

Reflections on Learning Math ...with my 12th grade daughter

from Susan Richman

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This is my last spring as an official homeschooling mom, as our daughter Hannah is graduating this year-- and she's our baby. I feel like I've recently had one of those epiphany moments in doing math with her this winter-- and it's definitely one I kind of wish I'd had a couple of years ago.

Hannah has always been quite strong in math, and through junior high I used to work with her directly, especially related to work preparing for math competitions like MathCounts (see www.mathcounts.org for info on this great program). We did lots of talking about math during these times, especially in our small group coaching sessions. But during most of high school she tended to want to work quite independently in her math, sometimes using CD programs, sometimes using texts, usually seeming to do quite well. Hannah has strong math SAT scores, even though she's not planning on going into any sort of math-related field in college. By the end of 11th grade she'd completed three years of math, so math was not a strict requirement for her senior year, but of course we planned for a math credit anyway, not wanting to only do the minimum.

I realize that none of this may sound like a "problem"-- seems like what we'd all be hoping for... a student gradually taking on more responsibility for a subject, working more independently, and getting ready for more advanced work by 12th grade.

But part way through this year we realized there was a bit of a problem. Hannah was feeling like she had a shaky background in some areas, and we hadn't been very consistent about actually having math lessons together. We were starting in on trigonometry, working together for the first time in several years-- and we began seeing that some algebra topics had been forgotten or had grown pretty hazy-- and I could tell I had some "refreshing" to do, too. There were gaps, and I realized that she really needed me to work with her-- and that I needed to be much more responsible in setting regular work times rather than expecting she'd just "do" her math. Her confidence was also flagging a bit, as happens to all of us when things seem hard or we are out of practice with something, and I began hearing questions along the lines of, "When am I ever going to have to use this in my future anyway? When was the last time you solved a quadratic equation??"

I could see that we were in need of some rearranging midyear-- if we continued as we were, I felt that we simply wouldn't even be able to count the year for a math credit at all. I felt that one of the key factors missing was my involvement-- or at least the involvement of some other adult. I began setting a daily shared math learning time-- and I made it only 1/2 hour per session at first, timed by my digital timer. I gave Hannah some choices about how we'd proceed-- did she want to continue with trigonometry? Did she want to switch to our reading aloud together from one of the very interesting books on advanced math topics that were on our shelf? Did she want to focus on SAT II math test prep? Or some

combination? What we decided was to focus on SAT II math prep work, going through several sample sets from the Math IIB exam and discussing every problem together-- yes, I did them all too, even though I was a bit rusty. Our work together at times involved her telling me how she did a problem when I was stumped-- and at other times I found further math resources to help her understand problems that confused her.

That work took half our math time-- the other half was spent reading aloud from the book *To Infinity and Beyond*, which is a fascinating discussion of the ways people have grappled with the concepts of infinity over time. We set a reading schedule, and we're staying with it fairly well-- and I think Hannah has actually found again that math can be fascinating and worthwhile and even full of its share of drama. I could start to see that "aha!" light go off in Hannah's mind once again, just as it had when she was little.

After we'd finished our SAT II math work, we moved into work firming up core algebra understandings, especially those dealing with quadratic equations. I actually got out our old set of base-ten blocks, and showed Hannah how they could be used to demonstrate factoring of polynomials. I'd thought our days of using "math manipulatives" were long over, but here once again they came in very handy-- both to help make a concept clear, and to help us have some fun with math, even in 12th grade.

So what did I learn through all this, one more time? I learned that we parents still have important tutoring roles with our kids, even when they seem "too big" to want to learn with us directly very often. Also in the process of working on math together, we spent the time to really enjoy each other-- so often at this level our kids are off and gone with outside classes and activities, or they are working (necessarily and properly) on their own independently more and more. It was really sweet to once again spend uninterrupted time focusing on learning together. We've even had many good laughs-- there have been many, many times when each of us has made little "goofs" in our work, making us come up with wildly wrong answers, where it was hard to see where we'd taken a wrong path. I've come to say that we make a good team-- usually one of us can figure out what the other did wrong, helping us together figure out the direction we should be going.

These math times have also made me aware once again of what it means to really respond to someone's current learning point, and how to use initiative to find further resources that will make more connections come alive. I've once again jumped onto the Internet to find websites that can add valuable ideas-- when Hannah wondered what word problems could possibly be solved by quadratic equations, I initially drew a complete blank and couldn't even find any good problems in the texts we had on hand somehow. But I found several websites with great examples-- and I printed them out and used them in many of our sessions.

I've also now challenged Hannah to make up her own similar word problems for me to solve, and I've written a bunch also. We then trade them back and forth, and she also needs to do all the legwork of writing out a full solution, too, using her algebraic tools and vocabulary and understanding. Check out the new Math by BIG Kids section in this issue for some of her problems.

We've talked too about how some of the questions we've been working on could be solved with much simpler problem solving techniques, ones she honed in the Math

Olympiad program in her elementary years (see www.moems.org). She's learned to humor me and solve these problems algebraically "just for fun" even when she'd already figured out a problem just by looking carefully at it and visualizing a solution. And she's now also realizing that these algebraic tools can be very, very helpful-- and can recognize when they really are needed.

I've learned humility through all of this, and gone through some times of berating myself for not working with Hannah more directly all along. But I've also learned-- again-- what fun it is to be involved in learning *with* our kids, at any level. As kids move into those "independent" high school years, I encourage all parents to have at least one or two subject areas where they really are involved with their students on a regular basis, beyond just checking work or handing out assignments, or making sure they have their work done for a distance course or co-op class. Have some set times when you sit down together, with no interruptions allowed, to grapple with tough subject matter together, learning *with* one another. Be ready to admit when you don't know, but keep working with your child to find answers. You may even find, as I have, that after a while you tend to go on quite a bit after the 30-minute timer goes off, as the work actually takes on a momentum of its own. And I think we'll be able to claim a good half-credit in math this year, too-- something I wasn't so sure about for a while!