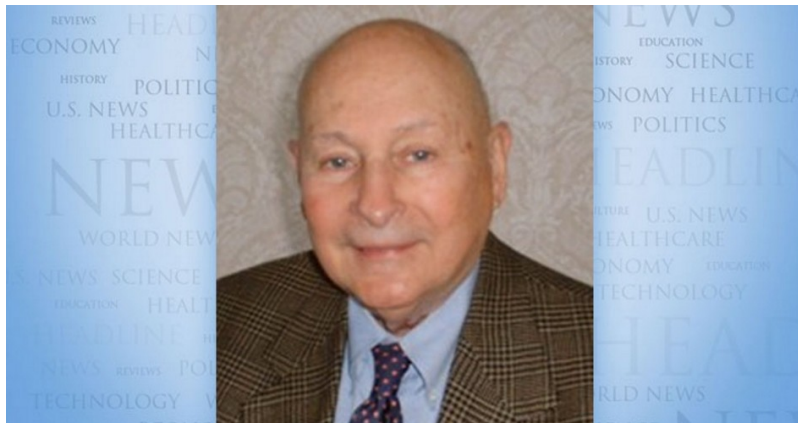




Written by [Sam Blumenfeld](#) on January 27, 2015

America's Math Problem

Does America have a math problem? Is there a reason why American students do so poorly in math on international tests? In 2012, the United States scored 481 in math on the PISA test (Program for International Student Assessment), ranking 27th among 34 nations. The report stated:



Students in the United States have particular weaknesses in performing mathematics tasks with higher cognitive demands, such as taking real-world situations, translating them into mathematical terms, and interpreting mathematical aspects in real-world problems.

China-Shanghai, which came out on top in math, scored 575.

So why do we do so poorly? Amanda Ripley writes in her book *The Smartest Kids in the World*: "In 2009, most American parents surveyed said it was more important to finish high school with strong reading and writing skills than with strong math and science skills."

So I guess we can blame the parents rather than the teachers and professors who create the math curriculum. Back in the 1930s and '40s when I was in elementary school, we all learned arithmetic. We all learned addition, subtraction, multiplication, and division. We memorized the multiplication tables and were able to do all our calculations in our heads and on paper. We did not have calculators at our disposal.

Years later the professors of mathematics discarded the term arithmetic and called everything math. It was a bad decision, for there is a considerable difference between arithmetic, our counting system, and math that includes algebra, geometry, trigonometry, and calculus before venturing further into the mysterious world of higher mathematics.

Back in the old days, our teachers taught arithmetic in the same way that they had been taught, by rote, with no explanation about the system itself. I had to wait until I wrote a book about arithmetic in 1973, *How to Tutor*, before I became aware of the wonderful origins of our counting system and worked out the best way to teach it.

Our place-value counting system uses only 10 symbols to perform every possible arithmetical calculation. It is a wonder of the human intellect. It was derived from the counting board used in India to keep track of quantities. The board was made up of columns going from right to left in which pebbles were placed representing a unit of quantity. In the first column the pebbles stood for ones, in the second column tens, third column hundreds, fourth column thousands, etc. At the bottom of each column, the quantity of pebbles was written in Arabic numbers. If the number at the bottom read 4,235 (four thousand, two hundred, thirty-five), meaning there were five pebbles in the ones column, three in the tens column, two in the hundreds, and four in the thousands.



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But sometimes a column would be empty. So what would be the number for nothing? Some unnamed genius invented a symbol for an empty column: 0, zero. Thus was born a calculating system that would replace Roman numerals and eventually take man to the moon. The invention of zero is one of the greatest achievements of the human mind. And that is why our place-value arithmetic system is so exciting. But unfortunately, it has been buried in the mediocre mush of public education, and children are never taught how awesome the system is.

It was also found that written numbers could replace the concrete pebbles for naming quantities. And it turned out that the most effective way to use this system was to *memorize the arithmetic facts*. In short, it became a system dependent on memory for its effective use. Rote memorization became the easiest way to put all the arithmetic facts into a student's head.

But since progressive educators have decided that rote memorization is a form of child abuse, children are now taught math (formerly arithmetic) with a minimum of memorizing anything. Children are now given calculators to use, and if they press the wrong button there is nothing in their heads that would make them aware of their error.

The result has been a decline in the ability of children to learn basic arithmetic (now called math). And now, since children learn their arithmetic so poorly, they find it difficult to do algebra, geometry, trigonometry, and calculus. Of course, many of them will never use any of these more difficult subjects after they leave school, but they will all have to use arithmetic for the rest of their lives whether they are good at it or not. They will have to manage their budgets, mortgages, interest payments, rents, purchases at the supermarket, income taxes, checking and savings accounts, insurance agreements, and more. In other words, effective arithmetic skills are necessary for survival in our economy.

But our progressive public schools don't seem to be interested in enabling young Americans to master basic arithmetic so that they can become economically literate. Such Americans might be able to figure out why trillion-dollar federal deficits are bad. But if they can barely figure out their car payments, or student-loan payments, they certainly will not be able to understand anything in the billions and trillions.

Almost anyone can become proficient in arithmetic. Rote memorization is the easiest way to learn anything. It just takes time and practice. Arithmetic deals with recognizable facts: money, groceries, miles, gallons, acres, etc. But it takes a very special kind of brain to go beyond arithmetic and become good at the abstractions of higher mathematics.

Edward Frenkel, in his book *Love and Math: The Heart of Hidden Reality*, writes:

There's a secret world out there. A hidden parallel universe of beauty and elegance intricately intertwined with ours. It's the world of mathematics. And it is invisible to most of us.... Every time we make an online purchase, send a text message, do a search on the Internet, or use a GPS device, mathematical formulas and algorithms are at play.... Mathematical knowledge is unlike any other knowledge. While our perception of the physical world can always be distorted, our perception of mathematical truths can't be. They are objective, persistent, necessary truths. A mathematical formula or theorem means the same thing to anyone anywhere ... and it will mean the same thing to anyone a thousand years from now.

Frenkel wrote his book in 2013 in order to introduce the average individual to the world of mathematics. His interest in the subject arose out of his fascination with the quantum world of invisible atomic particles. The more deeply physicists explore the nature of matter, the less matter they find. The



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latest discovery of the Large Hadron Collider under the city of Geneva is the Higgs boson, also known as the God particle. It is the particle that is believed to give mass to matter. The existence of the God particle brings us closer to an understanding of God's magnificent universe. For as we read in Colossians 1:16: "For by Him all things were created: things in heaven and on earth, visible and invisible ... all things were created by Him and for Him."

In other words, higher mathematics brings us closer to the mysteries of the universe and enhances our ability to unlock the deepest secrets of the world we live in. You may or may not have the type of mind that can deal with such abstractions. But if you do, first master arithmetic, then algebra, geometry, trigonometry, and calculus. That will prepare you for higher mathematics.

As Albert Einstein wrote in 1936,

Everyone who is seriously involved in the pursuit of science becomes convinced that some spirit is manifest in the laws of the universe — a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble.

It is hoped that in our post-progressive future, more and more schools will rediscover the greatness of our arithmetic system and teach it as it should be taught, and thus make the rest of math easier to learn.



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