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A solution to how to teach math: Subtract

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By [Greg Toppo](#), USA TODAY

WASHINGTON — Wondering why your child isn't learning enough math in school? Her textbook may be too thick.

In an unprecedented effort, a blue-ribbon panel commissioned by President Bush has been working since 2006 to find out why the math skills of U.S. students pale next to those in so many other industrialized nations. The 20 respected scholars scoured more than 16,000 research studies, heard testimony in eight cities and argued among themselves — sometimes heatedly — for nearly two years.

CHART: [What kids need to know -- and when](#)

In the end, they found a math instruction system that's "broken and must be fixed" if the USA is to compete with established economic powers or emerging ones such as China.

In its long-awaited report, out today, the National Math Panel zeroes in on several factors:

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- Children badly need both automatic recall of math facts and understanding of big concepts, in effect declawing both sides in the decades-long "math wars."

- Based on brain research, Americans should look at prowess in math less as a talent than as the result of sheer hard work.

- Schools must streamline their math courses, focusing on "a well-defined set of the most critical topics" from early elementary school through middle school. "Any approach that continually revisits topics year after year without closure is to be avoided," the report says.

If widely adopted by states, the new approach could force U.S. textbook publishers to slim down their wares, forcing massive textbooks — some run 700 or even 1,000 pages — into extinction.

In their place would be books as slim as 150 pages to help children solidly learn just a few key skills each year.

"There is a problem of kids not feeling like they're getting anywhere, that third-grade math is the same as fourth-grade math," says panel chairman Larry Faulkner, president emeritus of the University of Texas at Austin.

Math books are much smaller in many countries with higher mathematics achievement, the panel says.

"In the U.S., we're trying to teach first-graders 20-some topics," says Michigan State University professor William Schmidt.

Schmidt, who is not a member of the panel, agrees with the finding that math curriculums often lacks coherence. "You're trying to do everything everywhere," he says.

The panel lays out a plan for a "focused, coherent progression" of skills. The progression includes fluency in adding and subtracting whole numbers by the end of third grade, and multiplying and dividing whole numbers by the end of fifth grade. Students should be able to solve problems involving percent, ratio and rate by the end of seventh grade.

The panel issues a call for an "authentic algebra course" for many students by eighth grade and a greater emphasis on fractions for young students.

Teachers told the panel students' biggest deficiency was a poor command of fractions, Faulkner says.

The panel suggests updating the National Assessment of Educational Progress, a federally administered test, to emphasize mastery of fractions and other pre-algebra skills.

The report, to be delivered today to Education Secretary Margaret Spellings, could spark an effort to create a federally funded math program, much as the 2000 National Reading Panel led to the \$1-billion-a-year Reading First program for early elementary grades.

"There was a recognition that we had to do for math what had been done for reading, which is to settle some of these long-standing skirmishes and get a better understanding about the core things that we know," Spellings

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says. "Educators are hungry for it, looking for it. This will be well-received."

On the "talent" question, Faulkner says the research is clear: "Effort counts. Students who believe that working hard will make them smarter in math actually do achieve better."

The belief that people who are good in math are simply born good at it is "not a cultural belief that's shared in China," he says.

What kids need to know — and when

After two years of work, the National Math Panel issues its recommendations today. They include calls for greater emphasis on fractions, algebra and key "benchmark" skills in early grades. Here's a sample:

	Fluency with whole numbers	Fluency with fractions	Geometry and measurement
Grade 3	•Add and subtract		
Grade 4		•Identify and use fractions and decimals, and compare them on a number line	
Grade 5	•Multiply and divide	•Compare fractions and decimals and common percents; add and subtract them	•Solve problems involving perimeter and area of triangles and all quadrilaterals having at least one pair of parallel sides (i.e. trapezoids)
Grade 6		•Multiply, divide fractions and decimals •Add, subtract, multiply, divide positive and negative integers	•Analyze the properties of two- and three-dimensional shapes and solve problems involving perimeter and area, surface area and volume
Grade 7		•Add, subtract, multiply, divide positive, negative fractions •Solve problems involving percent, ratio, and rate and extend this work to proportionality	•Be familiar with the relationship between similar triangles and the concept of the slope of a line

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Gnu1here wrote: 5d 3h ago

It's about time somebody with some common sense determined what math to teach and when. When my 6yr. old grandson is not actually studying "estimating" in kindergarten and 1st grade, but just "passing through it" (and 5 other types of math too), it's getting beyond ridiculous. Actually learning each type of math thoroughly before passing on to the next type is simple common sense; but then we don't have alot of common sense where education is involved.

