ISSN 1481-7799 **Spring/Summer 2023**

President's Message

I'm delighted to be the incoming president of the NS Mathematics Teachers Association. I have been involved with the MTA for the past six years in numerous capacities including producing this newsletter. I look forward to working alongside the MTA executive to support NS mathematics educators at all levels and advocating for a robust and innovative mathematics curriculum.

The MTA executive is an amazing group of people who work hard to ensure our annual MTA conference is inspiring and informative. We have a great conference shaping up for October 2023. Information about the conference and our keynote speakers can be found in this newsletter.

I want to make sure that our association is inclusive and welcoming to everyone. We all have something unique to contribute, and I'm excited to hear your ideas and perspectives.

Erick Lee, President
Mathematics Teachers Association

Message du président

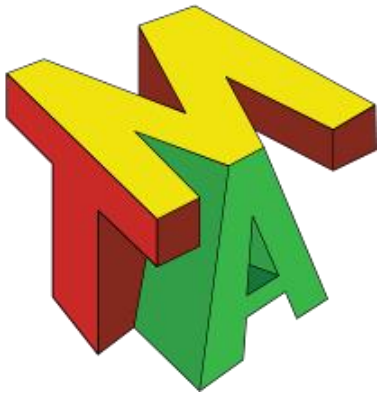
Je suis ravi d'être le nouveau président de la NS Mathematics Teachers Association (MTA). Au cours des six dernières années, j'ai été impliqué avec l'association à travers de nombreuses capacités, y compris la production de cet infolettre. J'ai hâte de travailler avec les membres du Comité Exécutif de la MTA pour soutenir le personnel enseignant de mathématiques de la Nouvelle-Écosse à tous les niveaux et de favoriser un programme de mathématiques solide et innovant.

Les membres du Comité Exécutif de la MTA forment un incroyable groupe de personnes qui travaillent dur pour s'assurer que notre conférence annuelle soit inspirante et informative. Nous préparons une excellente conférence pour le mois d'octobre 2023. Vous pouvez trouver plus d'informations sur la conférence et sur nos conférenciers principaux dans cet infolettre.

Je veux m'assurer que notre association soit inclusive et accueillante pour tout le monde. Nous avons chacun quelque chose d'unique à contribuer, et j'ai hâte d'écouter vos idées et vos points de vue.

Erick Lee, Président
Mathematics Teachers Association

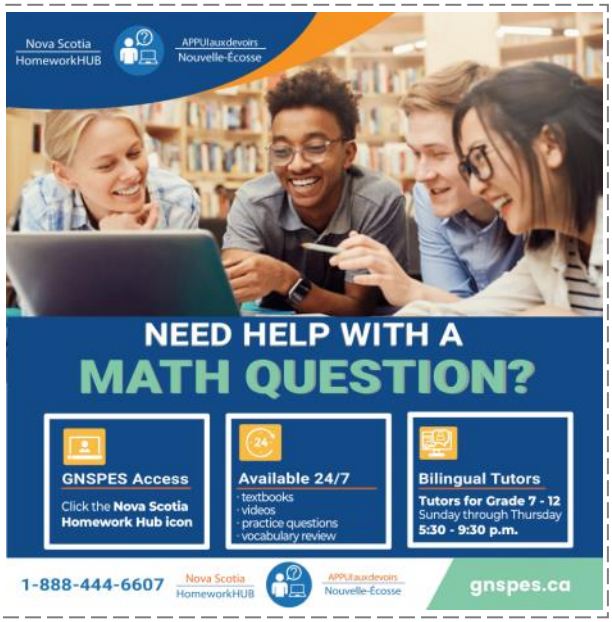
In This Issue



Math in the News and Around the Web

Nova Scotia Homework Hub — The homework hub is a place where students from grades 4 through 12 can get free one-on-one live virtual tutoring from licensed Nova Scotia educators. Live tutoring is available for grades 7 though 12 from Sunday to Thursday between 5:30pm and 9:30pm. For grades 4 through 6 tutoring is available from Monday to Wednesday between 5:30pm and 6:30pm.

In addition to live tutoring, students can also access a variety of helpful resources including videos, practice questions and e-texts. Students and teachers can access the Homework Hub by looking for the Homework Hub icon on their gnspes.ca landing page.



