



# Mathesis

Volume 50, Issue 2

November 2017

## *President's Message* **Taking Care of Ourselves**

By Annie Wallace

Every Friday I come home and review the weekend to-do list that has been building during the week and add to it. It seems that most of what I have to do is school-related in one way or another and the list keeps getting longer, not shorter. Granted, much of this is because of what I create for myself or feel that I need to do, rather than have to do, but how many of us do this?



This past week's EdWeek Update had the headline *Educators Are More Stressed at Work Than Average People, Survey Finds*. This may not be a surprising idea when you think that along with family and home, we are balancing our students' well-being and learning, parent expectations and concerns; along with all of the district, administration, and local, state and federal expectations and initiatives. On top of that, the number of meetings we have seems to have grown exponentially and overtakes things such as our prep times or lunch. I find, as a group, we are also more likely to be perfectionists, caring about and trying to strive for the best for others and we tend to put ourselves at the bottom of the list. With quarters/trimesters ending, parent-teacher conferences, and the holidays all coming forth how can we keep ourselves healthy and well, both mentally and physically? How can we take the time for our own self-care, so that we can have more to offer others?

I know that I struggle to take time for myself, feeling that I am being negligent in my responsibilities. However, over time, I am slowly learning, the importance of stepping back, taking time "off" and in doing things, non-school related, with family and friends. I am learning to have 'me time' and 'time away from school things with colleagues and friends.

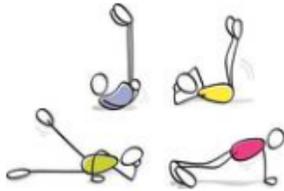
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## President's Message

### Taking Care of Ourselves

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I found that starting with time-away with others was less stressful than time-away alone. This may be just hanging out after the regular school hours with a colleague and talking about life and finding something to laugh about. Plan to have lunch or dinner with friend once a month and/or find a museum, concert, theatre production, or movie to see. Go to the gym, take a class/lessons in something that interests you. Whatever you decide to do, make time for yourself to enjoy others during the week. And find the time to laugh!

I found it much more difficult to incorporate the art of slowing down, relieving the pace and stress of day-to-day responsibilities, busyness, and the interconnectedness of today's world into my life. Too often my inner voice was saying "I'm too busy to make time for myself," or "I can't take time out --- I need to be productive." Starting small may help. I found that taking the time to read one chapter of a fiction book for pleasure each morning with my coffee and toast was a good start. No one else was up and it was quiet and peaceful. I was now finding the time to read for pleasure and it was a good way to start the day. Taking a walk, sitting in the sun watching the clouds or shutting the door and listening to music with your eyes closed, can also allow you a few moments of solitude. Solitude, the art of being alone with your thoughts, gives your brain a chance to wander, to plan, to reflect, to think deeply, and to get to know yourself a bit better. Being alone is not being lonely. We need that bit of solitude to recharge ourselves and to give ourselves time to filter through things.

So as the next part of the school year opens, the holiday season begins to build up steam and fall moves onto winter, remember that you don't need to try to find hours and hours of away from school stuff and alone time to help keep yourself physically and mentally healthy. Start off small and see what happens!



Stay Informed!



- NHTM New Hampshire  
Teachers of Mathematics



- @NHTM1964

## *Middle Level Representative* **Changing 50% in 5 Years**

By Katrina Hall

As I left the ATMNE Conference in November, I could not help but to reflect on the messages received throughout the day. The core of the messages asking math teachers to reflect on their teaching practices and to make what Steve Leinwand calls, “Tweaks” to the ways in which teachers are exposing students to mathematics.

A quick “Tweak” is to look at the homework that is being assigned. As controversial as the topic of homework is Leinwand did not suggest the elimination of homework but instead a restructuring of homework. Consider enveloping a spiraling of topics into your homework assignments in the manner of “2-4-2.” Two problems are based on the new skills, 4 problems are cumulative review and 2 problems asking students to explain, reason and/or justify. Post answers at the start of the next class, providing students time to discuss, and then allow for a whole class discussion on the problems, which continue to be a struggle.

