New Mexico Mathematical Association of Two-Year Colleges

NMMATYC News

November 5th , 2008

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2002-2004 NMMATYC Board

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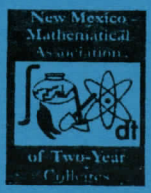

New Mexico Mathematical Association of Two-Year Colleges

NMMATYC News

Volume 13

Issue 2

Inside this issue:

President's Message

JOANNE PEEPLES

Greetings! I hope your new academic year is off to a good start. There are many challenges ahead for us, and possibly NMMATYC (and AMATYC) can help with some solutions (or at least partial solutions) of the academic challenges. I know the colleges are all short on-funds, and there are many new challenges to meet in the mathematics classroom. We need to find ways to meet these challenges – and to do it with a shrinking budget.

Networking and conferences are wonderful ways to gain new ideas. Our conference last May at San Juan College in Farmington was a good example. I met new people, and took back several ideas that I have already used in my classroom. I even presented some of these ideas at a faculty development workshop in August, so other members of my faculty could try them.

At our last conference we awarded three scholarships:

The Michelle Jimenez scholarship was awarded to Chi M. Bui from Central New Mexico CC. Chi has a 4.0 GPA and has completed through Differential Equations. She plans to become a civil engineer. We need to thank Betty Carpenter – her family and friends – who made it possible to award Chi $1,200.

The Vicki Froehlich Memorial Scholarship is given to a person who plans to teach mathematics. This year's recipient was Jeremy Busby from ENMU-Roswell. Jeremy also has a 4.0 GPA and in his application letter he said "You could say I have a passion for math." We need more math teachers with just that passion!

President's Message Continued...

JOANNE PEEPLES

The Celeste Nossiter Book Scholarship recipient was Giuliana F. DePiazza from San Juan College. Giuliana is a biology major, and has transferred to UNM this fall. Her goal is to become an orthodontist.

We had an excellent group of applicants for the scholarships, and making a choice was hard. The deadlines for this year to apply for these scholarships will be Feb. 27, 2009 – so let your students know about them.

The Faculty Professional Development Award recipient was Robert Baker, from NMSU Grants. This grant is open to all NMMATYC members. Check our web site for more details. The deadline for applications for this academic year will be Feb. 27, 2009.

There were no applications for the David Lovelock Teaching Award this past year, this award has been given every other year, and the recipient has been encouraged to be the NMMATYC nominee for the AMATYC teaching award. After some discussion at the Oct. 4, 2008 NMMATYC Board meeting, we decided we would award the David Lovelock award each year – that way you, NMMATYC members – will not have to remember if this is "the year" or not for the award, and we will have two nominees to forward to AMATYC (which gives the award every two years). The application deadline will be Feb. 27, 2009 (the same as for our other awards).

Our NMMATYC delegates at the AMATYC conference this November will be: NM State delegate, Ali Ahmad; NM State delegate, Mary Caffey; NM Affiliate delegate, Vicky Aldrich (sitting in for Philip Kaatz who is unable to attend); and NM Affiliate President, Joanne Peeples. If you have any items you think should be brought up at the delegate meeting, please let one of the delegates know.

Professional Development Funds Available

Each year, NMMATYC provides up to $300 to cover expenses for one of its members to take part in a professional development activity. The application process and form may be found on the NMMATYC web-site www.nmmatyc.org/. For additional information, contact Joanne Peeples, NMMATYC President, at joannep@epcc.edu or 915-831-5047. The completed application must be received by February 27, 2009.

President's Message Continued...

JOANNE PEEPLES

Our next NMMATYC conference will be a joint conference, held with MAA Southwestern Section at Western New Mexico University in Silver City, NM. It will be on April 3 – 4, 2009. The NMMATYC Conference Chair is Fariba Ansari (fansari@epcc.edu) and the MAA SW Section Conference Chair is Tom Gruszka (tpeter@cs.wnmu.edu) . Be thinking about talks, workshops, etc that you would like to see – and that you would like to present. More information about this conference can be found in this newsletter. Be sure to mark April 3 – 4, 2008 on your calendar!