Digits and All Ten — Digits (https://www.nytimes.com/games/digits) is a free online mathematics puzzle from the New York Times. Similar to Wordle, this puzzle posts a new challenge each day. This game is currently in beta testing. In each of a series of puzzles, users have to create an expression to get as close as possible to a target number using 6 different positive integers and the four basic arithmetic operations.

Another new daily math puzzle is All Ten (https://beastacademy.com/all-ten) from the Art of Problem Solving Beast Academy. In this game, users are given four different numbers between 1 and 9. From this collection of numbers, your challenge is to create an expression equal to each of the different integers from 1 to 10.

Both of these are great ways to play around with math and explore mental math and order of operations.

Bridges Math Art 2023 in Halifax — The Bridges conference will be held at Dalhousie University on 27–31 July, 2023 (check out https://www.bridgesmathart.org/b2023/). The goal of the Bridges Organization is to foster interest in mathematical connections to art, music, architecture, and culture.

The annual Bridges conference brings together a wide range of people with a variety of backgrounds interested in the intersection of mathematics, science, art and culture.

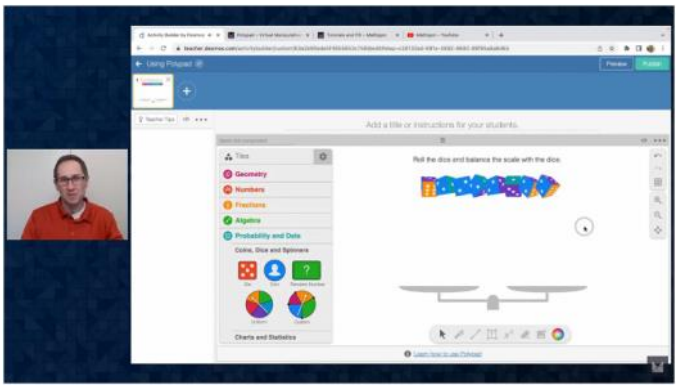
Art that has been submitted in previous conferences can be viewed at the Bridges website at: http://gallery.bridgesmathart.org/

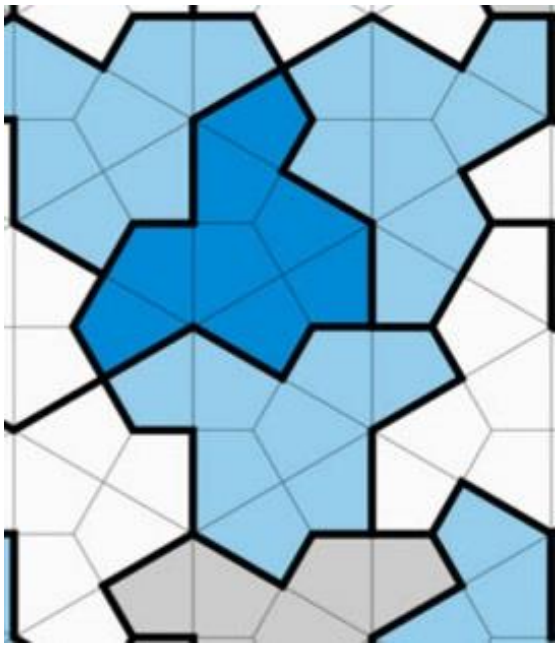
Math in the News and Around the Web

Wipebook Notebook Sweepstakes — Are you a fan of Wipebook workbooks and notebooks? Well, here is your chance to win these resources from the MTA. We have ten sets of a mini Wipebook notebook and several Wipebook student workbooks to give away. If you're a Nova Scotia public school educator, you're eligible to win. Just enter your name and regional centre in the Google Form below. We'll randomly select winners from across the province and send you these materials to use in your classroom.

Submission form: https://forms.gle/68GBbkJzKV9Xt38S8

Desmos and Mathigon Polypad! -- Did you know that you can insert a Mathigon Polypad canvas into a Desmos Activity? Desmos activities are customizable interactive online mathematics activities for students. Polypad is a platform for digital online virtual manipulatives. Now students can use all of the virtual manipulatives from Polypad inside a Desmos activity. Want to learn how? In this 6 minute long #PolypadPointer video, David Poras walks you through the steps to create a custom Desmos activity incorporating Polypad manipulatives. Watch the video at https://www.youtube.com/watch?v=0INrIRRmf34 . You can check out all the #PolypadPointer videos at https://www.youtube.com/playlist?list=PLzsOU-Y-kOkJMemcFtVErw49Y0NujfHTT





An Aperiodic Monotile -- On March 20, David Smith and University of Waterloo computer science professor Craig S. Kaplan, together with software developer Joseph Myers and mathematician Chaim Goodman-Strauss , announced that they had discovered a shape that mathematicians have been seeking for more than five decades. This shape was an "aperiodic" monotile: a single tile whose copies can fill the entire plane, but only in patterns that don't consist of a repeating block of tiles. The story of how this shape was discovered can be read at: https://uwaterloo.ca/news/mathematics/trick-hat

Want your own printable tile? Check out this page for printable pdf pages.