A second “Tweak” is the inclusion of formative assessments at the end of each class. The reminder being that formative assessments are not to be graded by the teacher but are used to drive instruction. Review student understanding, misunderstanding or misconceptions. Organize the data and use that to start the next class. Don’t be afraid to let students know that the lesson is being driven by their feedback. It is okay to empower the

A third “Tweak” that was mentioned throughout the conference and by numerous presenters was modifying the traditional textbook questions to allow for wonder in the classroom. For example, a question from a textbook may state that

The golf team went to their meet in a neighboring city. They took 4 cars and 3 mini-vans. There were 2 people in each car and 5 people in each van. How many people went on the trip?

There is no sense of wonder deriving from such problems. Revise that traditional word problem. For example change the problem to “A car holds 2 people and a van holds 5 people.” and ask students “What do you wonder?” Ask students to write a good math question using this information and share these problems with the class. Ask students what the question may have been that created this as a response. Empower the students in mathematical discourse that goes beyond the teacher as the leader.

A final “Tweak” that hit home for me, but certainly not the last of all “Tweaks” suggested throughout the day, was that of infusing technology into the math classroom. Consider how to use Google as a tool and don’t forbid its use in the classroom. Why make students focus on computational skills when those results can be easily found on Google? Push students beyond “number crunching” and look for ways to promote problem solving in the classroom. Secondly, consider how you can use Twitter to display the thinking of students. Make Twitter a platform for celebration for students and yourself as well as a tool for networking with other

students in their learning progression.

## *Middle Level Representative* **Changing 50% in 5 Years**

(CONTINUED FROM PAGE 3)

Extend the mathematical experiences beyond the four walls of the classroom to the cyber world, so we can all learn from each other.

professionals.

From the thoughts of Leinwand, "It is unreasonable to ask a professional to change much more than 10% a year, but it is unprofessional to change by much less than 10% a year." To mathematicians this means considering a change of approximately 6 minutes in a lesson, 18 days or one unit in a year. Even more impressive is that this is approximately 50% in 5 years. How will your approach this challenge of professionalism?

## *Secondary Representative* **Why Join NCTM?...Why Not!**

By Lesley Fallu

Several times in the last month I have been involved in conversations regarding membership in various mathematical professional organizations. The current mind set of some colleagues is that they will join if there is a need to join. For example, if there is a conference in town, membership increases. I am of the opposite opinion that there is no reason not to maintain membership in both the state and national organizations. Today, I'll focus on the national.

The biggest complaint that I hear is that teachers do not have enough time to research, plan and implement new lessons and strategies that will engage their students. I was feeling the same pressure when I decided to take a break and read this month's issue of *Mathematics Teacher* (Volume 111, No.2, October 2017). It just so happened that every featured article contained information or lessons I could immediately use. I didn't have to search through multitude of sites bookmarked on my computer to find and modify new material.

Take a look at these articles:

- "Semiregular Tessellations with Pattern Blocks," Debananda Chakraborty and Gunhan Caglayan. This is an easy fit into any geometry course and can be modified for all levels. They have included a series of problems for the students to solve. (pages 90-94)
- "An Emoji Is Worth A Thousand Variables," Tom McCaffrey and Percival G Matthews, offers some great ideas for emoji math for representing systems of equations in an Algebra I class. (pages 96 – 102)

## *Secondary Representative* **Why Join NCTM?...Why Not!**

(CONTINUED FROM PAGE 4)

- Calculus in Your Career: “Putting the ‘Relate’ Back in Related Rates,” Christina W. Lommatsch. The article focuses on having students do a related rates project as if they were actually presenting at a professional conference. The author requires the projects to include research, design, an oral presentation, and a technical report. My related rates project is a bit different, but I may use her method of presentation. (pages 112-118)
- In “Rethinking the Order of Operations,” author Jason Taff replaces PEMDAS with iTAFF (identify terms and factors first). It’s an interesting article examining the shortcomings of Dear Aunt Sally, offering a different approach to simplifying expressions, focusing on the structure of the expression rather than just a list of operations. (pages 126-132)
- In the Technology Tips section on pages 144-148, Jennifer Brady and Sharon Sterken, describe inserting a photograph into either GeoGebra or Desmos, and fitting a polynomial function to fit part of the image in the picture. Finding real-life objects which fit a polynomial model is not something the students see regularly. Their example, in “Polynomials on Pictures with Different Platforms,” of fitting a fourth degree polynomial to the shape of a dogs ears was an unusual approach. Students and teachers love Desmos. This is just one more way to use it.
- Finally, the last article in the publication, “Using Optimization to Redesign a Cylindrical Can Project,” Louis Lim describes a calculus lesson in which students use calculus to create a “better” cylindrical package for a product each has chosen. The project requires that they calculate the cylinder requiring the minimum surface area, and hence packaging, for a given volume. Students must develop their model and communicate their findings to the packaging company in the form of a business letter. (page 160)