I have been asked to chair (starting after the Jan. Joint Math Meetings) the MAA Committee on Two-Year Colleges. Do any of you have any ideas about how MAA could help you? Help AMATYC? Help NMMATYC? One idea I have had is for MAA to have a list, on its web site, of transfer scholarships for two-year college math majors. I could use some other ideas – I'd like to see the two organizations work closer to help each other.

Please send me comments, ideas or in general anything you think might be important for NMMATYC to consider. NMMATYC is your professional organization in New Mexico and El Paso, and we are here for you.

Joanne Peeples, President
(joannep@epcc.edu)

CALL FOR NOMINATIONS
NMMATYC David Lovelock Teaching Excellence Award

Nominations will be taken until February 27, 2009 for the David Lovelock Teaching Excellence Award which was established by NMMATYC to honor an educator who has made outstanding contributions to mathematics education at the two-year college level. Please visit http://www.nmmatyc.org/ to download the nomination form.

Using Practice Quizzes

By Robert Shankin

I heard about "Practice Quizzes" from a student with a creative instructor. I tried it, and was very surprised by the result. The day before a test I looked at the three problems that I knew would be most missed. I put three problems of a similar type on the board as a practice quiz. As I expected, very few students got these right. But the next day, on the test, few missed those three problems. I knew I was onto something big.

I now use a one-question practice quiz every day, as soon as I walk into the classroom. It doesn't require any additional class time, because they take the practice quiz while I take roll and/or pass back papers. Students take the practice quiz like a real quiz—no use of notes or the text. Now I and the students find out right away when they did not gain the needed conceptual understanding. I cover the foundational ideas in each chapter on practice quizzes, and tell all students to save these quizzes and study them well before the test. The practice quiz problems, in one form or another, will show up on each test.

After each practice quiz I get feedback from a quick raising of hands. If a quiz had very poor results, I may re-examine the way I teach that topic. But even if I don't revisit that topic again, when I use a similar problem on a later practice quiz, most will get it right. It seems that the initial practice quiz itself does the work for me. Sometimes I look ahead to my test. I may notice that a problem assumes that students know a basic formula. For instance, last week, in my Calculus class, I found that more than half didn't know the formula for the area of a circle. It was a great review opportunity—and essential basic knowledge for an advanced math class.

Last, I occasionally use the practice quiz to introduce a section. I may need to make sure that students have the foundational understanding and skills to handle to current topic. I may have a problem that checks for this understanding while also leading into the topic at hand. As you can see, these practice quizzes are put to many uses. But their main function is feedback. They tell me and my students whether or not students are ready for the testing environment.

Robert Shankin
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Santa Fe Community College

NMMATYC Student Scholarship Opportunities

The ***Michelle Jimenez Memorial Scholarship*** is presented jointly by the family of Michelle Jimenez and NMMATYC. The scholarship is primarily for students pursuing a degree in which mathematics plays a major role. At least two of the following courses must have been completed prior to the application deadline: Trigonometry, Pre-Calculus, Statistics, Calculus I, Business Calculus, or any mathematics course for which one of the listed courses is a prerequisite.

The ***Vickie Froehlich Memorial Scholarship*** is designed for education majors with emphasis in mathematics. To be eligible, a student must have completed at least three of the following courses prior to the application deadline: Math for Elementary Teachers I, Math for Elementary Teachers II, Pre-Calculus, College Algebra, Trigonometry, Statistics, Calculus I, or any math course for which one of the listed courses is a prerequisite.

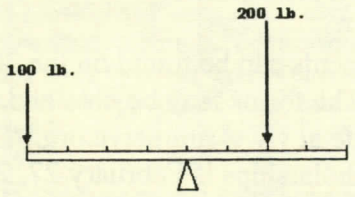
Additional requirements can be found on the 2009-2010 application forms. The forms may be obtained from the NMMATYC website at www.nmmatyc.org. The deadline to apply for both scholarships is February 27, 2009. Flyers are available on the website. Direct inquiries for either scholarship to Mary Caffey, NMMATYC Nominating Chair, at mary.caffey@clovis.edu , or 575-769-4967.