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Olga Gueits wrote: 5d 7h ago

Teaching chemistry for 30 years I could tell you in how math, that is the language of chemistry, is a challenge every year. After high expectations....Teachers and students must have discipline in the importance of sequence and scope in the process of teaching and learning respectively. Teachers w/o plans cannot assess...so a good supervision is needed too. Students w/o mental/phys/emotional organization are lost in the middle of no where. Parents need to pin point these issues: Accountability, Organization, Supervision and Discipline (In my classroom scientific calculators are used, but the students must show the problem setting with respective units, and its derivations, etc.). Relevance and significance is a must....Math w/o Why, How, Where, What, When has no meaning!!! In addition I do not believe in paternalism.I believe in the old school: " You do not master you can't pass to the next level" and an alternative assessment should be in place to deal with this problem....

of course with the respective graduation consequences. The social promotions and it pressure in school is what is dragging the problem down up and putting the students up down.
misisguets

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Rogers_ca wrote: 6d ago

Being a math teacher myself, I would tend to agree with the finding that good math skills are achieved through hard work. What I see in my practice are kids who'll say math is difficult without even making an effort.

I struggled with math as a youngster, but my parents insisted I try harder and eventually I got better and better. I am a math teacher, but am not any more mathematically talented than the other guy.

My success is purely from hard work. And, I believe this can be true for the majority of today's youth.

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tomryan wrote: 11d ago

I agree with you, believe_math (and with others, including the_hoff87).

I believe that the standards have gone backward considerably during the past 50+ years. The National Math Panel is recommending that multiplication and division be mastered in the 5th grade? I believe that we did so in the 3rd grade in the early 1950s.

I urge everyone interested in this debate to look at the online algebra book written by Professor Emeritus Herman Chernoff of Harvard University, which can be accessed at http://www.stat.harvard.edu/People/Faculty/Herman_Chernoff/Herman_Chernoff_Algebra_1.pdf, and think about the following quote, which I have used in one of the textbooks I've written and which I believe applies to math in general.

"Memorizing rules for solving problems is usually a way of avoiding understanding. Without understanding, great feats of memory are required to handle a limited class of problems, and there is no ability to handle new types of problems."

Think about that. I tried to motivate students to think during my three decades as a college professor, but usually with limited success because of the culture that existed. This must change or the country will continue to flounder mathematically.

Tom Ryan, PhD

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believe_math wrote: 12d ago

I think many people are missing the elephant in the room. You can make all the changes you want, change the textbooks, and require or not permit calculators. However, until we stop treating kids like they are delicate china - who cannot be yelled at or disciplined or called out in front of their peers - this is all a waste of time. This is exactly why that only 25% of high school teachers are men. And that matters! Boys are losing these positive role models. Besides pay, the main thing keeping men (myself included) away from public education, is being chastized for being tough on students. Somewhere along the lines, this feminine philosophy of handling kids has taken over. And no, I am NOT sexist - my wife also agrees with this. But you cannot get teenagers to work hard on a consistent basis unless you occasionally light a fire under them. And sometimes, that includes calling them out, yelling at a class when they deserve it, or challenging someone. As soon as anything close to this happens now, parents call the school and the teacher is brought before the principal, getting grilled with questions. Until this changes, public education in America is going to continue this downward spiral. I've been saying this for 10 years, and unfortunately, it is happening right before our eyes. We are creating a generation of pansies!

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Gil wrote: 13d ago

omo wrote: 21h 52m ago

Being Asian and had experience with the public education system for US and Asia, this report is generally good news. My own anecdote suggests that parents play an incredibly large role in getting their kids to study, and the sad fact as other comments nailed is that in some subjects, how well you do directly relates to how much time and effort you put into studying it.

Omo, I couldn't agree more. I hope we (as a country) can wake up and finally admit that mathematic proficiency is dependent upon hard work and determination (by the students and parents primarily), not some luck of the genes -- that's just a cop out.

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Gil wrote: 13d ago

Here's an interesting link:

<http://www.mountainlaurelsudbury.org/Rithmetic.a.sp>

It's from a schoolteacher talking about a group of kids that learned 6 years of math in 20 contact hours (classroom hours).

Also, here's another link:

<http://www.npr.org/templates/story/story.php?storyId=88188852>

This one is about how some Los Angeles schools are employing the same mathematic teaching methods that Singapore uses (where the national math scores are quite impressive).

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scottynumbers wrote: 13d ago

Focus on fundamentals, base everything on applications, eliminate calculators, outlaw summer break, periodically review everything. . . oh, and don't forget to prescribe medication for the students!

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kr476 wrote: 13d ago

I agree scottynumbers but any normal person forgets how to do these simple things if they aren't brought up every so often. I took geometry my freshman year of high school, didn't touch it again because I was in algebra or whatever, and then it came SAT time and I forgot how to do geometry. Every so often teachers should just touch up or refresh on the fundamentals of math. You can learn something but if you don't use it all the time, it's going to fade away eventually.

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the_hoff87 wrote: 14d ago

I think we need to get rid of calculators until higher level math. I graduated from high school 3 years ago, and I distinctly remember walking through the halls seeing the freshmen walk into Algebra class with \$150 graphing calculators. I was always an advanced math student (completed AP Calculus senior year) and I can say that I never needed a graphing calculator until my sophomore thermodynamics class in college. To this day I'm still usually the first one done on a test requiring math because I don't need to pull out a calculator to do a string of addition or multiplication like many of my classmates. If we would focus our attention on giving students a solid foundation on which to build higher math skills, we would be in much better shape.

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