



"Bringing the Common Core to Life"
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Part 3
Introduction to the Common Core State Standards for
Mathematics
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I said that the standards dare to focus on what matters most. Let's talk about that in mathematics. When we talk about the East Asian and other countries that are kicking our butts in math, I think while many people won't say it, there's a common image in their minds. It's basically this: we are doomed; they work harder and longer than we do; they work on everything and our kids may be a little bit more creative, but there's no way they'll ever do this much hard work so we might as well fold our tents up now. This is interestingly an illusion. In these East Asian and other countries, actually they focus on fewer things done well. The Singapore Teaching and Learning web site does not say work harder, do more. It says teach less, learn more. To be precise, in the Thai-performing countries in mathematics as measured by the TIMSS study, there are three and only three topics that are common to their curriculum in K-2. They are the addition and subtraction of numbers and operations, that is the addition and subtraction of numbers and the quantities that fulfill them. PERIOD. Addition and subtraction, the operations and whole numbers, and the quantities they measure.

What that means in the core standards is for the first time a set of American standards dares to go beyond the mile-wide, inch-deep approach to really focusing on what the world has found the most vibrant core to deliver higher mathematics performance. In kindergarten through 2nd grade, there is a relentless focus in the core standards on addition and subtraction of whole numbers and the quantities they measure. In 3rd through 5th grade, multiplication and division enter the picture and the mighty art which most critics your ability with algebra. Does anyone know what that is, that's cultivated at that time? It is fractions--that is the area of mathematics that studies show is least well understood in this country and most inhibiting kids' understanding of algebra is the fraction. And the core standards lavish--and I will go into some more detail in 3rd through 6th grade--great attention to a full understanding and manipulation of fractions.

When I talk about focus, the companion's ideas are coherence and depth. So when I talk about this level of focus leading to proportional reasoning, geometric measurement and finally linear algebra in 8th grade, and then expanding as I'll describe in high school, it's not just focus. It's that it's coherent. It fits together. But also it's the depth with which you study. What do I mean by depth here? I mean fluency,

understanding, and application. Fluency in the sense, let's be blunt about this, you are fast and accurate at the core mathematical facts and operations. Make no mistake about it. We have sometimes been too shy in this country of commanding of our students adequate fluency in their command of these operations. All kids can do it. They just do it at different rates. So you can without fear insist on it in your classrooms that kids gain these fluencies. They are essential for later mathematics but give kids time by focus to do them over different time periods if that makes sense--fewer things done well. By understanding what you need to do, if you were to say in this room there are 120 windows of which I have washed 40, how many do I have left to go? It is an understanding of subtraction to know that it's a subtraction situation. It is to understand what you're doing when faced with that problem to know subtraction is the tool you look for.

In application math means applying math when you're not asked to do so. So when someone is going to rip you off with the mortgage, they rarely say it would be a good time to take out your calculator and do the math. Rarely in life or in our work are we warned as to when a mathematics problem has arisen. The ability to apply math and have sufficient skill and confidence in your manipulation of it is you can apply it when you are unprompted to do so. And that's what emerges as modeling in the high school which is the application of these core arithmetic terms to a wide variety of situations and powerful uses.

So the in-depth fluency, understanding and application and what I'd like you to see is the development of the math standards are like the trunk of a tree. In K-8 there's this deep focus on what you might call arithmetic. In K-5 make no mistake, this is neither basic nor simple. This is the hardest work deserving of the most practice. Fractions are deep and hard. So if I were to ask you why when you divide fractions do you flip the second one and multiply? How many of you with confidence could answer that question? We'll get back to it but there are good reasons most of us don't know the answer to that question. And it is quite harmful to people's confidence in algebra that we don't know the answer to that question. It is hard work but that focus of arithmetic is the heartbeat of later mathematics, growing in middle school into work with data, with proportional reasoning and geometric measurement, widening but at the same time expanding to a sense of number sense that grows into linear algebra. And then in the high school, what's wonderful with someone with this kind of core trunk, this focus, is they can do a variety of things. They can go into later algebra, towards engineering and calculus, they can do more with statistics and probability, but they can also do economics and other applied math fields where modeling becomes the most important. Think of it like the handle of a fork. If you dare to focus and gain that command, it then exfoliates outward. However, if you don't gain that focus, to be equally clear, this is the essential math with which everything else is confusing and impossible to do. So that's the core of the math standards.