



Mathesis

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May 2014

NH Governor and NCTM President Address Conference Attendees

Upcoming Deadlines:

- May 23: Proposals for Christa McAuliffe Technology Conference Presentations due.
- August 1 deadline for items for publication in next Mathesis issue.
- September 16: MAA Contributed Paper Abstracts for 2014 Joint Mathematics Meetings due.
- Sept. 26 Early bird registration date for first of three NCTM Regional Conferences.
- September 30: Proposals for 2015 NCTM Regional Conferences due.
- December 15: Prevost and Evans Award nominations due.
- January 1: Nominations for Balomenos Award due.

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NHTM's 50th anniversary celebration began a year ago with a party and conference at the Radisson Hotel in Manchester, NH. The 2014 Spring Conference marked the end of the anniversary year with its own festivities, sessions, and speakers. Nearly 200 mathematics educators welcomed both New Hampshire's governor Maggie Hassan and the National Council of Teachers of Mathematics president Linda Gojak at New Hampshire Technological Institute on March 17, 2014.



Governor Hassan addresses NHTM members. Photo by Rich Andrusiak.

Scheduled on Saint Patrick's Day with a theme of *Leading Us to the Pot 'O Gold: The Standards For Mathematical Practice*, the rooms were decorated with pots holding gold treasures and green leprechaun hats identified the program committee and board members.

Governor Hassan kicked the day off as she discussed the importance of mathematics education, recognized the work of NHTM, announced her STEM task force, and proclaimed March 17-24, 2014 as Mathematics Education Week in New Hampshire. NCTM President Linda Gojak engaged the participants in exploring a variety of problem-solving strategies in her keynote address "Putting the Standards for Mathematical Practice into Action." Gojak also presented one of the thirty break out sessions offered during the day.

NHTM recognized mathematics educators through the [Balomenos](#) and [Evans](#) teaching awards, [honorary lifetime memberships](#), and [25 year recognitions](#). In the board elections, all of the incumbents were elected to continue in their positions.

Art's Attic:

Abu al Wafa

By Art Johnson

Abū al-Wafā' was the most outstanding mathematician of his time. But when he wrote his best-selling mathematics book he did not use modern notation. Instead he used words for numerals and employed 'finger reckoning' for all the computations.

When we think of famous mathematicians from the past we tend to recall ancient Greeks such as Archimedes and Euclid or post Renaissance mathematicians such as Blaise Pascal, Sir Isaac Newton, and Sonya Kovalevsky. This focus on European mathematicians ignores a long list of Indian and Persian mathematicians. Abū al-Wafā' is one of them.

Mohammed Abū al-Wafā' Al Būzjānī (940-998) lived most of his life in Baghdad during what is considered the Golden Age of Persian mathematics. During Abū al-Wafā's life the Caliphs of Bagdad were great patrons of science and mathematics, and supported a school and observatory in Baghdad.

Abū al-Wafā' moved to Baghdad when he was nineteen and remained there for the rest of his life. Although Abū al-Wafā' was primarily a mathematician he was involved in building the Baghdad observatory. It contained a quadrant that was over 6 meters long and a stone sextant that was 18 meters long. Both of these instruments enabled Abū al-Wafā' and others to make detailed observations of the heavens and to track the paths of planets and stars. They could then determine the start of holy seasons and deduce an extremely accurate length of a year.

Much of what we have from the ancient Greek mathematicians survived from the translations and commentaries by Persian mathematicians. In an ironic twist, several commentaries by Abū al-Wafā' on the works of Euclid, Diophantus and al-Khwarizimi have been lost.

Some time between 971 and 976 Abū al-Wafā' wrote *The Book on What Is Necessary from the Science of Arithmetic for Scribes and Businessmen*. According to his introduction, it was intended to

"...comprise all that an experienced or a

novice, subordinate or chief in arithmetic needs to know, the art of civil servants, the employment of land taxes and all kinds of business needed in administrations, proportions, multiplication, division, measurements, land taxes, distribution, exchange and all other practices used by various categories of men for doing business and which are useful to them in their daily life."

In *The Book* Abū al-Wafā' does not use the Indian numerals which had become widespread across the Persian world. Instead he used finger reckoning and no numerals at all. All the numbers in *The Book* are written in words. Why? *The Book* was intended for tradesmen and practitioners. These individuals used finger-reckoning exclusively, and to use only Indian numerals in *The Book* would have meant the intended audience would not read his book.

Of particular interest in *The Book* is Abū al-Wafā's use of negative numbers. He is the only Persian mathematician of the Middle Ages to refer to and then employ negative numbers, centuries before any European mathematician used them.

Another practical book that survives to our day is *A Book on those Geometric Constructions Which Are Necessary for a Craftsman*. The thirteen chapters of the book discuss all manner of constructions, including the division of spherical surfaces into regular spherical polygons.

Abū al-Wafā' is best known for first using the tangent function and compiling tables of sines and tangents at 15' intervals. His tables are accurate to 8 decimal places. He also introduced the secant and cosecant.

And, so it turns out that Abū al-Wafā' was not so different from any of today's authors. He wanted to reach the largest possible audience (and gain the greatest profit). If that meant suppressing the superior Indian numerals in favor of finger reckoning, then so be it. He would write other books that used Indian numerals.

President's Message:

What Determines Student Success, Principles to Actions?

By Greg Superchi

This column and the May NHTM Board meeting mark the end to my term as President of NHTM. It has truly been an honor and a privilege to serve all of you. When I was elected, I was told by a wise person that I would grow a tremendous amount during this time. I believe I have. Thank you to those of you who are responsible for that growth! Also, I am grateful to the Board members, regional coordinators, and all the volunteers who served over the past two years.

You have been tremendous to work with! Included in that thank you is your new President, Cecile Carlton. As you may recall, Cecile chose to give up her long-time role as NHTM Membership Chair. The vast experience that she has on the Board will serve her well during her term as President. I wish Cecile luck and I look forward to serving under her leadership as well as serving the membership for the next year as Past-President.

I hope you were able to attend our 51st Annual Spring Conference on March 17th at NHTI. Congratulations to Betty Erickson and Roberta Kieronski (Co-Chairs of the conference), Rich Andrusiak (Program Chair), and the entire Conference Committee for an excellent and successful conference! The Governor kicked off the day by welcoming us, sharing with us her reasons for the STEM Task Force she commissioned, and thanking us for the job we do as educators. Additionally, NCTM President Linda Gojak was our keynote. She spoke on the Standards for Mathematical Practice and how to make them part of our everyday classroom. That's three conferences in a row with NCTM presidents in attendance! I also want to thank those who ran for positions on the NHTM Board. Although the three incumbents were re-elected, I hope those

who ran against them will look for other ways to serve NHTM in the near future and consider running for Board positions again.

