

Rafaello Bombelli Encyclopedia Article

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Rafaello Bombelli

1526-1573

Italian Mathematician

The career of Italian algebraist Rafaello Bombelli helped bridge the late Renaissance and the early period of the Enlightenment. The last among many Italian mathematicians who contributed to a developing theory of equations, Bombelli became the first to conceive a consistent theory of imaginary numbers including rules for operations on complex numbers. His work, whose implications for complex numbers Bombelli never fully appreciated, won him admiration among future mathematical giants such as Gottfried Wilhelm von Leibniz (1646-1716) and Leonhard Euler (1707-1783).

Born in Bologna, Bombelli opted not to follow his father, Antonio, in the latter's profession as wool merchant. Instead, he became an engineer, and rather than attend university, received his training as apprentice to engineer-architect Pier Francesco Clementi of Corinaldo. He spent much of his career under the patronage of the Bishop of Melfi, Monsignor Alessandro Rufini, and was responsible for the draining of the Val di Chiana marshes (1551-60), as well as the unsuccessful 1561 attempt to repair the Ponte Santa Maria, a bridge in Rome.

Bombelli's work in mathematics began during the 1560s, first with the writing of *Algebra*. The latter is particularly significant because it reintroduced scholars to the work of the ancient Greek mathematician Diophantus of Alexandria (3rd century A.D.) In addition to reproducing 143 problems of Diophantus, whose writings Bombelli had discovered in the library of the Vatican, the book also introduced a number of symbols in algebraic notation.

Attempting to improve on the already established Cardano-Tartaglia formula, Bombelli set out to develop his own highly precise theory of imaginary numbers (e.g., the square root of a negative number). This led to the conclusion that real numbers can result from the operations of complex numbers (i.e., numbers that are a mixture of real and imaginary). His findings on complex numbers would have a larger impact than Bombelli, who considered such numbers irrelevant, might have guessed. Euler would quote him in his own *Algebra*, and Leibniz called him an "outstanding master of the analytical art."