All of the publications are available to members online at <http://www.nctm.org/>. In one monthly publication, I have engaging lessons to present as well as current issues to discuss at our PLC meetings. I haven’t even mentioned that the problems in the monthly calendar are great in any class. If the membership fee is the issue, I’d say that I got a great return for my membership fee in just one month. So why join NCTM? I have to say, “Why not?”

### **SAVE THE DATE:**

**When: April 7, 2018 - Math and Science Joint Annual Conference.**

**Who: NHTM and NHSTA (NH math and science professional organizations)**

**Where: Pinkerton Academy**

**Theme: Modeling**

**Consider: Presenting with a colleague or alone**  
*stay tuned for how to submit proposals!*



## *Middle Level Representative* **10% Change with a Tweak**

By Katrina Hall

Display one of the following images or statements for students.

There are a multitude of options. You choose but here is a suggestion. 😊

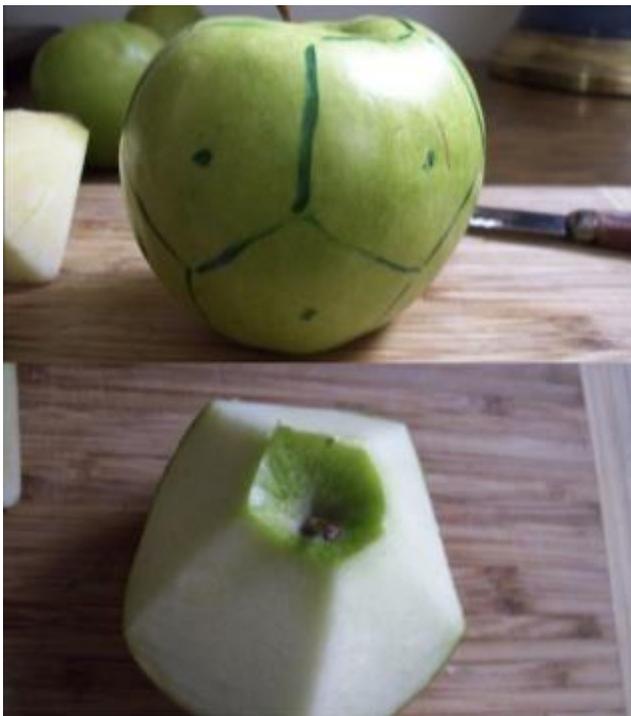
- Ask students to write one mathematical question that could be written from the information and to find the answer to the question.
- Ask students to write one mathematical question that could be answered from the information.
- In groups, ask students to share their questions and require students to answer their classmates' mathematical questions.
- Ask the groups to choose the best question to share with the class.

Consider ways in which you can use these examples to get students to wonder.

### **Examples**

The recommended daily calcium intake for a 20-year-old is 1,000 milligrams (mg).

By the age of 66 most people will have shed 100 pounds of skin.



## *Post-Secondary Representative* **Empowering Mathematically Competent Students**

By Sharon McCrone

About 40 NH mathematics teachers gathered at the Kimball-Jenkins Estate in Concord, NH on the evening of October 10 for the NHTM Annual Fall Dine-and-Discuss. This year the keynote speaker was Dr. Robert Q. Berry III, President-elect of NCTM and Associate Professor of Mathematics Education at the University of Virginia.



Dr. Berry started the evening by sharing news about upcoming changes to NCTM, such as the new myNCTM member portal, tiered membership options, and the “soon to be released” document *Catalyzing Change in High School Mathematics* edited by NH’s own Dr. Karen Graham. The main event came next, with the keynote address on “Using Tasks and Discourse to Position Students as Mathematically Competent.”