In my final opportunity to address you in this column, I'd like to share a question that was asked of me by an NHTM member. The question, paraphrased a bit, was, "What do you think makes for a successful math program? Does the program determine success or does it all come down to the teacher?"

An excellent teacher with a less than exceptional textbook/program is far more effective than a less than exceptional teacher with an excellent textbook/program.

My reply went something like this...

What a great question! I think it's one that all educators often debate publically, privately, or indi-

vidually. The number one factor to me is the teacher. An excellent teacher with a less than exceptional textbook/program is far more effective than a less than exceptional teacher with an excellent textbook/program. The first will find the resources necessary to make his/her students successful. The latter can do so much more damage that can seldom be undone. However, any teacher who is doing his/her best and is honestly trying to learn an exceptional textbook/program philosophy will have much more success. Maybe that makes him/her an excellent teacher in the end?

However, the ideal situation is to have the "best of both worlds." As the grade levels progress, what students are exposed to in the previous grades is so important. A 5th Grade teacher with strong mathematics teachers before him/her who use an exceptional textbook/program will find so much more success than when one or both is missing. For instance, my high school students come to me being flexible enough to work independently or with a group and are ready to learn, engage, struggle, and succeed because that is what they have been asked to do

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President's Message

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before they get to me. I am very lucky to have so many exceptional teachers in my district who use a solid mathematics program (thank you LRS teachers!). When I first began teaching 20 years ago, it was extremely difficult to get students to problem solve, reason, and communicate about mathematics. As time went on, I began to see the positive changes related to students who are in a truly Standards Based Curriculum being used by excellent teachers. When seniors graduate this year at my school, it will mark the first class to use a Standards Based Curriculum from K-12. And now with the CCSS firmly in place, we look to what will be our next step to make our program even better.

So, I believe it is *you*, the teacher, who makes all the difference in the world, especially when you are armed with great resources! The teacher is number one, but the textbook/program is a close second.

Speaking of great resources... As I write this, I am just returning from the NCTM Annual Meeting in New Orleans. What an energizing opportunity! I am so grateful that I am able to go. I think that it is imperative that I report to you (if you have not heard) that NCTM has released the publication, *Principles to Actions: Ensuring Mathematical Success for All*. In it, NCTM has tried "...to define and describe the principles and actions, including specific teaching practices, that are essential for a high-quality mathematics education for all students." It is intended to guide teachers, math coaches, administrators, parents, and policy makers in how "...to turn the opportunity of the Common Core

into reality in every classroom, school, and district." I attended three sessions at the conference given by the writers and I must say, I was impressed! Impressed by the vision, guidance, and research that is found within its covers. As Steven Leinwand, one of the writers and a Principal Research Analyst at the American Institutes for Research (AIR) in Washington, D.C., said at his session, "Read it. Annotate it. Cogitate on it. Read it again." It's just that important. For more information or to purchase a bound copy (\$23.16 for members) or e-copy (\$4.99), go to <http://www.nctm.org/principlestoactions/>.

Thank you all again! Have a strong end to your school year and recharge yourself over the summer!



NCTM President Linda Gojak and NHTM President Greg Superchi before the keynote address on March 17, 2014.

Photo by Rich Andrusiak

Secondary Representative

Reflections on a Good Year

By Michelle Fox-Bushaw

This month marks my first full year as a member of the NHTM Executive Board, serving as the Secondary Representative. As you all know, I was asked to finish out Greta Mills' term as the Secondary Rep when she moved out of state. I have really enjoyed my first year in this position. I have been able to meet and work with wonderful, inspiring, and dedicated teachers all over the state. I traveled to Washington, DC to attend the NCTM conference last summer, presented with Kim Knighton at the Dine and Discuss in Concord this fall, and helped organize the NHTM Spring Conference last month. This year has been a whirlwind of wonderful and, again, inspiring experiences, and I am thankful that I was elected to do two more years in this position. I am excited to see what the next year(s) will bring!

I am also thankful every day that I became a mathematics educator. I know, just like many of you, that teaching mathematics to young people is the reason we get out of bed in the morning! However, each and every week, I am also shocked to see that it is more and more acceptable in society to be bad at math. How are people supposed to know if they are being taken advantage of on a bill at a restaurant, or with change at a supermarket, or in any other kind of commercial situation? Why is it ok to bring up in everyday conversation "Oh – I am really bad at math" and you NEVER hear anyone say "Oh – I can't read"!?! Yikes!

As it is getting closer to the end of the school year, and graduation is just around the corner, I have been talking a lot with Seniors and their parents about the future plans of students. I really wish that more of our students would go to school for mathematics, engineering, or a scientific field, but so many kids don't want to put in the efforts needed to be successful in the tough courses that they will encounter in college. When did "just getting by" or "doing ok" become a norm? Eek!

With the Smarter Balanced Test and Performance Based Tasks looming over us for next year, and all of the rigor and perseverance we are going to expect from our students, I am excited but also leery as how future mathematics students are going to perform, and how hard they are going to work to meet and/or exceed the Common Core standards we are going to be holding them accountable to. Every year, I have students that just want to get by...and getting them to do any "real" thinking is like pulling teeth! And we wonder why less than 3% of the state has been proficient on the 11th grade NECAP exam every single year it has been given in the state of NH...Wow! However, I am still thankful for the majority of students that DO try and do a good job, even though the NECAP does not directly affect them. There are no consequences to the students if they do badly, and really no incentive if they do well – but thank goodness for the kids who do well or at least do their best because that is what they do!

I think we can all agree that we want our students to be productive, informed, intelligent members of society. If the students that are leaving high school are truly not prepared for college and are not getting what they need from public education to pursue the careers of the future, which most of which have not even been created yet – and that itself is scary – changes are inevitable. Therefore, I am ready to face the Common Core standards in my classroom next year along with the new challenges and changes that it will bring. Good luck everyone, and here's to a great next year!



Do you want to recognize your students' "Outstanding Achievement in Mathematics"?

*NHTM Student Achievement Certificates are available to any and all NHTM Members sent directly to you *free of charge.* Unfortunately, four certificates per school is the limit.*

Contact Michelle Fox at m_fox@sau58.org for more information or to order certificates for your school!



NHTM will hold a free STEM Summer Camp for immigrant and disadvantaged children (grades 3-6) from the Monadnock region from July 14-18. The camp will be held at Keene State College. The camp is designed to help children from these populations learn significant mathematical skills and provide a sound foundation for understanding mathematics at an early age.

