Introduction

Living in a World of Large Numbers

Children, and a great many adults, love the number 1,000,000. On the surface, it is only a number. But it's a number that motivates and inspires. Early in life, the word *million* becomes an integral part of our vocabulary, even if the number itself remains a somewhat mysterious quantity.

When teachers tap into their students' inherent interest in big numbers—especially 1,000,000, the best-known of them all—they not only answer the oft-heard question, "How much is a million?" They also generate excitement about mathematics in general. And countless classes have found that exploring the number 1,000,000 can encompass virtually every area of the curriculum, from math and science to reading and social studies. As one child said after participating in activities that involved counting, collecting, calculating, estimating, and measuring various items in quantities of one million, "A million is more than meets the eye!"

In this book you will see a few of the myriad ways that students and teachers together have explored this popular number. Each activity is accompanied by "The Math Classroom in Action," where you will see how some teachers and students investigated one million.

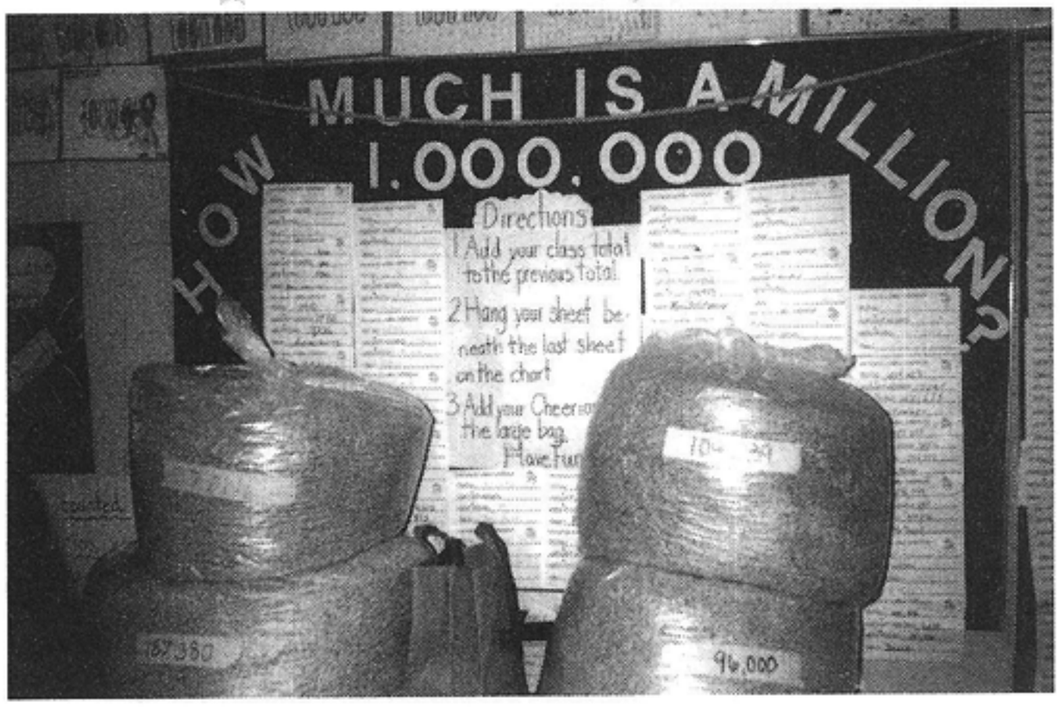
◀ "999,996, 999,997, 999,998. . ."
That's one long string of popcorn!

Meet the Authors!

How did you each get involved with the idea of the importance of big numbers?

David Schwartz: As a kid I was interested in math and science. Above all, I liked to think about how to apply math to aspects of daily life in ways that "boggled" my mind. I was fascinated with things that came in large numbers, and things that were large and very distant—like stars. As an adult, these thoughts came back to me as I looked at the stars. How far away are they? How many of them are there? How long would it take for someone to count that high? I thought about how rarely children discover the true meaning of the word *awesome*. And from there I moved on to ideas for writing my books about big numbers—*How Much Is a Million?* and *If You Made a Million*.

David Whitin: My interest in large numbers came from reading David Schwartz's books. As my teacher colleagues and I read math/literature books to students, we found these books about one million were extremely appealing to them. From a two-year-old who reported that she had a million mosquito bites, to some eighth grade students who wanted to display a million computer dots, I've discovered that these ideas have a universal appeal. Also, as I work with in-service and pre-service teachers in my university classes, I find that exploring large numbers is a good way for my own students to improve their number sense and gain a better understanding of place value.

