**MY PUBLIC RESPONSE TO FaceBook/Blog POST**
https://www.change.org/p/back-to-basics-mastering-the-fundamentals-of-mathematics/u/14238386

G'Day All:

Please help me understand what is happening here. Folk should absolutely be involved, cognizant, and invested in out next generations' education, all the way through, from K though 12. Great! The conversations I am seeing and hearing are primarily about the early grades. Is there equal concern and discussion about the higher grades, including senior high (which is where I focus)? I am genuinely wondering.

I fear that "memorization" has become a target word. The fact that that word was mentioned in a flyer about an impromptu talk I was asked to give while passing through Calgary seemed to have caused quite the reaction! (Well, the phrase "understanding trumps memorization." See the p.s.) Am I right to guess that people presumed that meant I don't believe kids in the early grades should, at some point, whatever is grade appropriate, just have their math facts straight? That phrase in the flyer came from the context of some high-school work, about polynomial division (letting go of synthetic division) and the like. Of course youngsters should, at the right point, know their multiplication facts so that they are not held back stumbling over small details and can readily move forward. And as people point out that there is good research to show that memorization tasks do help with developing good cognitive function. But the part that is throwing me is: Is that research also suggesting that a focus on memorization is appropriate for all levels of mathematics teaching – middle school, junior high, senior high? Is the evidence suggesting this the basis of best practice for mathematics learning in all grades, all the way through? Of course, the art of memorization is appropriate throughout many subjects for kids in school. So that begs the question too: Must a focus on memorization be conducted in math class because that cognitive development doesn't happen well enough in other areas of schooling? (Again, genuinely asking.) But I am on board with you about at some point about our youngsters having math facts all straight and sorted out. Just make sure it stays a joyful process. I personally think "fluency" is a better word than "memorization" for this.

I am also curious about the term "discovery learning" being used about the Alberta curriculum. I had a quick, admittedly brief so I may have missed it, scan of the Alberta standards and descriptors and I don't see it used anywhere. I was hoping to see, in print, its description just to get clarity on the specifics of the concerns in Alberta.

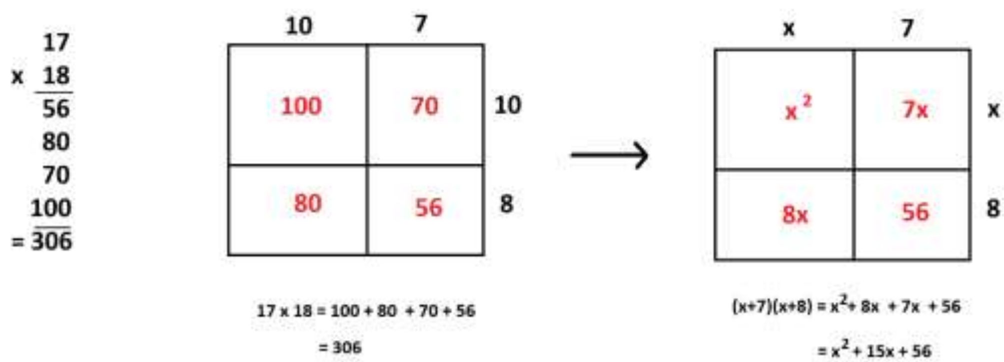
I do worry about the lack of support of teachers caught in the middle of things. They are parents and people too, and if a change in curriculum comes along, they may well need help and support too in making sense of it. The trouble is that they are often put in the spotlight right off the bat and their work, as they try to figure things out, is held up as exemplars of inanity and badness. We are all, of course, on board in wanting to teach kids nimble, flexible thinking, the confidence to solve problems in both the standard contexts and in new contexts. So to this end a new curriculum might suggest possibly exploring a range of strategies for solving a subtraction problem, say. Do 205 – 168 with the standard algorithm, or be clever and save yourself some work and subtract 5 from both numbers and do the problem 200 - 163 and see the answer in your head, or if you don't quite trust your head yet, subtract one more from each number and make it 199 – 162 and do the standard algorithm and now avoid all the tricky carries. (And if a student can reason this way, then, wow!, that's true mastery of the long subtraction algorithm.) But if a new teacher interprets the idea of multiple strategies as an edict to teach all the strategies and test students on all the strategies (which usually requires giving all the strategies names so you can then call on them in a test question), and mark students wrong if they solve a question correctly but with the wrong strategy, then we have a problem. A serious problem! Is this the sort of example serving as the basis of concern for the “Back to Basics: Mastering the Fundamentals of Mathematics” call? If so, then, yes! Let’s help support that teacher to really understand that we’re really working to develop mastery, flexibility with the mechanical work of mathematics, and not a set of edicts of alternatives that can only serve to confuse and demoralize if all enforced. (And, again, is the “Back to Basics” call focusing just on the early grade math work? Areas of concern for high school too?)

As far as I can tell, it seems we are all on the same page? I will request that we model uplifting and respectful conversation -- with the basic fact checking of any claims or assertions made, that would be nice. And if we don’t personally know, for sure, the basis of a particular claim, then ask the question.

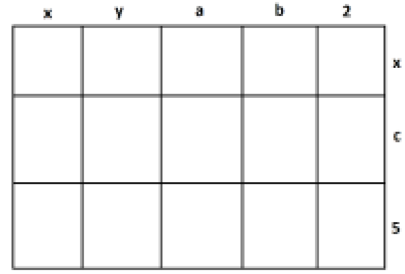
Cheers,

James.

p.s. I should give a concrete example of what I mean by this phrase in teaching high-school mathematics. First take a classic grade-school arithmetic problem like 17x18. One can, of course solve via the standard long-multiplication algorithm to get the answer 306. And one can see why this algorithm works if you see the computation as a geometry problem: compute the area of a 17x18 rectangle. And there lies the power of understanding. Zoom on up to high-school algebra to compute (x+7)(x+8) and one sees that this is exactly the same work.

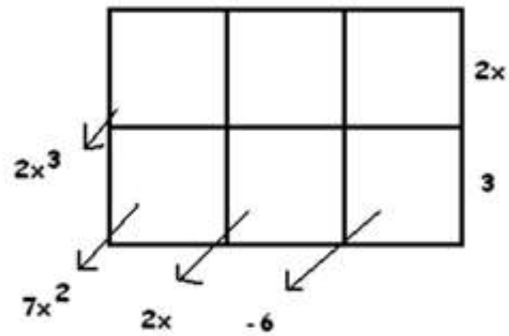



Students are typically taught the mnemonic FOIL to expand brackets in algebra class: first, outer, inner, last. But by understanding the task as a geometry problem it is obvious that there are four pieces to be considered and that it does not matter one whit in which order one computes them. Moreover, FOIL is directly relevant only to a very small class of algebra problems. Students with geometry in their minds can see, with natural ease, that expanding (x + y + a + b + 2)(x + c + 5), for example, must give a sum with 15 terms. FOIL is of little immediate help here.



Go further. In Senior High students are expected to factor large polynomials. This often requires dividing one polynomial by another. Well … division is just reverse multiplication. We can do this work by just applying our geometric understanding backwards!

**Computing** $\frac{2x^3 + 7x^2 + 2x - 6}{2x + 3}$




This is an example of a whole mathematics story line that starts in the early grades and plays itself all the way out to senior high mathematics. The standard long multiplication algorithm (with fluency of the basic math facts) … sure! But this alone makes for a very tough road for the follow-on years of mathematics learning.