MTA Provincial Conference—Friday, Oct. 27, 2023

Keynote Speaker—Nat Banting

Nat Banting is a classroom mathematics teacher with Saskatoon Public Schools who blogs about teaching math at nat-banting.com/blog and tweets as @NatBanting. He also enjoys working as a lecturer in math education programs at St. FX University and the University of Saskatchewan. Recently, he received a 2021 Prime Minister's Certificate of Excellence in STEM, and in 2019 the Fields Institute for Research in Mathematical Sciences awarded him the 2019 Margaret Sinclair Memorial Award recognizing innovation and excellence across Canadian mathematics education. When he is not working in math education, you can usually find Nat spending time with his kids, on his gravel bike, or in a rink coaching young goaltenders.

Keynote Speaker—Dr. Lisa Lunney Borden

Lisa Lunney Borden is a professor of mathematics education at St. Francis Xavier University in Canada and holds the John Jerome Paul Chair for Equity in Mathematics Education. For over 30 years, She has worked alongside Mi'kmaw communities aiming to decolonize education and centre Indigenous knowledge systems. Having taught 7-12 mathematics in a Mi'kmaw community, she credits her students and the community for helping her to think differently about mathematics teaching and learning. She is committed to research and outreach that focuses on decolonizing mathematics and STEM/STEAM education through culturally based practices and experiences that are rooted in Indigenous languages and knowledge systems. Lisa teaches courses in mathematics education and Indigenous education.

Locaction -- The MTA would like to thank Charles P. Allen High School in Bedford for once again hosting our 2023 conference. The size of this school allows us to host numerous sessions simultaneously and to make space for as many participants as we have sessions for. Being in a location that is near the centre of the province makes it reasonable for as many teachers as possible to have access to. We will be using the "cafetorium" at CPA to host the keynote sessions. Both of these educators have amazing messages to share and we want as many people as possible to be able to participate. Lisa Lunney Borden was recently the keynote speaker at the 2022 BCAMT conference. Nat Banting presented at the 2022 NCTM conference as well as being invited to give an ignite talk that you can watch on Vimeo.

Speaker Proposals—The key factor in the success of the MTA conference is the willingness of classroom teachers and educators to share their knowledge and experience. So many good things are happening in Nova Scotia mathematics classrooms that, when shared, can inspire and encourage teachers. Please reflect on what you might have to offer. Teachers can submit proposals for conference sessions using the following Google Form: https://forms.gle/HxxnLnXmN6wRNuSx8.

News from Conseil scolaire acadien provincial

Les membres des équipes du Conseil scolaire acadien provincial (CSAP) continuent à promouvoir l'intégration de pratiques gagnantes, spécifiques et harmonisées en numératie afin de développer le plein potentiel de tous les élèves. Le développement professionnel et par le biais de l'accompagnement du personnel enseignant est primordial au développement des habiletés en numératie.

Le personnel enseignant continue l'utilisation de la plateforme Knowledgehook, outil d'évaluation des apprentissages des élèves. Il y a eu quelques ajouts à cette plateforme. Premièrement, il y a maintenant des activités d'évaluation pour les niveaux de la maternelle, de la première et de la deuxième année. De plus, des évaluations en lien avec les leçons apprises associées aux évaluations provinciales du MEDPE ont été ajoutées pour les niveaux de la 3e à la 9e année. Ces évaluations sont divisées par domaine permettant au personnel de consulter ces informations afin de noter les défis démontrés par les élèves sur ces différentes évaluations provinciales. Ces ajouts permettent aux enseignants de créer et d'utiliser des activités d'apprentissage afin d'adresser ces besoins.

