



Sinclair Mathnet

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FROM THE CHAIR



Hello and welcome to the Winter Quarter installment of *Mathnet*. Since I recently returned from the Achieving the Dream (ATD) Strategy Session held in Atlanta, Georgia, I thought it would be interesting to share what I learned from the session.

First, I was very surprised by the number of attendees at the conference. Sinclair sent six delegates to the conference--Surinder Jain, Donna Fletcher, myself, Penelope Parmer, Linda Pastore, and Joan Patton. (Joan, Linda, and Penelope presented a session on the CCSSE data that was collected at Sinclair and I heard a number of favorable comments from other attendees about their session!) Yet some institutions sent as many as 10 or 11 representatives. Clearly this initiative continues to gain widespread support by a large number of institutions! In Ohio, there are five ATD schools, namely Cuyahoga, Jefferson C.C., Zane State C.C., North Central State C.C. and Sinclair C.C.

I was struck by the fact that many of the sessions were NOT focused on technology such as MyMathLab, although I did attend a session where *Plato* was being incorporated. I believe that it is also noteworthy that none of the sessions that I attended were reporting "huge" increases in their success rates! Also of concern is that I heard no mention of "statistical significance." Several presenters reported very low enrollment in their pilot sections, a problem that the Math Department is familiar with. Finally, I encountered several sessions that focused on Learning Communities, Supplemental Instruction (SI), or an Open Entry/Open Exit (self-paced) program; again only modest gains were cited: 3% - 5% improvement over nonpilot sections.

By now you may be thinking that I was discouraged by the fact that many of our colleagues at institutions all over the country have tried many of the same initiatives we have been trying at Sinclair—and getting about the same results. Quite the contrary! That's because these same faculty dropped several "pearls of encouragement," such as "maintain high standards," and "don't take on too many initiatives!" I also learned that the grass isn't always greener on the other side of the bridge! How so? Although I encountered faculty from institutions that enforce a time limit on placement test scores, I also encountered a faculty member from one community college where pre-requisites are not enforced and another faculty member where a large percentage of the courses at their institution are taught by adjunct faculty.

Bottom Line

So what's the "bottom line?" First, we should stay focused and be cautious about creating more initiatives than what we can effectively support. Second, we need to remain data focused (something Sinclair has been doing for quite some time), but don't discount incremental improvement. Third, in a period in which resources are scarce, collaborating with other ATD schools in Ohio may prevent the Math Department from wasting time and resources on ineffective initiatives. Many of the ATD institutions are from states which have community college systems. Although community colleges in these states may not be collaborating very much, I believe that regular collaboration with our sister ATD schools in Ohio may provide us with a fresh perspective on overcoming the challenges we face in educating our students in mathematics here at Sinclair. In fact, while at the conference in Atlanta I had the opportunity to speak to Donna McNat, one of the math coordinators from Cuyahoga C.C.'s Metro campus, about opening a dialogue between our two departments. Donna was very open to this idea, and I will be working with her to schedule a meeting between our two departments sometime in the spring!

Tony Ponder ■



Featuring *Carol Bonner*

In this issue of the *Mathnet*, we feature Carol Bonner. Carol is currently working in the Mathematics Department office while completing a degree in Math Education and Middle School Education, with an emphasis on Mathematics and Science.



youngest son will begin college in the fall of 2008. Both Carol and her husband are heavily involved in church—Henry is a minister, and Carol is the Minister of Music for her church district. They both love working with youth development programs and with seniors in their community.

When asked what else she would like to share with people in the department, Carol says, “I play the piano and organ, and I love to cook!”

Susan Harris ■

Prior to becoming a student, Carol worked as an Environmental Engineering Specialist. Her work included environmental permit writing, air emission analysis, water sampling and testing, and chemical analysis using mass spectrometry, inductive coupled plasma, and atomic absorption. She is certified through the US Department of Labor as a Mine Safety and Health Instructor. She is also certified through MIT as an Environmental Negotiator. Be sure to ask her what this all means, because I cannot say!

Carol has traveled the world to work on environmental projects. In 1993, she was chosen by the US Department of Environmental Protection Agency to assist in China with developing an Environmental program for several industries.

So why did Carol decide to go back to school and pursue a different career? She says that she got tired of the physical requirements of the job and of all the travel. Climbing big tanks filled with chemicals, and working outdoors all day was no longer fun for her.

Through working with youth at her church, Carol found satisfaction in working with kids, and she decided that pursuing a teaching degree would allow her to help them even more.

Carol and her husband Henry have four boys, one daughter, and four grandchildren. Carol's

Pre-College

Algebra Initiatives

In both the October 2007 and November 2007 issues of *Sinclair Mathnet*, Tony Ponder discussed the initiatives occurring in the MAT 191, 192, 193 pilot series. (Note: past issues of *Sinclair Mathnet* are available online at: <http://www.sinclair.edu/academics/sme/departments/mat/DepartmentNewsletter/index.cfm>.)

Tony's November article concluded with a section titled “What Lies Ahead?” Several modifications have been made to these courses from fall quarter to winter quarter.

All MAT 191 and 192 courses this quarter meet twice a week. The instructors use common syllabi and administer common tests (developed by the team of faculty teaching each particular course).