Any child who attends a school (public or private) within the Monadnock region is eligible to attend. The camp is free for the children, but they must be recommended by their teachers.

For more information and/or a recommendation form, please contact Dr. Beverly J. Ferrucci by email at:

bferrucc@keene.edu.

Elementary Representative

NCTM and You

By Stephanie Wheeler

When was the last time you visited NCTM's *Illuminations* site? If it's been a while, explore www.illuminations.nctm.org. The site itself is very easy to navigate, it has tons of lessons and best of all it's free! Speaking professionally, I would encourage you to spend the money and join NCTM. Like NHTM's membership, an NCTM membership would connect you to exclusive resources, a network of math educators and math education expertise, as well as supporting you in your ongoing efforts to improve your own teaching – and your own learning – of mathematics. There are several options for memberships, so check it out at www.nctm.org.

The home page of *Illuminations* offers:

A *Featured Lesson Plan*

A *Featured Game*

An *In The Community* Story

A *Thinkfinity Resource*

However, the beauty of the *Illuminations* site is that you can search for lessons by NCTM strand or by the Common Core State Standard by grade (see the right side of the home page). For example, you could choose:

CC Math Standards – Grade 3 (and several options will pop up and you could choose)

Looking Back and Moving Forward

Under each lesson you choose, the following information is available:

Instructional Plan

Objectives and Standards

Materials

Assessments and Extensions

Questions and Reflection

Related Resources

You should also check out the *Interactives* tab at the top of the home page. There are several games/activities to use with students. While the games can be utilized to practice skills, NCTM designed the *Interactives* games/activities with the *Common Core's 8 Mathematical Practice Standards* in mind. The games are very engaging and promote perseverance through playing and solving!

While there are a myriad of sites, materials, lessons and games on line, it can be time consuming to find sites that are worthy of your time and energy. NCTM's *Illuminations* site is definitely one worth your time – so check it out. I would love to hear what you think!



One of many hands-on workshops at the NHTM Spring Conference.
Photo by Rich Andrusiak

Post-Secondary Representative

Summer Opportunities & Updates

By Rich Andrusiak

For my final column of the academic year, I asked our post-secondary institutions to submit summer opportunities and program updates.

Community College System of New Hampshire

Tuition will be decreasing throughout the Community College System of New Hampshire beginning fall semester 2014. The current in-state credit cost will drop from \$210 per credit hour to \$200 per credit hour. To read more, go here: <http://www.ccsnh.edu/tuition-news>.

Over the past two academic years many of the community colleges, including River Valley Community College, NHTI, Manchester Community College, and Nashua Community College have added degree programs that include concentrations in STEM fields such as mathematics, engineering, biological science, and physical science. The University System of NH and the Community College System of NH are working together to establish clear course equivalencies and future 2+2 agreements which will result in seamless transfer between the two institutions. To learn more about STEM studies at the community colleges, go to:

<http://www.ccsnh.edu/academics/stem-studies-science-technology-engineering-math>.

Plymouth State University

Plymouth State University is offering two graduate courses this summer.

Probability and Statistics with CCSS
3 credits

July 28 – August 1: Monday-Friday, 8:30 P.M. - 2:30 P.M.

Dr. Natalya Vinogradova

Topics in Algebra for Middle/Secondary School Teachers (Functions)
2 credits

August 4, 5, 11, 12, 18: 8:30 A.M. - 12:30 P.M.
Dr. John Donovan

Register at <http://www.plymouth.edu/graduate/>.

Rivier University

Rivier University in Nashua, NH announces the following Summer Graduate Courses for Mathematics Teachers 2014. All classes are held on the Rivier University campus in Nashua, NH. Visit www.rivier.edu for more information or to register. Please contact Dr. Terri Magnus at tmagnus@rivier.edu if you would like to learn more about these courses or the Masters of Arts in Teaching (M.A.T.) degree in Mathematics.

MA565A1 Concepts in Calculus (3 credits)

May 27 – July 3: Tuesdays/Thursdays 6:00 P.M. – 9:00 P.M.

The course requires preliminary knowledge of differentiating and integrating techniques and focuses on the conceptual aspects of calculus. It revisits the fundamental concepts of a function (defined in Cartesian, parametric, and polar systems), limit, derivative, tangency, definite and indefinite integrals, infinite sequences and series, and multivariable differentiation and integration. The concepts are viewed in the historical development; special attention is paid to the complementary impulses of mathematical precision and practical applicability.

Instructor: O. Chuyan

MA610AW2 Topics: Managing the Diverse Mathematics Classroom (3 credits)

July 7 - 11: Monday through Friday 8:30 A.M. – 4:00 P.M.

Teaching mathematics requires teachers to develop a classroom culture of mathematical discourse and support all students' development of mathematical understandings as they actively engage

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Captive audience at the Keynote Address and Award Presentations on March 17, 2014. Photo by Terri Magnus.

Post-Secondary Summer Opportunities & Updates

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with mathematical content. This course provides teachers with the tools necessary to both manage and facilitate learning in a diverse mathematics classroom. Topics include: developing a classroom culture that welcomes and thrives on student participation in mathematical reasoning; differentiating instruction to meet the diverse needs of learners; designing curriculum for student engagement; making effective use of instructional aides (and getting by without them); promoting students' personal and mathematical self-esteem; collaborating with students, families, and professionals to further student development, learning, and well-being; and promoting equity in the classroom.

Instructor: A. Gaffney

MA523AW2 Mathematical Patterns and Connections (3 credits)

July 14 - 18: Monday through Friday 8:30 A.M. – 4:00 P.M.

Mastering the transition from whole number computations to algebraic reasoning is a critical stage in mathematical development. In this course, students will delve deeper into a variety of mathematical topics including patterning,

symbolic notation, algebraic properties, signed numbers, rational numbers, real numbers, decimal expressions, geometry, proportional reasoning, problem solving, and quantitative reasoning. The emphasis will be on developing a deeper understanding of these concepts, exploring multiple approaches to problem solving, generating and identifying patterns, and recognizing the interconnectedness of mathematical topics.

Instructor: T. Magnus

University of New Hampshire

The UNH Department of Mathematics & Statistics will again be hosting its Masters of Science for Teachers in Mathematics Program. Designed primarily for teachers of secondary and middle school mathematics, this program provides a broader and deeper background in several areas of mathematics, including algebra, geometry and analysis.

Dates for this summer's program are June 26 - August 1, 2014. You do not need to matriculate into the degree program to take MST courses.

For more information, visit the MST website at www.math.unh.edu/graduate/teach.