Une autre plateforme numérique, Matific, est maintenant utilisée par plusieurs classes du niveau élémentaire. Cette plateforme est accessible par le biais de plusieurs appareils numériques : tablettes, Chromebooks et ordinateurs. Matific permet aux élèves d'explorer, sous forme de jeux interactifs, différents concepts mathématiques alignés avec les programmes d'études du CSAP. Les activités peuvent être individualisées en fonction des habiletés de chaque élève, ce qui permet la différenciation. De plus, les rapports de progrès des élèves générés par Matific permettent au personnel enseignant de faire des suivis avec les élèves selon leurs besoins. Selon les commentaires des élèves et la rétroaction du personnel enseignant, les activités pédagogiques sont à la fois motivantes et enrichissantes.

Conseil scolaire acadien provincial

Pour soutenir les objectifs du plan stratégique du CSAP, le site de numératie offre des ressources qui appuient l'utilisation de la communication orale comme un outil d'apprentissage en mathématiques. Un bel exemple de ceci est l'utilisation des jasettes mathématiques « number talks » permettant aux élèves de partager leurs stratégies selon le contexte particulier. Ceci permet au personnel enseignant et à leurs élèves de ressortir des concepts importants et des stratégies efficaces associés à la cible d'apprentissage.

Nous sommes toujours en réflexion pour faciliter l'approche de l'enseignement d'un concept, en passant du concret vers l'abstrait. Nous promouvons le matériel de manipulation pour ainsi favoriser ces transitions. L'accompagnement du personnel enseignant dans ce domaine est prioritaire afin de miser sur l'importance du matériel pour construire du sens et approfondir des concepts permettant de consolider les apprentissages concrets avant de passer à l'abstrait. Un défi que nous sommes prêts à relever pour que nos apprenants échafaudent bien leurs connaissances et compétences.

Nous sommes reconnaissants du travail ardu de tous les membres des équipes du CSAP. La continuité des apprentissages de nos élèves est assurée avec la collaboration de ces derniers.

Kwe', wla wejiag Mi'kmaw Kina'matnewey

We, in Mi'kmaw Kina'matnewey (MK) are adherents of the Nova Scotia curricula while at the same time cognizant of our vision to engage in a holistic lifelong journey rooted in Mi'kmaw language and culture. We are addressing this more and more by introducing whenever and wherever possible outdoor learning.

Approximately 80% of the First Nation students in MK communities attend community schools. For teachers in provincial schools who would like to learn more background on the educational aspects in these communities I would recommend a quick perusal of the 20/21 Annual Report on our web site. It provides a quick read, graphical and informative summary.

As many educators surely recognize the Covid lag has been a significant elephant in the room as we move forward addressing the learning gaps (and sometime chasms) that it has created in students

This coming year to help address this, a priority of the numeracy consultants is to support Tier 1 instruction. This is done through PLCs, mentoring/coaching.

Also, working with EECDs Student Services and Equity Branch resources we are going to pilot a Tier 2 intervention program in one of our schools. Data gleaned will be used to pair with the formative assessment and self-directed professional learning that is an integral aspect of Knowledgehook.

We recognize that the immediacy of targeted Tier 2 intervention support goes a long way in ameliorating difficulties students experience. We have seen Tier 2 success with students from five bands that are attending provincial schools. With the dedicated math intervention provided, many of these students are meeting grade level expectations on provincial assessments.

Of course, I could not end this short missive if I did not recognize and give kudos to the support and encouragement we receive from the Provincial Math Team.

For more information about Mi'kmaw Kina'matnewey, you can visit virtually:

https://www.facebook.com/Mi'kmawKinamatnewey

https://twitter.com/mk_education

https://www.kinu.ca

or contact me at bobcrane@kinu.ca

Nova Scotia Mathematics Teachers Association Website

Have you visited the NS MTA website recently? This is your source for information on the NS MTA conference, NCTM conferences and resources including math websites, enrichment, math contests and past issues of this newsletter. Check it out at http://mta.nstu.ca/

Curating Student Learning in Real Time

By Melissa Dean (@Dean_of_math) is a high school math and science teaching in Manitoba, Canada. She is the author of the book ***Unravel School: Reimagine Classrooms, Reinvent Assessment, & Revive Learning.*** *This article is reprinted with permission from https://deanofmath.wordpress.com/2023/04/14/curating-student-learning-in-real-time/*

One of the things I'm really passionate about is reframing assessment away from something we do to student, to be something, a conversation really, that we do WITH students. The biggest change that I have made with respect to this is that I try to gather as much assessment data as I can in real time — because that data is crucial in planning and knowing what the next step in instruction should be.