The Seesaw Method: An Easy Way to Work Mixture Problems

By Russel Ellwood

Some word problems require us to mix two quantities of different concentrations to produce a mixture whose concentration is to be some specific value between the other two. To solve such problems more easily, I developed a "Seesaw Method" from a principle of Engineering Statics. My students find this much easier to use than traditional methods. First I will introduce the idea of the Seesaw Method using an illustration; then I will show examples of how to apply this to mixture problems; finally, I will offer a proof of this method.

To illustrate the principle of the Seesaw Method, suppose we have an 8-foot seesaw (teeter-totter) with the fulcrum (point of balance) in the middle. A 100-lb. boy sits at one end, 4 feet from the fulcrum. Where should a 200-lb. man sit on the other side to balance him out? Answer: Two feet from the fulcrum! Why? Because their *torques* must be equal in order for the seesaw to be balanced. (The torque is the person's weight multiplied by his distance from the fulcrum.) See the diagram below:



Boy's torque = Man's torque

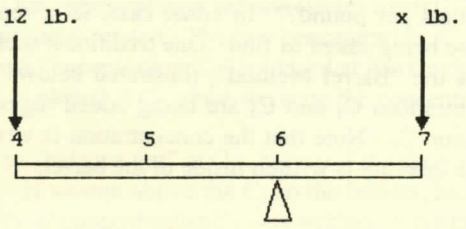
(100 lb.)(4 ft.) = (200 lb.)(2 ft.)

400 ft-lb. = 400 ft-lb.

That is, each person is exerting 400 foot-pounds of torque about the fulcrum. But these two torques are acting in opposite directions (the man's torque is clockwise and the boy's torque is counterclockwise); so they cancel each other out and the seesaw is balanced. Now let's apply this analogy to an example:

Example: How many pounds of coffee worth \$7 per pound must be mixed with 12 pounds of coffee worth \$4 per pound to make a mixture worth \$6 per pound?

Let's let x = the number of pounds of the \$7 / lb. coffee that is needed. We make a "Concentration Seesaw" that shows the dollar-per-pound "concentration" of the coffees. We put the low concentration (\$4 / lb.) at the left end, and the high concentration (\$7 / lb.) at the right end. (See the diagram below.) We have 12 pounds of the \$4 / lb. coffee and x pounds of the \$7 / lb. coffee; so we have 12 lb. of coffee "acting" at 4, and x lb. of coffee "acting" at 7. Now, the resulting mixture must be worth \$6 / lb.; that is, we want the dollar-per-pound "concentration" of the mixture to "balance out" at \$6 / lb. -- so we put the fulcrum at 6. The 12 lb. weight is acting 2 units from the fulcrum (since 4 and 6 are 2 units apart on the seesaw), and the x lb. weight is similarly acting 1 unit from the fulcrum. Since the two "torques" must be equal, we have:



$$(12 \text{ lb.})(2) = (x \text{ lb.})(1)$$

$$24 = x$$

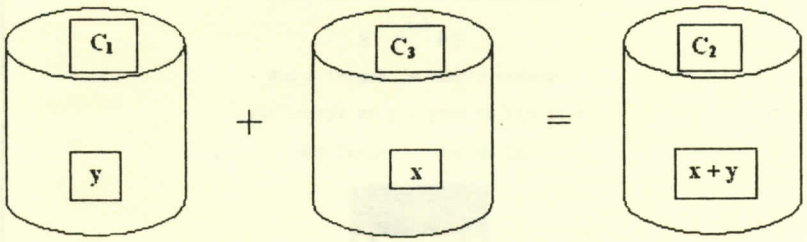
(Notice that it was not necessary to write the "$ / lb." units for the numbers on the seesaw: since they are the same on both sides of the equation, they will cancel out anyway.)