An Application of Trigonometric Identities: Tuning a Musical Instrument
Rich Andrusiak, Post-Secondary Representative

In my Functions & Modeling II course (a college-algebra and trigonometry course) students are required to extend their classroom learning by completing two projects. The projects require written reports and classroom presentations which involve a Powerpoint, a Prezzi, or other similar presentation software. Students are required to make connections between mathematical ideas studied in the course and extend their learning to applications not directly studied in the class. Students choose from a variety of topics or propose their own topics. The following is a brief version of an activity illustrating a connection between trigonometric identities and music. I created the original project in 2002 when my high school students requested applications of trigonometric identities. Many students in that class were interested in music. The content credit is given to Dave Benson's on-line manuscript *Mathematics and Music* (2002). I modified the material making it accessible to a high school precalculus-level course or beginning college-level algebra and trigonometry course, and I integrated appropriate applets and technology to help illustrate the concepts. The project assumes no prior knowledge of music.

You can find the most recent version of Dave Benson's text at <http://homepages.abdn.ac.uk/mth192/pages/html/maths-music.html>.

Warm-up

Assume a car is moving forward at a certain speed. Next to the driver, between the driver's seat and passenger's seat, is a balloon filled with Helium. If the driver suddenly slams on his or her brakes will the balloon go forward, stay in the same position, or move backwards? Explain your reasoning.

Background

Air consists of molecules that are continuously in motion and colliding with each other. We might think that these air molecules should be pulled to the ground by gravity; however, the molecules do not travel very far before colliding and bouncing back up again. Thus, the effect of gravity can be seen as the difference of air pressure at different elevations. As you travel to higher elevations air pressure decreases. Sound is caused by vibrations of these air molecules resulting in waves of increased and decreased pressure. Playing a musical note results in increasing and decreasing air pressure, or the motion of molecules pressing toward and moving away from the source of the sound at regular intervals that repeat over time resulting in a function of the form

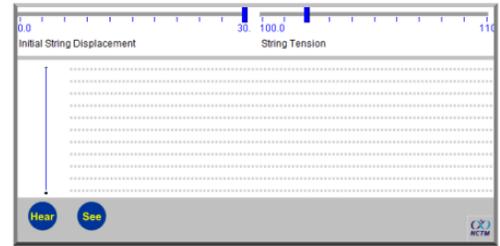
$$p(x) = A\sin(kx+c)$$

where p represent pressure, A represent amplitude or the "loudness" of the sound, period is $\frac{2\pi}{|k|}$ and c is the phase shift.

Applets

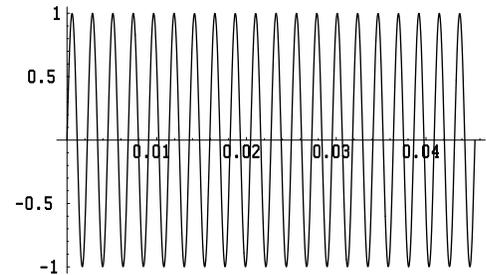
These two applets will help students explore sound waves.

<http://illuminations.nctm.org/ActivityDetail.aspx?id=37>
<http://illuminations.nctm.org/tools/soundsketch/index.html>



Focus Questions/Explorations

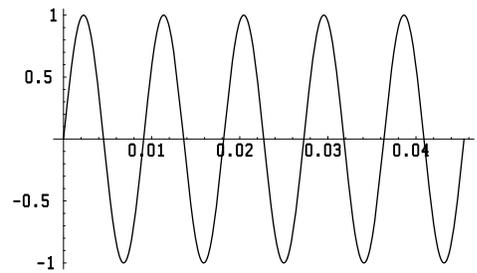
1. Explain the relationship between the period of a sinusoidal function and frequency. As the period of the function increases/decreases, what happens to the frequency of the function?
2. Determine the frequency of the A note above middle C. Create a sinusoidal function that models the A note above middle C and the A note two octaves lower. Graph both functions using the same scale and discuss how to visually determine which note has a higher frequency.



A Note above Middle C

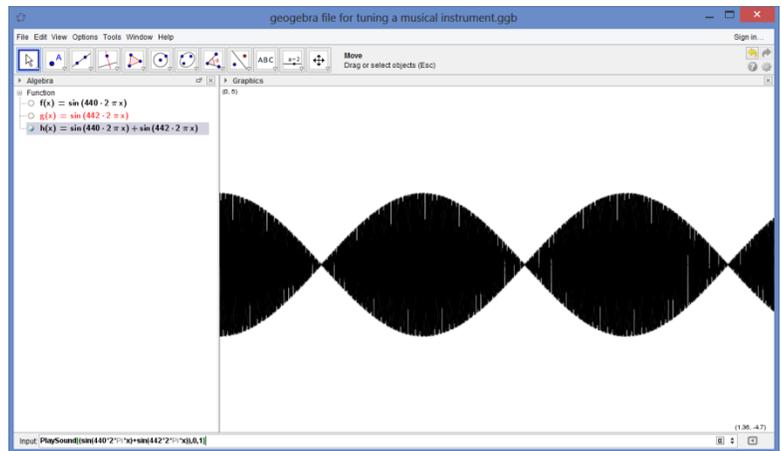
3. Use the PlaySound function in Geogebra to listen to the notes.

`PlaySound[function, xmin, xmax]`



A Note Two Octaves below Middle C

4. Suppose one instrument is in tune and playing the A note above middle C and one instrument is attempting to play the same A note above middle C but is playing a note which is 2 Hz greater than middle C (slightly sharp). Using Geogebra, play these two sounds individually. Can you determine which one is slightly sharp? Do you believe that people can correctly identify the sharp note at a proportion that is statistically significantly higher than guessing alone? [For students that have had a statistics course, this is a great opportunity to conduct an experiment and run a test of significance.]



5. Even a good musical ear has difficulty distinguishing such a small difference in frequency. Both notes, played independently, would appear to be the correct A note. However, played together, air pressure would be changing according to the function

$$f(x) = A_1 \sin(442 \cdot 2\pi x + c_1) + A_2 \sin(440 \cdot 2\pi x + c_2)$$

Assuming the amplitudes are 1 and the phase shifts are 0, use Geogebra to play this sound. What do you notice? Are the instruments in tune? How can you tell?