The notion of positioning students as mathematically competent speaks to the issues of access, equity and empowerment. Dr. Berry challenged us to create structures in our mathematics classrooms to allow students to position themselves as competent. One suggestion was to implement the Eight Mathematics Teaching Practices outlined in NCTM’s *Principles to Actions*. Within those eight, a few were highlighted as important to achieving the goals described by Dr. Berry. For instance, the practice of “implement[ing] tasks that promote reasoning and problem solving” can be seen as a way to help students build their mathematical identity. In addition, when teachers “facilitate meaningful mathematical discourse” by “elic[it] and us[ing] evidence of student thinking” they can help to support the development of students’ mathematical identities and position students as mathematically competent.

It is sometimes the case that teachers are reluctant to choose tasks that might be a struggle for students, as students can get discouraged and come to believe that they are not capable of doing mathematics. This can have a negative effect on students’ developing mathematical identities. However, I hope we all agree that worthwhile mathematics will not always be easy, and productive struggle is an important component of learning mathematics. So how do we introduce powerful mathematics, or high cognitive-demand tasks for which all students will have access, and that will engage all students as doers of mathematics?

## *Post-Secondary Representative* **Empowering Mathematically Competent Students**

(CONTINUED FROM PAGE 7)

Dr. Berry introduced the idea of making the task a social activity through noticing and wondering. If we invite students to tell us what they notice about a situation, and if we allow them to work in groups of peers, we lower the risk (of being wrong, of not knowing how to do the problem, etc.) and students will be more likely to engage with the task. One example that participants experienced at the workshop was an image of a cell phone lock screen. We noticed the time, the date, an alarm was set, battery level was low, the battery was being charged, and much more. We wondered who the owner might be, where they might be going, and how long it would take the charge the battery. That's where the mathematics came in. With a bit more information, we began to create a function to model the charging battery. Or so we thought... until more information was provided that showed us our linear model was not correct, that perhaps a logarithmic model was more appropriate. Powerful mathematics! And we were willing to engage because we wanted to answer questions that arose from our own curiosity!



Overall, the conversation at the Dine-and-Discuss was rich. Many questions were asked and many ideas were sparked. Let's continue the conversation to:

- Seek ways to engage students with powerful mathematics;
- Challenge ourselves to find ways for our students to see themselves as mathematically competent;
- Take another look at the Eight Mathematics Teaching Practices and take steps to implement one or two or more.



**NCTM ANNUAL MEETING  
& EXPOSITION 2018**  
April 25-28 | Washington, DC

PREMIER MATH EDUCATION EVENT

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Mathematics Community*

Learn more at [nctm.org/annual](http://nctm.org/annual) #NCTMannual



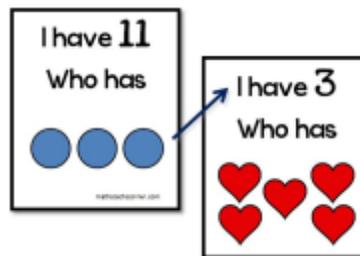
## *Elementary Representative* Number Sense in the Early Elementary Grades

By Amy Gregoire

In honor of the 50<sup>th</sup> Volume of the Mathesis, I got to thinking about the importance of the numbers 5 and 10. We all know that 5 times 10 is 50, but the foundation for that understanding goes all the way back to our early elementary years. According to the Common Core State Standards by the end of kindergarten students should be able to find the number that makes 10 when added to the given number, for any number from 1 to 9. In addition, they should be able to fluently add and subtract within 5.

Hands on activities are wonderful ways in which to develop a sense of number. Students can make bracelets with different colored beads or use linking cubes of two different colors to show how two quantities combine together to create a new amount. One of the many steps in developing strong number sense is by subitizing. Subitizing is the ability to identify a small amount of objects and know how many there are without counting. The Common Core State Standards state that by the end of kindergarten students should be able to recognize instantly the quantity of a small group of objects in organized and random arrangements. By the end of first grade, students should recognize instantly the quantity of structured arrangements. Playing cards, dice, and five and ten frames are great ways to practice visualizing numbers. The game I Have Who Has is always a fun way to get all of your students involved. Here is a fun version of this from the Math Coach's Corner, which helps students with subitizing.

