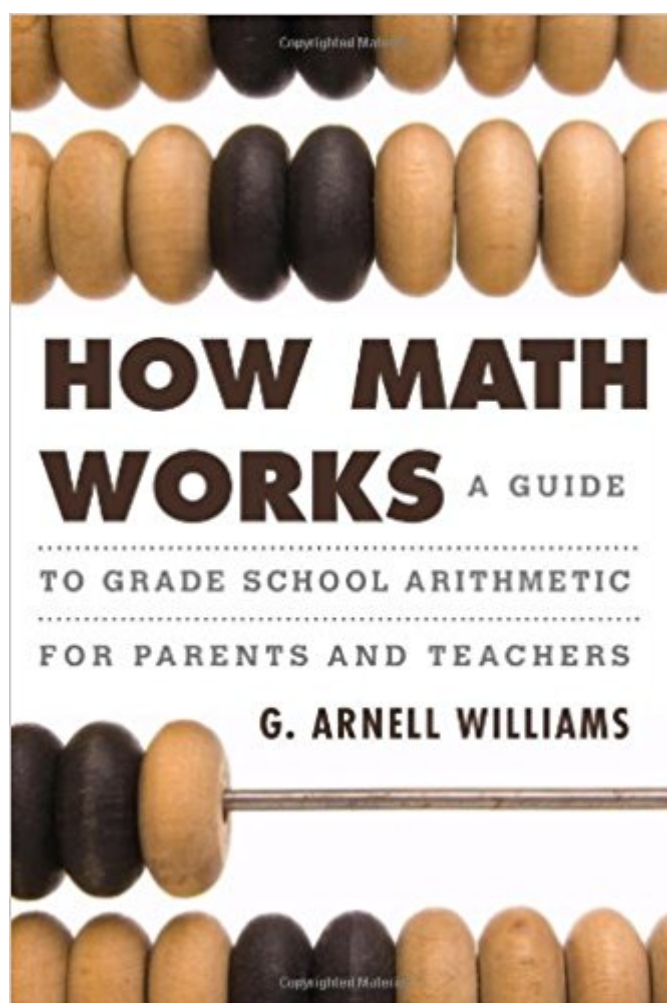


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# How Math Works: A Guide To Grade School Arithmetic For Parents And Teachers



## Synopsis

We hear all the time how American children are falling behind their global peers in various basic subjects, but particularly in math. Is it our fear of math that constrains us? Or our inability to understand math's place in relation to our everyday lives? How can we help our children better understand the basics of arithmetic if we're not really sure we understand them ourselves? Here, G. Arnell Williams helps parents and teachers explore the world of math that their elementary school children are learning. Taking readers on a tour of the history of arithmetic, and its growth into the subject we know it to be today, Williams explores the beauty and relevance of mathematics by focusing on the great conceptual depth and genius already inherent in the elementary mathematics familiar to us all, and by connecting it to other well-known areas such as language and the conceptual aspects of everyday life. The result is a book that will help you to better explain mathematics to your children. For those already well versed in these areas, the book offers a tour of the great conceptual and historical facts and assumptions that most simply take for granted. If you are someone who has always struggled with mathematics either because you couldn't do it or because you never really understood why the rules are the way they are, if you were irritated with the way it was taught to you with the emphasis being only on learning the rules and "recipes" by rote as opposed to obtaining a good conceptual understanding, then *How Math Works* is for you!

## Book Information

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## Customer Reviews

How Math Works delivers exactly what it promises: an extremely thorough explanation of numeration and the four basic operations. It's completely fascinating, but information-dense and academic. It could serve as a text for a graduate-level course in the history of arithmetic...All explanations are accompanied by detailed diagrams and multiple methods: a "coin system" (basically enhanced tally marks), an abacus, and written out in Arabic numerals (though you'll learn about Roman numerals, too). Learn how ancient Egyptians multiplied using doubling charts. It's pretty amazing. If you've always wanted to understand math but never quite grasped it, this book can help you see how the numbers dance. (Tulsa Book Review)

Williams is a huge fan of using diagrams and pictures along with step-by-step breakdowns of each concept he discusses. Williams sets the stage by beginning with the "coin system," which is basically the method of tally marks, the abacus, and Arabic numerals. The reader will also obtain an understanding of how the Romans had a difficult time coming to grips with the number zero, negative numbers, and how the Egyptians used doubling charts to multiply numbers. The examples in the book are simple to understand yet the history is more complex. When reading the book, the reader is sent on a journey through history that is compelling and downright fun. (Mathematical Association of America)