Trigonometric Identities

Verify the following identities:

$$\sin(A + B) = \sin(A) \cos(B) + \cos(A) \sin(B)$$

$$\sin(A - B) = \sin(A) \cos(B) - \cos(A) \sin(B)$$

$$\sin(A + B) + \sin(A - B) = 2 \sin(A) \cos(B)$$

$$\sin(x) + \sin(y) = 2 \sin\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$$

Assume that $A_1 = A_2$ in $f(x) = A_1 \sin(442 \cdot 2\pi x + c_1) + A_2 \sin(440 \cdot 2\pi x + c_2)$. Show that,

$$\begin{aligned} f(x) &= A_1 \sin(442 \cdot 2\pi x + c_1) + A_2 \sin(440 \cdot 2\pi x + c_2) \\ &= A_3 \sin(k_3 x + c_3) \quad , \text{ where } A_3 = 2A_1 \cos\left(\frac{(884\pi - 880\pi)x}{2} + \frac{c_1 - c_2}{2}\right), k_3 = \frac{884\pi + 880\pi}{2}, \text{ and } c_3 = \frac{c_1 + c_2}{2}. \end{aligned}$$

Explain why the combined effect of playing the two instruments together at the same time is a slightly sharp note that is the average of the two frequencies being played. Find the period, in seconds, of the function that describes the amplitude of combining both notes. Find the length of time between the maximum and minimum points of this amplitude function.

Since amplitude represents loudness, the maximum and minimum points tell us how often the “loud” moments should occur. Thus, if you play the two instruments together and one is slightly out of tune, you will hear a single note where the loudness warbles in and out. How often should these loud moments occur? Play the function in Geogebra and verify your calculations. Discuss how to tune your instrument based upon loud moments happening more or less frequently and the importance of playing the notes together rather than separately.

References

Benson, Dave. (2002). Mathematics and Music, Manuscript. Retrieved March 2002 from <http://homepages.abdn.ac.uk/mth192/pages/html/maths-music.html>.

Middle Levels Representative

Blogging into the Middle School Mathematics Classroom

By Katrina Hall

Not a day goes by in education without the mention of technology, 21st century teaching and learning, Web 2.0 or social media. Along with this chatter one cannot forget to note the rise of blogging. Blog use in education has grown considerably in the last decade, and the amount of research that has focused on the use of blogs in education is significant. Churchill (2009) notes that blogging can be effective educationally where “a teacher can create an ambience in which students feel themselves to be important parts of the classroom community” (Churchill, 2009, p. 183).

According to Scheidt (2009), blogging became popular after the opening of two commercial services, Livejournal.com and blogger.com, in 1999. A blog is simply a web-based journal in reverse chronological order, which allow users to create, publish and share information with others (Dyrud, Worley and Flatley, 2005; Richardson, 2006). Dyrud et al (2005) noted that there were over 4 million of these simple online journals on the worldwide web by 2004. As a result, doors were opened to the instructional, technical, ethical and organization criteria, which is necessary to content and pedagogy in the classroom (Papa, 2010).

Educational blogs range from school websites, class websites, class blogs, educator blogs, professional learning and for ePortfolios. Such blogs allow students to post text, share hyperlinks, images, and multimedia and to create an asynchronous location where readers can provide feedback, hold discussions, and foster a collaborative learning environment (West, 2008). When blogs are used, students are given opportunities to connect what is being learned in the classroom (Hungerford-Kresser, Wiggins and Amaro-Jiménez, 2011).

Read Write Think (2014) notes that teaching with blogs provides the opportunity to engage students and to share their writing with an authentic audience. When students blog their writing becomes an “integral part of a lively literacy community” (Read Write Think, 2014). More important is the transparency of learning, which occurs with blogging. Student bloggers, as with all bloggers, have the opportunity to write not just for their teachers but also for a global audience.

MacBride and Luehmann (2008) propose “the *realized* benefits of classroom blogs depended largely on how teachers choose to structure and use the blog” (p. 182). Simply using technology will not guarantee student engagement, learning or the effectiveness as a pedagogical tool. In looking to use blogging with students, teachers must maintain their focus on planning and decision-making as it relates to their goals and standards. Despite the flexibility and the literature, which share the benefits of blogging in the classroom, teacher awareness of student needs should remain the utmost priority. Macbride and Luehmann (2008) warn teachers “that the benefits purported in the literature will not be automatic” (p. 182).

Essential to student learning is student “buy-in.” Yang and Chang (2011) proposed dialogues in the form of blogging are associated with positive attitudes. Ellison and Wu (2008) conducted a study that investigated students’ attitudes toward blogging in the classroom and its effect on comprehension where the majority of the participants showed positive attitudes toward blogging.

Hossain and Quinn (2013) suggest that blogs be incorporated into middle school mathematics

Blogging in Middle School

education to improve teaching and learning of mathematics. Technologies such as blogs can be used widely and responsibly, with the goal of enriching students' learning of mathematics (NCTM, 2000). And with the average teenager using some form of digital media between 15 and 20 hours per day through "multitasking," or using several different types simultaneously, venturing into blogging in the middle school mathematics classroom might be a goal to set (Rosen, 2011). Are you willing to venture into the mathematical blogosphere?

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Results of the 42nd annual NHTM - PSU Contest

By Stephen Latvis

Our 42nd annual State Mathematics Contest is history finally. Thanks to all of the high school teams and advisors that made the trek to Plymouth State University for the competition. We had 55 schools registered that competed this year!

We extend our congratulations to our outstanding performers, to our winning teams and advisors in each division. High praise is due to Kellie Gabriel and her Nashua High School **South** team (from the Large school division) for their performance in achieving a score of 280 points out of a possible 432 points. Hollis-Brookline High School in the Intermediate school division earned a score of 255 points and Pinkerton Academy in the Large school division scored 254 points. Bravo! Five students achieved a perfect score of 36 points this year. – seniors Matt Correia (from Merrimack High School), John Zhang (from Nashua High School **South**), and Arch Patel (from Nashua High School **South**); junior Rebekah Terry (from Pinkerton Academy); and sophomore Adam DeMio (from Pinkerton Academy).

Our sincere thanks for the contributions all of you

made to the contest by performing your duties so well. Many of you did other tasks before, during, and after the contest that assisted in getting the details accomplished. Our special thanks to those who were able to accommodate our needs at the site – Prof. Shawn Hackshaw, PSU Math Dept, Jennifer Smith, Coordinator of Activities at the Hartman Union Building; to Donna Kelley and her team of question writers; to Kellie Gabriel for heading up registration; to the chairpersons of all the various duties on contest day – Jim Brizard, Ellen Berchtold, Greg Morris, Lorainne Mascioli, Sue Capano and Michelle Morton-Currit; to Dave and Barbara Kent for their guidance and support as I have assumed the reigns for the running of the state contest; to “team refreshments” for helping me with the food for the coaches; and to any others I may have missed who assisted myself and others attending to the small details on the day itself.