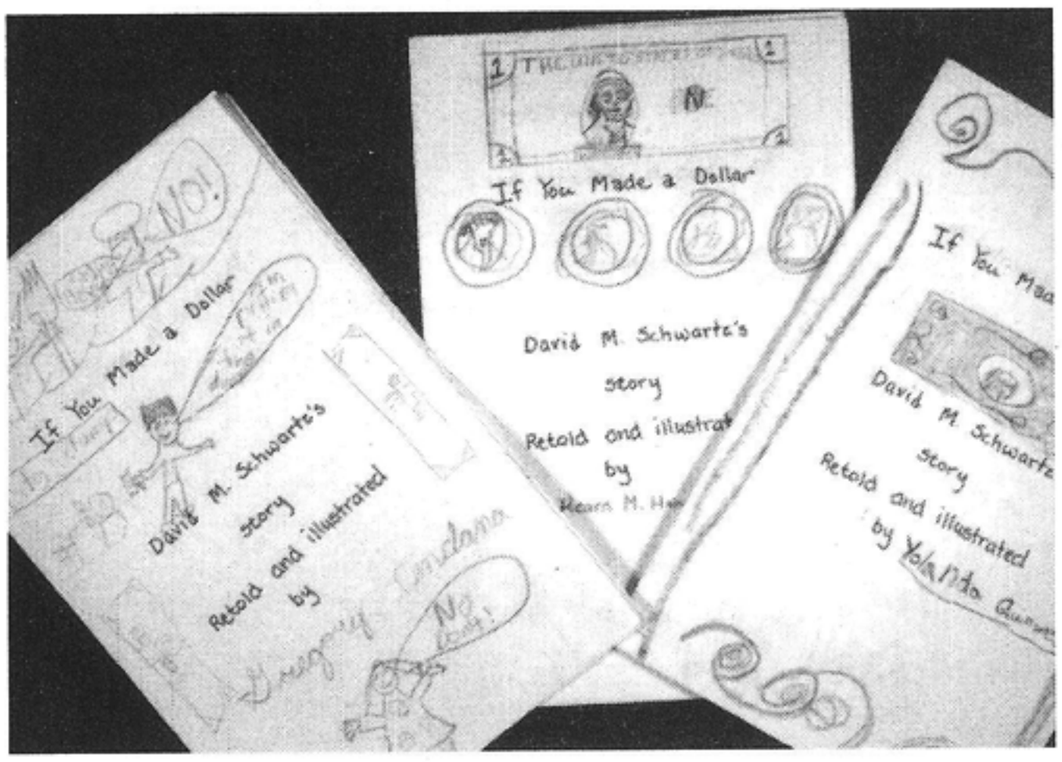


◀ What do one million pieces of Cheerios cereal look like? The students in this class tried to find out!

And how did this book come about?

David Whitin: We kept swapping stories about big number projects. With the numerous stories we both had collected about teachers exploring one million in such creative ways, I suggested that we assemble these stories into a resource book for teachers. And that's the book you now are reading!

David Schwartz: Thanks to the creativity, inspiration, and generosity of teachers and students too numerous to list, we collected enough material for a heavyweight tome! What we have here represents a small fraction of the many wonderful activities and projects we have collected. We hope that these activities and snapshots from many math classrooms "in action" will serve as inspiration for more teachers and students to invent their own variations on the "million" theme.



◀ Three students' personal takes on David Schwartz's books.

The Magic of a Million and the NCTM Standards

When the National Council of Teachers of Mathematics published their Curriculum and Evaluation Standards for School Mathematics in 1989, they described a direction of change which we have attempted to embody in the activities in this book. The vision of the Standards is "...built around five overall curricular goals for students to achieve: learning to value mathematics, becoming confident in one's own ability, becoming a mathematical problem solver, learning to communicate mathematically, and learning to reason mathematically."

In keeping with the goals of the Standards, we have designed activities that:

- ★ are conceptually oriented
- ★ actively involve children in doing mathematics
- ★ make use of materials including calculators and computers
- ★ emphasize development of thinking, reasoning, and communication
- ★ emphasize application of mathematics in purposeful situations

In this book, we've tried to inspire both imagination and mathematical thinking. The investigations are easily adaptable to a range of grade levels. They are an excellent vehicle for helping students reinforce math concepts, record information in an orderly way, and reflect on their processes and thinking through discussion or in a math journal.