As a similar example, suppose we are asked, "How many gallons of a 70% alcohol solution must be mixed with 12 gallons of a 40% alcohol solution to make a mixture that is 60% alcohol?" Using the figure above, we would change "lb." to "gal."; also, "4" through "7" on the seesaw would be changed to "40%" through "70%". So our equation would now read,

$$(12 \text{ gal.})(20) = (x \text{ gal.})(10)$$

$$\text{Hence, } x = 24$$

A Proof of the Seesaw Method. Suppose we are asked, "How many gallons of a C_3% alcohol solution must be mixed with y gallons of a C_1% alcohol solution to make a mixture that is C_2% alcohol?", where $C_1 < C_2 < C_3$. Or, we may be similarly asked, "How many pounds of coffee worth C_3 dollars per pound must be mixed with y pounds of coffee worth C_1 dollars per pound to make a mixture worth C_2 dollars per pound?" In either case, let x represent the unknown quantity we are being asked to find. One traditional method for working these problems is the "Barrel Method", illustrated below. It shows that two barrels of concentrations C_1 and C_3 are being added together to make a mixture of concentration C_2. Note that the concentration is written on the lid of each barrel, and the quantity is written inside of the barrel.



Now two relationships must be preserved across the equals sign. First, the *quantity* of the mixture (the barrel on the right) must be the sum of the quantities in the two barrels on the left; hence, we add the y and the x to get the "x + y" in the barrel on the right. Secondly, the *amount of pure alcohol* in the mixture must be the sum of the amounts of pure alcohol in the other two barrels. [Or, the dollar value of the coffee mixture must be the sum of the dollar values of the coffees in the other two barrels.] These relationships give us the equation

$$C_1y + C_3x = C_2(x+y)$$

$$C_1y + C_3x = C_2x + C_2y$$

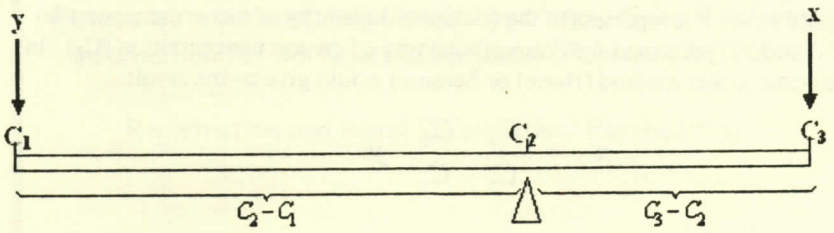
$$C_3x - C_2x = C_2y - C_1y$$

$$(C_3 - C_2)x = (C_2 - C_1)y$$

Hence, $$x = \frac{C_2 - C_1}{C_3 - C_2}\ y\ .$$

Now let's set up this same example using the Seesaw Method. First, we construct a horizontal bar representing a seesaw (teeter-totter). The units on the seesaw are concentration-related. The low concentration, C_1, is placed at the far left, and the high concentration, C_3, is placed at the far right. The fulcrum (point of balance) is placed at C_2, since we want the concentration of the

resulting mixture to "balance out" at C_2. Now y -- the (known) quantity of concentration C_1 -- is written above the C_1 on the seesaw, and x -- the (unknown) quantity of concentration C_3 -- is written above the C_3 on the seesaw. See the diagram below.



Now a principle of Engineering Statics tells us that "the sum of all external torques acting on a rigid body in equilibrium must equal zero". Hence, in order for the seesaw to be balanced, the "torques" of the two quantities x and y must be equal and opposite. (Each "torque" is the quantity multiplied by its distance from the fulcrum.) Now y's torque is acting (counterclockwise) a distance of $C_2 - C_1$ units from the fulcrum, and x's torque is acting (clockwise) a distance of $C_3 - C_2$ units from the fulcrum. Since the magnitudes of the two torques must be equal, we have

$$(C_2 - C_1)\, y \;=\; (C_3 - C_2)\, x$$

$$\textbf{Hence,} \quad x \;=\; \frac{C_2 - C_1}{C_3 - C_2}\; y,$$

the same result obtained by the Barrel Method.