The final stats are still available online at <http://tinyurl.com/42statecontest>. Again, our sincere congratulations and thanks to all of you. We hope you are now planning to be present for our 43rd contest next spring.

2014 Top Scoring Teams

SMALL

Bishop Brady 248
 Portsmouth Christian 219
 Interlakes 204
 Newfound 169
 Hopkinton 153
 Belmont 150
 Raymond 125
 Trinity 124
 Wilton-Lyndeborough 106

INTERMEDIATE

Hollis Brookline 255
 Souhegan 228
 Plymouth 202
 ConVal 180
 Windham 176
 Milford 159
 Portsmouth 148
 Bishop Guertin 134
 Kingswood 131
 Pembroke 124
 Hanover 119

MEDIUM

Bow 166
 Oyster River 165
 Gilford 150
 Fall Mountain 145
 Kearsarge 138
 Campbell 132
 St. Thomas Aquinas 123
 Laconia 103

LARGE

Nashua South 280
 Pinkerton 254
 Bedford 250
 Salem 219
 Londonderry 212
 Dover 202
 Exeter 180
 Keene 158
 Timberlane 140
 Merrimack 137
 Concord 135
 Nashua North 121

Goffstown Teacher Wins Evans Award

2014 Richard C. Evans Distinguished Mathematics Educator Award Presentation

Good afternoon. My name is Stephanie Wheeler and I am here to present the Richard C. Evans Distinguished Mathematics Educator Award. The intent of this award is to highlight passion, creativity and innovation in the teaching of mathematics to all students. The recipient of this award will represent Dr. Evans philosophy, passion and knowledge of mathematics education.

Today's award recipient will receive \$500, a plaque, a one year membership to NHTM, become an honorary board member for one year, be invited to present at the spring conference, invited to contribute articles for the quarterly newsletter, and will be encouraged to offer professional development opportunities for mathematics educators with the support of NHTM.

Our sole finalist this year is a 7th grade math teacher and teacher leader for the Math Department at Mountain View Middle School in Goffstown. A parent writes on her behalf, "Some teachers try to make their students believe that math is fun, but Lynn's excitement, energy and genuine passion for mathematics was more than enough to inspire reluctant students like



Stephanie Wheeler presents the Richard C. Evans Distinguished Educator Award to Lynn Tassi.

Photo by Terri Magnus

our daughter. Math was 'cool' again because Ms. Tassi made it 'cool.'"

One of Lynn's colleagues writes, "Her interest in the students doesn't limit itself to their classroom performance; she understands that each student is multi-faceted and treats them as such. This allows her to connect with each student in ways that ultimately make them more receptive to the learning process. They demonstrate an ease and comfort level with Lynn that extends beyond the subject of math. Lynn appreciates the whole child, which is vital to being a successful middle school teacher. Lynn serves as an inspiration to me in my own approach to education on a daily basis. Her drive, professionalism, and philosophy for teaching have served as a strong motivation for me in my own career."

This sentiment is echoed by Lynn's Assistant Superintendent who writes, "Student centered and a firm believer that all students (adults and children) can learn, Lynn is able to meet the needs of all styles and levels of learners. Persistently advocating on behalf of each student,

Lynn maintains vigilant focus on the "whole child."

This year's recipient, like many past recipients, is a former student of Dr. Evans. In a letter to the award committee, Lynn writes, "Richard Evans was an inspiration for me when he was my college advisor and professor when I attended Plymouth State College. To be nominated for an award that carries his name is an amazing honor." It is now my honor to announce Lynn Tassi as the winner of the 2014 Richard C. Evans Distinguished Mathematics Educator Award.

Balomenos Award Recognizes Andrusiak's Service to NH Mathematics Education

Hello. My name is Christine Downing. Due to an unfortunate accident, I am not able to attend the conference this year in person.

As the most recent recipient of the Richard H. Balomenos award, it is my pleasure to explain the award and announce this year's recipient. I was truly honored and grateful to receive the award last year. Thank you to the New Hampshire Teachers of Mathematics.

The Richard H. Balomenos Memorial Award was established by the Executive Board of NH-ATMNE in 1987, to remember and honor a former colleague, educator, and friend. Richard Balomenos and his wife, Georgia, died tragically in an automobile accident in December 1986. As both teacher and administrator at the University of New Hampshire for almost 25 years, Richard had a profound influence on mathematics education in the state of New Hampshire. The award is presented annually to a New Hampshire mathematics educator who has shown outstanding or meritorious service or leadership to the mathematics education community on a statewide basis.

I will do my best to not give away too many clues for this year's recipient until the very end. It will be difficult because of the far reaching influence this person has had on mathematics education in the state of New Hampshire over the past 14 years. I am so pleased to be able to be part of announcing this year's recipient. This person has a passion for mathematics education at all levels. I have had the honor of witnessing this person in elementary, middle school, high school, and post-secondary classroom settings. Mathematics comes alive and real for all students who are lucky to have this person as an instructor.

Here are a few highlights of the service this year's recipient has given to mathematics education in the state of New Hampshire:

- High School Mathematics Teacher
- Instrumental in the development and implementation of the New Hampshire Curriculum Frameworks for Mathematics (known to many as the GLEs); as well as the multitude of GLE support materials that have enhanced mathematics instruction across the state



Alisa and Rich Andrusiak pose with the Balomenos Award plaque.

Photo by Greg Superchi

(Continued on page 18)

Andrusiak Presented with Balomenos Award

(Continued from page 17)

- Lead Mathematics Consultant on the NECAP collaboration for the NH Department of Education
- Committee member and post-secondary lead writer for the state of NH Numeracy Plan
- State coordinator and selection committee member for the Presidential Awards in Excellence for Mathematics and Science Teaching
- State lead on the revision of middle school and high school mathematics certification standards
- Member of the NH Community College System steering committee to create a threshold mathematics course that bridges high school mathematics with collegiate mathematics courses
- Writer for the state high school mathematics contest
- Software judge for the CODIE awards for Best Instructional Solution in the Mathematics category
- Writer and editor of mathematical units of study utilized by the Rhode Island Department of Education for professional development with its teachers
- Creator of many sample high school competencies and units
- Member and writer of the NH Alternative Assessment Learning Progressions – which bridge GLEs with alternative assessment standards
- Presented numerous workshops and sessions designed to clarify state standards in mathematics and enhance the content knowledge and pedagogy of mathematics educators throughout New Hampshire, as well as New England
- Leader in providing state feedback during the early drafts of the Common Core State Standards and NHTM's recent efforts to provide feedback to the New Hampshire Department of Education on mathematics standards for the minimum school approval standards
- Member of the NHTM board as NH DOE liaison, post-secondary representative, and current chair of the annual Fall Focus Dine and Discuss events
- Co-instructor of the Intel Mathematics program, which is an intense 80-hour professional learning experience for K-8 educators to enhance mathematical content and pedagogical knowledge, for the past three summers, and
- Current mathematics professor for one of NH's community colleges.