<https://www.teacherspayteachers.com/Product/Subitizing-to-12-I-HaveWho-Has-and-Ten-Frame-Flash-2338496>



**HAPPY 50<sup>TH</sup>!**

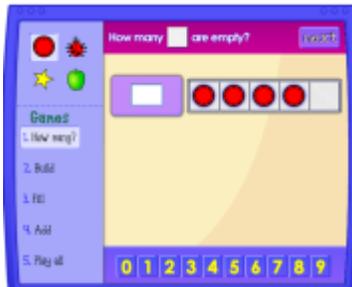
Have an answer to the following problem? E-mail your solution to [Annie Wallace](#), NHTM President, by January 1<sup>st</sup>.

*The first issue of the Mathesis was published in 1967. Using these digits (1, 9, 6, and 7), can you make the number 50? How many ways can you find?*

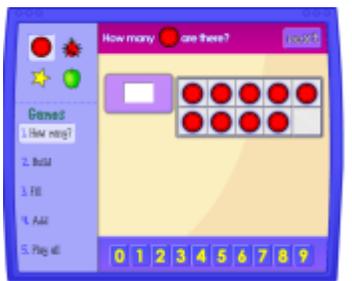
## *Elementary Representative* Number Sense in the Early Elementary Grades

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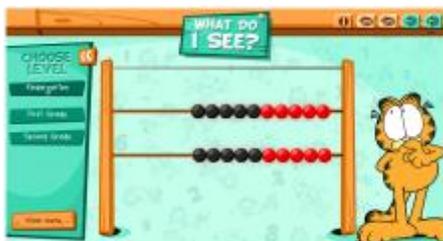
In addition, I thought I would share some online resources that can help our young students develop number sense. NCTM's Illuminations has some great online tools. They have both a five frame and ten frame activity. The five frame can be found at <http://illuminations.nctm.org/Activity.aspx?id=3564>



The ten frame tool can be found at <http://illuminations.nctm.org/Activity.aspx?id=3565>



Professor Garfield has a nice interactive rekenrek for students, which has various levels for students in kindergarten through second grade. This can be found at <http://www.professorgarfield.org/yourfuture/math.html>.

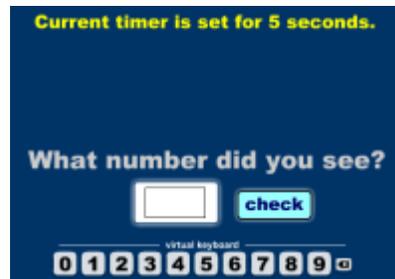


## *Elementary Representative* Number Sense in the Early Elementary Grades

(CONTINUED FROM PAGE 10)

Finally, there is a self-correcting tool, which helps students check to see if they were able to correctly identify the given amount.

<http://www.coolkindergarten.com/math/subitizing-adding/>



I hope you will find these resources helpful to you as you work with your students.

### *Art's Attic* Einstein's Tip

By Art Johnson

Not all events in the history of mathematics are eventful, life-changing happenings. Recently a small event from the life of Albert Einstein came to light.

In 1922 Einstein was traveling from Europe to Japan where he was to deliver a series of paid lectures. While en route, he received word that he had at last won the Nobel Prize for physics. The news of the award and Einstein's arrival in Japan spread quickly. Thousands lined his travel route to catch a glimpse of the world famous Nobel Laureate.

While sheltered in the Imperial Hotel in Tokyo, he received a delivery message to his room. Einstein had no small change to tip the messenger, so he wrote two small notes and handed them to the messenger. "If you are lucky, the notes themselves will be worth more than some spare change".



Writing in German on the hotel's stationery, Einstein penned "A calm and modest life brings more happiness than the pursuit of success combined with constant restlessness". The other note said, "Where there's a will, there's a way".

## *Art's Attic* **Einstein's Tip**

(CONTINUED FROM PAGE 11)

Einstein's first talk drew a paying audience of 2500. Even more people thronged the Imperial Palace when Einstein met the emperor and empress. More crowds followed him throughout his stay in Japan. Hardly the 'calm and modest life' he wrote in his note.

What about those notes? Did the messenger make up for the lost tip?

You could say that. This past October the notes sold at auction for 1.8 million dollars!