To explain the principle of the Seesaw Method, let's return for a moment to our original illustration of the boy and the man on the seesaw. If they wanted to sit the same distance away from the fulcrum, they would have to weigh the same. But suppose the man wants to sit closer to the fulcrum. The shorter his distance from the fulcrum, the more he must weigh so that his torque -- the product of his weight and distance from the fulcrum -- will be the same as the boy's. The Seesaw Method is entirely analogous -- except that C_1 and C_3 are fixed positions, and it is C_2 (the fulcrum's position) which moves. If we wanted the concentration of the mixture to be exactly half way between the concentrations of the two quantities we were mixing, we would obviously need equal amounts of those two quantities (that is, x and y would be equal). But the *greater* we want the concentration of the mixture to be (that is, the closer C_2 moves to C_3), the more we need of the quantity of *higher* concentration, C_3 (that is, the greater x must be).

Finally, it should also be mentioned that a similar proof and explanation would ensue if x represented the (unknown) quantity of *lesser* concentration (C_1) and y represented the (known) quantity of greater concentration (C_3). In that case, either method (Barrel or Seesaw) would give us the result

$$x \;=\; \frac{C_3 - C_2}{C_2 - C_1}\; y$$

Russel Ellwood
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El Paso Community College

Joint Conference of the Southwest Section of the MAA and NMMATYC

When: April 3-4, 2009

Where: Western New Mexico University, Silver City, NM

Special Guests:

Polya Lecturer: Louis H. Kauffman, Department of Mathematics, Statistics, and Computer Science, University of Illinois at Chicago;

Keynote Speaker: Daniel Teague, North Carolina School of Math and Science

Who to contact:

Conference chair: Tom Gruszka, Professor of Applied Mathematics, WNMU, PO Box 680, Silver City, NM 88061; ph: (575) 538-6102; fax: (575) 538-6710; tpeter@cs.wnmu.edu; or

NMMATYC related issues: Fariba Ansari, fansari@epcc.edu

Requests to present talks/workshops/etc: Submit relevant information to Tom Gruszka by Friday, February 13, 2009.

Registration and Hotel Information: Forthcoming.

Math Adoptive Technology for Students with Disability

By Shakir Manshad

Our mission for the MATSD (Math Adoptive Technology for Students with Disabilities) Lab is to help guide students with difficulties in mathematics in the right direction, using the latest software and computer hardware. Our facilities incorporate talking software for visually impaired students and Braille printing hardware, among other amenities. In addition, further development is already underway to extend our services to students with other disabilities, helping them successfully continue their mathematical education. The accessory for making computer technology extra accessible is our first priority.

This Fall semester we are serving one blind and one visually impaired student who are in need for sixth grade and GED math level tutoring. Because these students do not know Braille, we are developing mathematical software to assist in tutoring and teaching a math. Other students being served by MATSD include a handicapped DACC student in College Algebra , a Middle school 6th grade visually impaired student, a speech disabled DACC student in Trade Math , an NMSU blind student in Math Appreciation, a GED blind student for Math and Computer literacy, and a Visually Impaired DACC student in College Algebra Math 121.

We are also working on requests made by New Mexico State University. These requests include Braille pamphlets for the Computer Science department, Braille book chapters for Intermediate Algebra, Braille Java programs and Braille research documents. There is also a request from NMSU for several graphical toasts.

MATSD has also been conducting research projects since 2004. These include research on an add-on device to the white cane used by the blind and visually impaired individuals, a refreshable device to draw graphs and software, a distance learning application, and a language enhanced Braille keyboard.