The list of accomplishments goes on and on. To quote from one of the nomination letters, "One only has to visit the NH DOE website and the mathematics curriculum home page to see the many projects and initiatives this person has either led or participated in that have helped to shape and guide kindergarten through post secondary educators across the state. This person is a dynamic, energetic, and passionate instructor for both adults and students. You will not find a more natural teacher. Students of all ages can only benefit and grow mathematically if they are fortunate enough to have this person as a Mathematics educator."

It is my sincere pleasure to present this year's Richard H. Balomenos Memorial award to my dear friend, colleague and mentor, Rich Andrusiak. Congratulations!

News Bytes: What's Happening in New England

- The Common Core State Standards site has been updated. Visit www.corestandards.org/math for suggestions on how to answer the many questions parents, friends, and colleagues may have about the new standards.
- Illustrative Mathematics is building a website <https://www.illustrativemathematics.org/> with tasks for addressing and assessing the CCSS Mathematics Standards.
- Check out the new temporary exhibit **2theXtreme: Math Alive!** opens May 25 at the Boston Museum of Science. The interactive and entertaining exhibit, sponsored by Raytheon, seeks to communicate the relevance of mathematics to today's society by demonstrating the mathematics behind video games, sports, design, music, entertainment, space, robotics, and more. Guest will be accompanied throughout their visit by math-loving virtual tour guides who will make the concepts fun and accessible to young visitors. Visit www.mos.org for more information.
- "Using TI-Nspire and TI-84 Plus (COLOR) Technology Effectively in Science/Math," a Super Saturday Mini-PD Event will be offered at the Massachusetts Academy of Math and Science on May 31, 2014 from 8:30-1:00. The event is aimed at middle- and high-school teachers and offers a choice of six sessions in each of two time blocks. The cost is \$25 and loaner calculators will be available during the workshop. Contact Jim Donatelli at 508-529-6787 or jdonatelli@ti.com for more information or to register.
- Lesley University announces their 2nd annual Summer Mathematics Institute, **Problem Solving Using the Structure of Mathematics**, with 6 sessions from each of the middle school and secondary grade bands over the course of the 3-day institute, July 29-31, 2014. Additional information at <http://www.lesley.edu/EventDetail.aspx?id=11530>.
- The American Statistical Association (ASA) announces two statistics workshops this summer in Boston to strengthen knowledge and teaching of data analysis and statistics in the middle and high school Common Core Standards and AP curriculum: **Meeting Within a Meeting (MWM) Statistics Workshop for Middle and High School Mathematics and Science Teachers**, August 5-6, 2014, and **Beyond AP Statistics**, August 6, 2014, in conjunction with the 2014 Joint Statistical Association Meetings. More information is available at <http://www.amstat.org/education/workshops.cfm>.
- New Hampshire Association for Supervision and Curriculum Development and Pinkerton Academy are co-sponsoring Teaching to the Common Core Standards for Mathematical Practice Institute, August 5-6, 8:30-3:00, at Pinkerton Academy. Training will be provided by Amy Lucenta and Bowen Kerins from the Educational Development Center (EDC) based in Waltham, MA. A middle school session and high school session are planned and graduate credit is available through Plymouth State University. For more information contact chrisharper@pinkertonacademy.org or [click here](#).
- NCTM is offering Interactive Institutes again this summer. *Connecting Number and Operations in the Classroom* is designed for teachers of grades PK-5 and runs July 10-12 in San Diego, *Algebra Readiness for Every Student* focuses on grades 6-8 and runs July 7-9 also in San Diego. High school teachers are invited to attend *Engaging Students in Learning: Mathematical Practices and Process Standards* in Chicago, July 31-August 2. The new publication *Principles to Actions* will be provided free of charge to all attendees. More information on all of these Interactive Institutes can be found at www.nctm.org/institutes/.

NCTM Representative **Principles to Actions Release**

By Annie Wallace

The 2014 Annual NCTM Meeting and Exposition was held in New Orleans in beautiful weather --- sunny, in the 70s and not muggy... Nice after our long, cold and damp winter. If you were not fortunate to attend and enjoy the warmth, many of the handouts are available online on the NCTM site (may need to be a member to access) at <http://www.nctm.org/conferences/content.aspx?id=26991> . Some of the sessions were also recorded.

The newest NCTM publication, written by a team chaired by Steve Leinwand, was released at this event: *Principles to Actions, Ensuring Mathematics Success for All*. This landmark publication was written to help define, describe and support the principles and actions, including specific teaching practices that are essential for a high-quality and effective mathematics education. It reminds us that although standards give clarity and direction, it is us, the teachers who teach. *Principles to Actions* is designed to provide the support one needs within the classroom, school and district to plan and implement the mathematical teaching practices to ensure lasting mathematical learning in all students.

Mathematics Teaching Practices
Establish mathematics goals to focus learning. Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.
Implement tasks that promote reasoning and problem solving. Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.
Use and connect mathematical representations. Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.
Facilitate meaningful mathematical discourse. Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.
Pose purposeful questions. Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.
Build procedural fluency from conceptual understanding. Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.
Support productive struggle in learning mathematics. Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.
Elicit and use evidence of student thinking. Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

Fig. 1. Mathematics Teaching Practices

From the Executive Summary of Principals to Action p.3 http://www.nctm.org/uploadedFiles/Standards_and_Focal_Points/Principles_to_Action/PtAExecutiveSummary.pdf

The executive summary, webinars, and a reflective study guide for Principals to Action may be found at <http://www.nctm.org/principlestoactions/>

(Continued on page 21)

NCTM News: Upcoming Conferences

(Continued from page 20)

Another announcement is that the NCTM website is in the process of being redesigned for easier use. Keep your eye out for the change as this will be released as a major redesign rather than fixes and modifications here and there.

News also announced is that beginning in 2020, the Annual Meeting and Exposition will move to the fall, hopefully allowing more people to participate and attend. The Regional Conferences will then be moved to the spring.