### **NHTM Scholarships – Picture of Maria Aiello, Recipient of College Scholarship – Announced in the August Mathesis**



### **46th Annual NHTM/PSU Mathematics Contest**

Contest date will be Tuesday, March 20th, 2018 (with a snow date of Wednesday, March 21st, 2018). Registration information will be e-mailed out sometime in early to mid-December. If you have any questions feel free to contact the State Mathematics Contest coordinator - Stephen Latvis - at his school e-mail address of [slatvis@windhamsd.org](mailto:slatvis@windhamsd.org)

## From the Archives--

June, 1994

# MATHesis

NEW HAMPSHIRE • ASSOCIATION of TEACHERS of MATHEMATICS in NEW ENGLAND

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### President's Column

Jim Roman

Recently the principal at my school initiated a conversation on the issue of rigor. The intent was to encourage teachers to reflect on their curriculum and teaching after 12 months at a new high school. While the focus was on all subject areas, I felt that mathematics had a unique perspective caused by the current reform movement at local, state, and national levels. Do you ever think that "rigor" in mathematics is at risk? Is there a perception that suggested changes in curriculum and assessment policies are issues threatening the implementation of the Standards?

I wonder if a rigorous curriculum is easy to define. In schools that are moving toward a performance-based curriculum can we really be overly concerned about rigor? It seems to me that the issue is to clearly identify which outcomes we value and then to provide students with the necessary skills to demonstrate proficiency. I believe that we have begun to provide significant opportunities for students to construct their mathematics. Reasoning, communication, problem solving, and connections are the cornerstones of this reform movement. In my opinion, rigor will naturally follow. The danger lies in emphasizing rigor for its own sake and that is what many traditional schools do.

What are the indicators of a rigorous curriculum? Is it the number of students who are accepted to very competitive colleges? Is it the number of failures we have at the end of the year? Is it the amount of homework each student

brings home each night? These certainly have been issues in the past when I wondered if my students were being challenged in their failures. Then I would remember that I had other responsibilities as well. I recognized the importance of students developing their skills of communication and working with others. This expectation does not always coincide with the traditional school's view of rigor.

Do teachers, students, parents, and administrators have the same perception of rigor? Clearly we have heard some parents and some students indicate the need for more challenges. Perhaps there is a need to "beef up" some curriculum areas and perhaps there is a need to encourage our students to accept the personal challenges that are available to them. However, I am confident that the policy of "mathematics for all" coupled with the movement away from tracking will cause some students to be challenged beyond all expectations in a traditional school.

Mathematics reform is not a simple venture. The need for rigor is obvious in all schools. The difference is this reform movement is not typical, we do not want it to be typical, and we have much to do in order to insure it does not become typical. The issues related to developing a new society of learners are complex and need insightful leadership. Focused discussion generates ideas and solutions. Starting with your colleagues is an essential step in the reform process. Let's talk.

8

A · T · M · N · E Fall Conference

**"RIDING THE WAVE  
OF THE FUTURE"**

Burlington, VT  
October 20-22, 1994

**ASSOCIATION OF TEACHERS OF  
MATHEMATICS IN NEW ENGLAND**



**Remember:**

- **Scholarships** - encourage students to apply for the [\*NHTM Mathematics Education Major, Mathematics Major, and Elementary Education Scholarship \(College Student\)\*](#)

And the [\*NHTM Mathematics Education Major, Mathematics Major, and Elementary Education Scholarship \(High School Student\)\*](#)

- **Awards** - nominate yourself or a colleague for the [\*Richard C. Evans Distinguished Mathematics Educator Award\*](#) (5+ years experience) or the [\*Fernand J. Prevost Mathematics Teaching Award\*](#) (1<sup>st</sup> - 5<sup>th</sup> year teaching)
- **Also consider nominating** a friend or colleague who has shown outstanding or meritorious service or leadership to the mathematics education community on a statewide basis for the [\*Richard H. Balomenos Memorial Award\*](#)

## NHTM Executive Board

<http://www.nhmathteachers.org/page-1715832>

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## Professional Development & Conferences

### National

NCTM Regional Conference	Chicago, IL	November 29- December 1, 2017
NCTM Innov8 Conference	Las Vegas, NV	November 15-17, 2017
NCTM Annual Meeting	Washington, DC	April 25-28, 2018

### State

Math & Science Joint Conference	Derry, NH	April 7, 2018
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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.



### Upcoming Deadlines

- Information for November Mathesis- January 22<sup>nd</sup>
- Nominations for NHTM Awards
  - Balomenos- January 1<sup>st</sup>
  - Evans- December 15<sup>th</sup>
  - Provost- December 15<sup>th</sup>