Students in both courses are assigned five review homework assignments to be completed online through MyMathLab. The review topics were chosen based upon the skills that would be necessary in the class. For example, a review of fractions was assigned for MAT 192 students because of the work they were going to be asked to do with rational expressions. Students are given two weeks to complete these five review assignments.
(Continued on page 4)



A Criterion for Factoring Trinomials

by Harvey Chew

In a previous article, we showed that the quadratic trinomial $ax^2 + bx + c$ (a , b , and c integers) is factorable over the integers if and only if we can find integers p and q such that $p + q = b$ and $pq = ac$, and $ax^2 + bx + c = a\left(x + \frac{p}{a}\right)\left(x + \frac{q}{a}\right)$.

An easier criterion for students to use in order to tell whether $ax^2 + bx + c$ is composite or prime is the following:

$ax^2 + bx + c$ is factorable if and only if $b^2 - 4ac$ is a perfect square.

Proof:

When $ax^2 + bx + c$ is factorable, we have $b^2 - 4ac = (p + q)^2 - 4pq = (p - q)^2$, a perfect square.

Conversely, suppose that $b^2 - 4ac = J^2$, the square of an integer J . By the quadratic formula, the roots of $ax^2 + bx + c = 0$ are $x_1 = \frac{-b + J}{2a}$ and $x_2 = \frac{-b - J}{2a}$, where $J = \sqrt{b^2 - 4ac}$.

The sum of the roots is $x_1 + x_2 = -\frac{2b}{2a}$ and the product of the roots is $x_1x_2 = \frac{ac}{a^2}$, where x_1 and x_2 are rational numbers.

$$\text{Let } x_1 = -\frac{p}{a} = \frac{-b + J}{2a} \Rightarrow -2p = -b + J.$$

$$\text{Let } x_2 = -\frac{q}{a} = \frac{-b - J}{2a} \Rightarrow -2q = -b - J.$$

Solving simultaneously, we find $b = p + q$ and $x_1x_2 = \left(-\frac{p}{a}\right)\left(-\frac{q}{a}\right) = \frac{pq}{a^2} = \frac{ac}{a^2} \Rightarrow pq = ac$.

Therefore, $b^2 - 4ac$ is a perfect square if and only if there are integers p and q such that $p + q = b$ and $pq = ac$.

Using the perfect square criterion for $b^2 - 4ac$ allows us to determine quickly whether we should try to find p and q .

Exercises:

1. Determine whether each trinomial is prime or composite.
 - a. $3x^2 + 5x + 1$
 - b. $x^2 + x - 30$
2. Show that $x^2 + bx - 4$ is composite iff $b = 0$ or $b = 3$.
3. Find all integers b such that $x^2 + bx - 30$ is composite.
 4. If a and c are given integers, show that $ax^2 + bx + c$ is either prime or has a finite number of factorizations.

The solutions appear on page 4.



(Continued from page 2) The departmental diagnostic test, given on the first day of class, was aligned with these review assignments so that if a student demonstrated proficiency with a topic on the diagnostic, (s)he would be exempted from having to complete the review assignment for that topic. Thus if a student missed no questions on the diagnostic assessment, (s)he would be exempted from all of the review assignments.

Students have either a homework assignment or a quiz due six days a week. Each class day the students have a few homework problems from the textbook to turn in. These assignments usually consist of five problems that require the students to clearly demonstrate the solution process. Each of these assignments is graded by the faculty member, showing corrections, and returned. On three of the five days that the students are not in class they have a homework assignment due online through MyMathLab. These assignments vary in length and many assignments include review questions from past topics as well as questions concerning current material. Students have multiple resources available to them through MyMathLab when completing their assignments. They can view a similar problem, ask for help, try a similar exercise, and in many cases watch a video or computer animation that will explain the topic in detail. Every weekend the students have an online quiz due through MyMathLab. The quiz is a five question timed quiz and the students receive none of the help that is available with the online homework.

The classroom structure is predominately group work. The instructors lecture very little, using group exercises to both assess the student's preparedness for a topic (called a "warm-up" exercise) at the beginning of class, as well as their mastery of the day's material at the end of the class.

Several additional resources are being made available to students this quarter. The Math Department has reinstated the test review sessions for MAT 191 and 192 students. In addition to the face-to-face review sessions, Richard Uchida and Jim Willis are creating Lecturescribe videos that can be viewed online using a Flash program. These videos are designed to give the students a review of all major topics on each of the MAT 191 and 192 tests.

Faculty members: contact Tony Ponder or Richard Uchida if you are interested in helping out with the continual evolution of this Pre-College Algebra pilot sequence in the spring.

David Hare ■

FACTORING TRINOMIALS – SOLUTIONS

- 1a. $b^2 - 4ac = 25 - 12 = 13$, prime.
- 1b. $b^2 - 4ac = 121 = 11^2$, composite.
2. $b^2 - 4ac = b^2 + 16$ is a square for $b = 0$ and $b = 3$ only.
3. $b^2 + 120$ is a square only for $b = \pm 1, \pm 7, \pm 13, \pm 29$.
4. Proof: If $b^2 - 4ac = J^2$, then $J^2 - b^2 = 4ac$, $(J + b)(J - b) = 4ac$, where J, a and c are fixed. Thus the equation has only a finite number of solutions. (Consider only pairs of even factors of $4ac$.)

Harvey's Joke Corner

(from Len Ruth)

Q: What did one math book say to the other?

A: Don't bother me. I've got my own problems.



Can you help me with my spelling?

π

Sure.

e

Thanks.

pie