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Pappus Reborn : Pappus of Alexandria and the Changing Face of Analysis and Synthesis in Late Antiquity. (2008)



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Abstract

Despite the recent interest in Pappus of Alexandria, the late antiquarian mathematician remains an enigma in the history of mathematics. Only a handful of chapters and fragments of his seminal work, the *Collection*, have been translated into English and there has been little effort to reveal the common mathematical threads therein. To correct this stasis and move Pappian studies into the exploratory stage, I approached the *Collection* with three questions designed to remove the historiographical biases and avoid the missteps that have persisted over the five-hundred years since Commandino's estate published the first Latin translation. The first question is whether an improved understanding of late antiquity Alexandria and its intellectual environs offer greater insight into Pappus' mathematical style. The second is whether Pappus' infamous exposition on analysis and synthesis from Book 7 of the *Collection* can be reconciled with propositions from the same book. My final question is that after the reconciliation of proposition and exposition in Book 7, what are the consequences for other books in the *Collection* that contain otherwise unacknowledged instances of analysis and synthesis? More specifically, will we find consistency between Books 7, 3, and most surprising of all, 2. What is revealed through these questions is the problem modern scholars have with

Pappus was never actually about his ability but rather the interference of pedagogy in a field where it is least desired: advanced geometry. Pappus demonstrated thoroughly in Books 2 and 3 that his knowledge of analysis and synthesis was more nuanced than he has been given credit for, involving the social practice of mathematics in Alexandria and the application of arithmetic within a supposedly geometrical method.

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Pappus of Alexandria. * Author L. Euler (Translated by Cameron Friend, Research Fellow, Quesu University, and Dr. Cynthia J. Huffman, Pittsburg State University, figures are courtesy of the Linda Hall Library, www.lindahall.org). Theorem. If lines AP and BP from the ends of any line AB to any point P of any circle are drawn, cutting the circle at a and b , then moreover [if] points F and G are taken, so that it is $AF = AP \times Aa$ and $BG = BP \times Bb$, $AB \cdot AB$ then it will always be [the case that] $FP \times Ff = GP \times Gg = AF \times BG$. * Proposition 117 of Book 7 of Pappus' Collection. The problem of Pappus Pappus of Alexandria and the Mathematics of Late Antiquity. Cambridge: Cambridge University Press. [zbMATHGoogle Scholar](https://math.google.com). Heath, Sir Thomas L. (1921). "The Geography of Pappus of Alexandria: A Translation of the Armenian Fragments." *Isis* 62: 186–207. [Google Scholar](https://math.google.com). Junge, G. (1936). Greek mathematics is usually seen as having reached its height in a "golden age" around 300 b.c., after which it declined, reaching a rather sad stage in late antiquity. In this latter period Pappus of Alexandria stands out as one of the last competent mathematicians, although even his Mathematical Collection has been valued by historians mainly for its wealth of information on earlier mathematical achievements. In her readable book, Serafina Cuomo sets out to correct the conventional view of mathematics in late antiquity: her general goal is "to show that the mathematics of late antiquity des