The add-on device is used as an assistive tool to acquire information from objects before a white cane is able to sense them. This device will be made up of several range sensors to determine if and what type of obstacles are in the way. The device's main objective is to assist the white cane user's ability to better visualize the environment. The refreshable device draws graphs and includes a

software interface for visually impaired students. This will be is a tool to be used for distance learning and traditional classes. The distance learning system uses Visual Basic and text-to-speech libraries. The system is accessible through the Braille keyboard and converts HTML to Braille. It allows teachers to add customized distance learning objects such as Tests, Quizzes, and Homework submission, which are all accessible for visually impaired students. Finally, the Multi-Language Enhanced Braille Keyboard is being developed for visually impaired students which supports Literary Braille Grade 1, Grade 2, and Braille ASCII.

The MATSD Lab is working hard to give visually impaired students the opportunities they need to get help. It is our hope that we are guiding the students with difficulties in math in the right direction through our use of software and computer hardware.

Shakir Manshad
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Dona Ana Community College

Web Resources
Topic: Multicultural Studies and Ethnomathematics

The Maya Astronomy Page by Dawn Jenkins
http://www.michielb.nl/maya/astro.html

Mathematicians of the African Diaspora by Scott W. Williams
http://www.math.buffalo.edu/mad/00.INDEXmad.html

Discovering Ancient Egypt by Mark Millmore
http://www.eyelid.co.uk/index.htm

The Technology Corner:

Technology in Math and Science to Enhance Learning By Fariba Ansari

In an on-going effort to help students better understand math and science courses, how can problems be overcome by designing technology instruction in classrooms to accommodate teaching? By using calculators and motion sensors during the lesson or lab, students will be able to see how their movement in front of the motion sensor affects the graph of position versus time. This can lead to better understanding of kinematics in physics or subjects involving linear equations in math and can improve students' practical experience by engaging them in a hands-on activity, yielding immediate feedback through discussion with classmates or instructor. With the introduction of this classroom technology, students will have an opportunity to engage better with the suject.

Fariba Ansari
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El Paso Community College

Other Upcoming Conferences

AMATYC 28th Annual Conference
November 20-23, 2008
Washington D.C.
Website: http://www.amatyc.org

NADE 33rd Annual Conference
February 25-28, 2009
Greensboro, North Carolina
Website: http://www.nade..net

NCTM 2009 Annual Meeting and Exposition
April 22-25, 2008
Washington, D.C.
Website: http://www.nctm.org

Funny Math: Abbot and Costello in "Buck Privates"

Here is a scene from the 1941 movie "Buck Privates".

Abbott: You're 40 years old, and you're in love with a little girl, say 10 years old. You're four times as old as that girl. You couldn't marry that girl, could you?
Costello: No. ?
Abbott: So you wait 5 years. Now the little girl is 15, and you're 45. You're only three times as old as that girl. So you wait 15 years more. Now the little girl is 30, and you're 60. You're only twice as old as that little girl. ?
Costello: She's catching up. ?
Abbott: Here's the question. How long do you have to wait before you and that little girl are the same age?
Costello: What kind of question is that? That's ridiculous. If I keep waiting for that girl, she'll pass me up. She'll wind up older than I am. Then she'll have to wait for me!

Here's another one from the same movie:

Abbott: Do me a favor. Loan me $50.
Costello: I can't lend you $50. All I've got is $40.
Abbott: That's okay. Give me the $40, and you'll owe me $10.
Costello: How come I owe you $10?
Abbott: What did I ask you for?
Costello: $50.
Abbott: What did you give me?
Costello; $40.
Abbott: So you owe me $10.
Costello: That's right. But you owe me $40. Give me my $40 back.
Abbott: There's your $40. Now give me the $10 you owe me. That's the last time I'll ever ask you for the loan of $50.
Costello: How can I loan you $50 now? All I have is $30.
Abbott: Give me the $30, and you'll owe me $20.
Costello: This is getting worse all the time. First I owe you $10, and now I owe you $20!
Abbott: So you owe me $20. Twenty and 30 is 50.
Costello; Nope! Twenty-five and 25 is 50.
Abbott: Here's your $30. Give me back my $20.
Costello: All I've got now is $10!

Reference: Peterson, Ivars (2008) Abbot and Costello's Wacky Math. http://www.maa.org/mathland/mathtrek_3_27_00.html

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