

REVIEWS

Edited by Joseph B. Dence

Reviews should be sent to Joseph B. Dence, Department of Chemistry, University of Missouri, 8001 Natural Bridge Rd., St. Louis, MO, 63121. Books on any area of undergraduate mathematics, mathematics education, or computer science are appropriate for consideration in this column. Reviews may be typed or neatly printed, and should be about two pages in length. The editor may undertake minor editing of a review, but only in connection with matters unrelated to the essential content or opinion of the review.

P. J. Nahin. *An Imaginary Tale: The Story of $\sqrt{-1}$* . Princeton University Press, New Jersey, 1998, pp. 257.

Entertaining scientific books, especially mathematics books, are few and far between, but this book belongs to a growing minority of that type. The hardback by P. J. Nahin, an engineering professor in New Hampshire, chronicles the historical development of a number! It is a story that rivals its famous cousin, *The History of Pi*, for the number denoted by $\sqrt{-1}$, or more commonly by the single letter i , is every bit as important in mathematics as is pi.

We cannot be sure just when the drama concerning imaginary numbers began because negative numbers themselves were rejected by all cultures before the Hindus introduced them around 600 A.D. Even the Alexandrian Diophantus (ca. 250 A.D.), who was centuries ahead of his time, rejected quadratic equations as unsolvable if they possessed no positive roots. Many centuries pass until around 1500 the Italian algebraic community, then a major powerhouse in mathematics, encounters square roots of negative numbers while trying to solve cubic equations. It is remarkable that it should be the solution of cubic rather than quadratic equations where i receives its first real scrutiny.

The Italians foremost in this picture include Scipione del Ferro (1465–1526), Girolamo Cardano (1499?–1557), Antonio Fior (1st half of 16th C), and Niccolò Fontana (1501–1576). Their contributions (and rivalry) is one of the most remarkable and colorful episodes in the history of mathematics. Later, Raffaello Bombelli (1526?–1573), an Italian engineer, showed that manipulating quantities involving square roots of negative numbers using ordinary rules of arithmetic led to correct results. For example, he demonstrated the remarkable equality

$$\sqrt[3]{2 + \sqrt{-121}} - \sqrt[3]{-2 + \sqrt{-121}} = 4.$$

One hurdle left, however, was to explain the physical meaning of square roots of negative numbers.