize the topic by shedding light on Al-Khwarizmi’s derivation of it (particularly in his Al-Jabr). Overall, Al-Khwarizmi’s introduction and derivation of these algebraic methods and algorithms not only proved to be useful to his contemporaries, particularly in matters such as trade, legal inheritance, lawsuits, etc. but also to everyone living in the modern world who rely on virtually any technological device that relies on algorithmic code to run. His dedication to both translating and deriving mathematical works set an admirable example for the future to follow, and without his fundamental algebraic treatises technological development would have taken a completely different path.

My artwork visualizes Al-Khwarizmi’s contributions to mathematics particularly by depicting a scene that adds animation to his concept of “completing the square.” The scene involves a sky in the form of a manuscript—in its middle is a square that is completed by another smaller square (the smaller square essentially has been “inserted” into the bigger, incomplete square, indicated by the shining rays that resultantly travel out if its edges). To the left and to the right

are the directions of how to “complete the square,” in Arabic, that Al-Khwarizmi laid out in his Al-Jabr. The central figure in the middle is Al-Khwarizmi himself, watching his own mathematical treatises successfully unfold before his eyes, surrounded by a large audience who also watch alongside him in awe while the rays cast a shine on their clothes. The architecture is meant to resemble the House of Wisdom to emphasize the place in which Al-Khwarizmi wrote and introduced much of his mathematical treatises (the most notable of them being Al-Jabr). All these factors merged together serve a central purpose of not only shedding light on Al-Khwarizmi’s mathematical findings, but also depicting them in the manner that they were written in (i.e., distinct from the more abstracted version of his works that are taught today).

This artwork mostly transformed my understanding of Algebra from one that was largely driven by abstract methods to one driven by more detailed and concrete methods. Although I knew some information about Al-Khwarizmi’s contributions and findings before starting this project, the process of researching and coming up with an artwork idea exposed me to a more detailed aspect of his works (i.e., manuscripts of his work, geometric depictions of Algebra, his derivations, etc.). I learned to look at Algebra not merely in its form of symbols and numbers but also in the purest form from which it was derived (i.e., its geometric form). Looking at Algebra from this perspective allowed me to understand how and why applying Algebra and quadratics to real-world problems actually works, and why it functions well as one of the main driving forces of technological development.