I don't know about you but I honestly have to admit that Math confuses me at times! As a Homeschool parent, I find that often it seems like Greek language to me. I have struggled with Math since high school and now that my son is 10, I feel that I need to have a better understanding of Math. Thanks to How Math Works by G. Arnell Williams I do feel like I at least have a better understanding of Math. I love that the book explains the history of arithmetic and the author connects it to other areas such as language which is a subject I love. My son enjoyed learning more about numbers and how they came about and I honestly feel that I now am more capable of explaining Math to my son. I'm still not an expert in the subject, but it would take a lot for me to accomplish that goal. I do like that this book was also interesting to read and I highly recommend it to all parents and teachers. Math no longer seems like a complicated and boring subject to me. This book truly has helped me to see the beauty in Math and that is a big accomplishment! (Home Education Magazine)

This guide outlines the rich history of math by answering how it formed and how it functions. Williams clearly articulates how math was founded through relationship patterns using symbols such as tally marks, abacus tables, and Hindu - Arabic (numeral) methods. He writes about how necessary these methods are when teaching foundational algorithms in elementary school classrooms. As an elementary school math teacher, I recommend this book for those who are curious about math and are interested in knowing more about its history and how it works. (Teaching Children Mathematics)

What are numbers?

Where did our numbers come from? And why do we calculate with them the way we do? This entertaining, well-written, and instructively illustrated book is a mine of information for anyone (children, parents, teachers, etc.) fascinated by such questions. (Robin Wilson, emeritus professor of pure mathematics, Open University Pembroke College, Oxford)

G. Arnell Williams (MS Yale) is an associate professor of mathematics at San Juan College in New Mexico. He has won numerous teaching awards for helping people to overcome their fear of math.

I have had the pleasure of instructing students in mathematics for the past eleven years, so I'm aware of how boring the material is to most people. I myself had the same attitude while attending public school. I hated math. Teaching math can be very frustrating for even the seasoned teacher, even the over seasoned. While reading books on various disciplines of mathematics, and a few on the history of math, I sometimes find myself dozing off due to the lack of the author's imagination. *How Math Works* is a cleverly engaging introduction to the genesis of math, having the energy and freshness of aspect any good book should own, truly a great story with great writing. I believe mathematics is more attractive because of the history of humankind's endeavor to perfect it. Although the math in this book is elementary, the history is far more sophisticated.

This book explains how math developed over the years. Williams describes math in such way so parents can explain it very easily to their children, and students of math can gain an excellent understanding of math. Math teachers can use this book to help teach their students. I love this book. Williams has an excellent insight to the inner workings of math. All wanting to learn math must buy this book.

I found this at the library and picked it up on a whim because it looked both fun and interesting. It's everything I was hoping it would be. G. Arnell Williams is a good writer who knows his material. In particular, he has a good understanding of the history of mathematics. He takes basic mathematical principles and shows you why they are worth a deeper look. In the math classes I've taken, "elegant" is the highest form of praise you can give; this is an elegant book. Reading it is like sitting in on a really good math lecture. He skips nothing (although if you understand what he is doing, you can certainly do a little skipping yourself), but the material is surprising, interesting, insightful, and as fun as I had hoped it would be. In the U.S., we have relegated basic math functions to grade school; Mr.

Williams shows you what they were like when they were considered grown-up territory. He reminds me of my favorite math teacher, who had a similar gift for making math more interesting than I had ever thought possible. One thing Mr. Williams explains especially well is the power of symbols when it comes to solving problems. He is not the first person to teach me that you can solve a difficult problem by mapping it, or transforming it, into something simpler, but he certainly teaches the idea well, and shows the reader why symbols are such powerful tools. He has put together a delightful book that is well worth the time of anyone who is interested enough to pick it up. I realize math books are not for everyone, but this is a good one. I can understand it with no problem, but it doesn't bore me. If you have young children, you may want to read it just so you can provide better help. Or you may just want to read it because it is worth reading for its own sake.

"This gateway subject to all of mathematics is truly spectacular in its own right, and...in its everyday use we are in possession of ancient knowledge every bit as useful to us as the wheel, music, or even language itself." I am a word person, but I'm also a homeschooling mom. I need to know my math. My husband, an engineer, likes to tease me when I get frustrated, "Don't you see how the numbers dance into place?" I always reply that numbers don't do any dancing for me, but after reading the chapter called "Dance of the Digits" (on multiple-digit multiplication), I can at least begin to see where that strangely poetic idea might come from. How Math Works delivers exactly what it promises: an extremely thorough explanation of numeration and the four basic operations. It's completely fascinating, but information-dense and academic. It could serve as a text for a graduate-level course in the history of arithmetic. This is not a quick-reference book to turn to when your child needs help with homework. All explanations are accompanied by detailed diagrams and multiple methods: a "coin system" (basically enhanced tally marks), an abacus, and written out in Arabic numerals (though you'll learn about Roman numerals, too). Learn how ancient Egyptians multiplied using doubling charts. It's pretty amazing. If you've always wanted to understand math but never quite grasped it, this book can help you see how the numbers dance. Randy-Lynne Wach  
Review for San Francisco Book Review

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