Information for Summer Interactive Institutes and Fall regional conferences are found at <http://www.nctm.org/conferences/default.aspx?id=52>. The 2014 Summer Interactive Institutes are a 2½ day immersive experience with breakout workshops. The focus in grades 6-8 is *Algebra Readiness* and for Pre-K-5 is *Connecting Number and Operations in the Classroom*. Both of these will be held in San Diego, CA in July. The high school focus is *Engaging all Students in Learning: Mathematical Practices and Process Standards* and will be held in Chicago, IL the end of July-Beginning of August. Having participated in one of these interactive institutes, I can say that they are very good and worthwhile as well as allowing you to not only meet colleagues from all of the United States, but also from Canada and from various countries from around the world!

Remember, that the 2015 Annual Meeting and Exposition will be held in our own backyard, in Boston, MA on 15 – 18 April. The theme for this event is *Effective Teaching to Ensure Mathematical Success for All*. Information, registration rates, a downloadable pdf poster and more may be found at <http://www.nctm.org/Boston/>.

From the desk of the Membership Chair...

As of May 2014 our membership is at 397. Thank you for your membership renewals!

	SY 13-14	SY 14-15	SY 15-16	SY 16-17+	NHJEM 2014	Up-to-date Total
Individual	212**	166	8	3	3	
Institutional	5					
Totals	217	166	8	3	3	397

** Includes 8
Honorary Life-
time Members

Congratulations to Judy Curran Buck and Roberta Kieronski who were the recipients of this year's Honorary Lifetime Memberships. Criteria for this recognition are posted on the web site. Congratulations also go out to Laurie Boswell and Connie Up-schulte who were the recipients of this year's NHTM 25 Year Math Educator Awards.

NHTM Board members also want to thank all of the individuals who made contributions to our scholarship fund. Those who made contributions at this year's Annual Spring Conference are listed below:

Rich Andrusiak, Cecile Carlton, Andrea Drake, Roberta Kieronski,

Robert Lukasiak, Teresa Magnus, Sharon McCrone, Stephanie Wheeler

We also thank those members who have donated anonymously or at other times during the year.

Gretchen Scruton

NHTM Membership Chair

Scenes from the NHTM Spring Conference

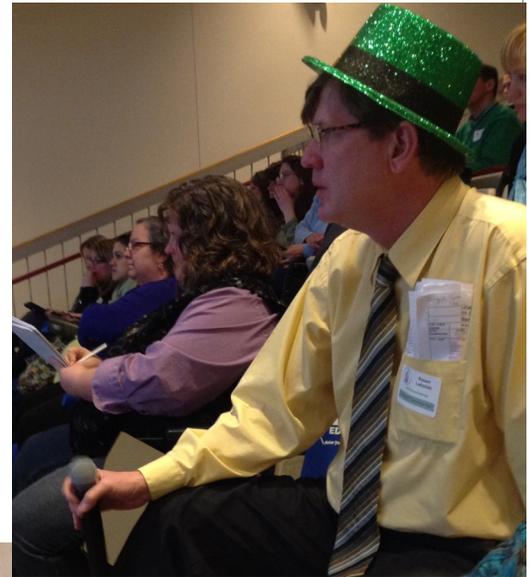


Conference Co-chairs Betty Erickson and Roberta Kieronski.

Photo by Terri Magnus

Rob Lukasiak in charge of the microphone at the Keynote Address.

Photo by T. Magnus



*The State of New Hampshire
By Her Excellency
Margaret Wood Hassan, Governor*

A Proclamation

**MATHEMATICS EDUCATION WEEK
MARCH 17-24, 2014**

WHEREAS, The state of New Hampshire recognizes mathematics education as crucial to the social welfare and economic growth of the state; and

WHEREAS, The mission of New Hampshire Teachers of Mathematics (NHTM) is to provide vision and leadership in improving the teaching and learning of mathematics so that each student is ensured quality mathematics education and each mathematics teacher is ensured the opportunity to grow professionally; and

WHEREAS, The New Hampshire Department of Education has approved the Elementary Mathematics Specialist certification; and

WHEREAS, The University System of New Hampshire has an initiative to double the number of science, technology, engineering, and mathematics graduates by 2025; and

WHEREAS, NHTM provides leadership in mathematics education through its many offerings such as the newsletter *Mathesis*, its Fall Dine & Discuss, and its annual Spring Conference; and

WHEREAS, NHTM grants financial support to future mathematics teachers by offering two scholarships annually; and

WHEREAS, NHTM recognizes leaders in mathematics education by awarding the Richard H. Balomenos Award, the Fernand J. Prevost Mathematics Teaching Award, and the Richard C. Evans Distinguished Mathematics Educator Award; and

WHEREAS, NHTM is a section of the Association of Teachers of Mathematics in New England and an affiliate of the National Council of Teachers of Mathematics, which helps educators stay connected to the professional circuit, and provides them with the opportunity to network with other mathematics educators and enhance mathematical, pedagogical, and content knowledge;

NOW, THEREFORE, I, MARGARET WOOD HASSAN, GOVERNOR of the State of New Hampshire, do hereby proclaim **MARCH 17-24, 2014**, as **MATHEMATICS EDUCATION WEEK** in the State of New Hampshire and encourage all residents to increase their mathematical knowledge and help students understand the importance of math skills and concepts.



Workshop attendees share their thoughts.

Photo by Rich Andrusiak



Given this 17th day of March, in the year of Our Lord two thousand and fourteen, and the independence of the United States of America, two hundred and thirty-eight.

Maggie Hassan
Margaret Wood Hassan
Governor

NHTM Executive Board

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Please visit <www.nhmathteachers.org> for more detailed Board information.

Professional Development and Conferences

National

MAA Mathfest	Portland OR	6 - 9 August 2014
AMATYC 40th Annual Conference	Nashville TN	13 - 16 November 2014
Joint Mathematics Meetings	San Antonio TX	10 - 13 January 2015
ICTCM 26th Annual Conference	Las Vegas NV	12 - 15 March 2015
T ³ Annual Conference	Ft. Worth TX	13 - 15 March 2015
NCSM 47th Annual Conference	Boston MA	13 - 15 April 2015
NCTM 92nd Annual Meeting & Exposition	Boston MA	15 - 18 April 2015

Regional

NCTM	Indianapolis IN	29 - 31 October 2014
NCTM	Richmond VA	12 - 14 November 2014
NCTM	Houston TX	19 - 21 November 2014

State

Christa McAuliffe Technology Conference	Manchester NH	2 - 4 December 2014
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Mathesis is the newsletter of the New Hampshire Teachers of Mathematics. It is published four times a year: August, November, February, and May. The mission of the New Hampshire Teachers of Mathematics shall be to provide vision and leadership in improving the teaching and learning of mathematics so that each student is ensured quality mathematics education and each teacher of mathematics is ensured the opportunity to grow professionally.