This is a change from what I used to do as a teacher. I used to teach, and teach and teach, and then assign, assign, assign and then grade, and grade and grade, and then hand back. Sometimes, I would hand back while it was still useful! But more often than not, I was gathering data that by the time I had actually looked at it, the time for its real usefulness had long passed. Now, I gather assessment information as my students are interacting with the information that we are exploring together. Yes, this involves direct instruction sometimes, and yes, this involves inquiry work and research in others. It all depends on the day. But what doesn't depend on the day is the importance of gathering information about where my learners are, so that I can understand where they need to go next. This means that I'm constantly giving feedback, interacting with learners and their work, and evaluating and analyzing the information that I'm gathering.

How do I curate this information? Well, I used to write A LOT of sticky notes about things that weren't all that useful. I gathered a lot of data. But it wasn't data that really had an impact on instruction — it was usually information about what students were doing, or at least looked like they were doing, rather than how and why there were doing it. Now, I try to gather data about what the learning of the day is, and how my learners are interacting with it.

I employ a few different digital tools to gather this learning in real time.

1. Google Forms on my iPad or phone. It is quite simple to set up a form to gather informal observational data about student learning with respect to outcomes and standards. This is a quick snap shot that I can then easily transfer into a spread sheet to analyse how a class is doing with respect the learning objectives.

2. Google Slides and Google Keep. Setting up a Slide deck for each learner is somewhat labour intensive, but it is easy to manage and add information to using Google Keep as students are working. I snap photos or make notes in Keep and can then easily add it to a slide deck to collate into an digital portfolio for a learner.

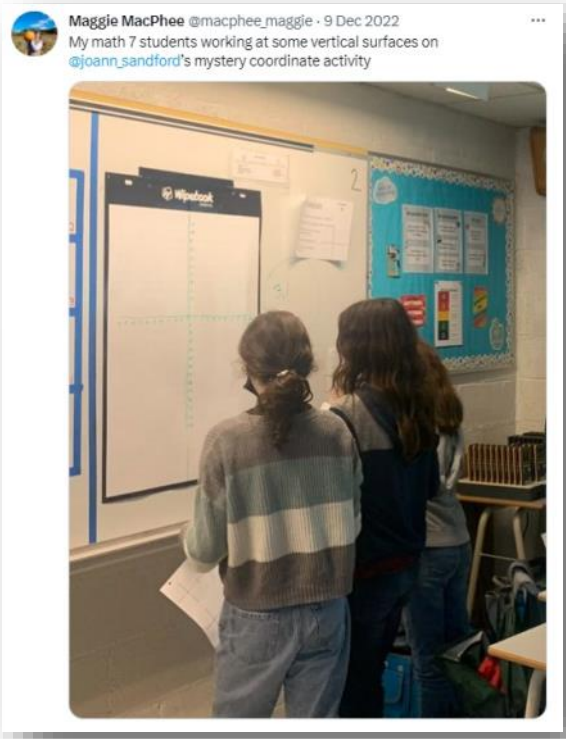
3. Notability or Goodnotes. These are both user friendly apps that you can set up notebooks for students, where you can add photos and then annotate.

4. gotLearning. This is a newly launched web-based platform designed to easily capture learning and then easily record and leave feedback for students. I love it because it is much easier to leave feedback and dialogue back and forth with students on their learning than Google Classroom.

Those are just some of the tools that I use to gather student learning. Ultimately, you need to find a tool or system that works for you. But what is most important is really reimagining the cycle. You don't have to be stuck in the teach-assign-grade loop. You can know where your learners are in the moment, and easily dialogue with them or other stakeholders about progress. You can do this without constantly gathering in papers to mark. This allows you to be present in the moment with your learners, to provide targeted feedback as they are working, and allows you to plan responsive instruction.

Nova Scotia Mathematics Highlights from Twitter

Inspiring mathematics is just a click away. Check out some of the ideas and resources shared on Twitter by Nova Scotian mathematics educators. Find other great tweets using hashtags like , #CCRCEmath #HRCEmath, #ITeachMath, #ThinkingClassroom and #Mathtalk .



The MTA is on Twitter! Follow @MTA_NS to join the conversation.

Making mental math strategies visible during a number talk: Challenges and benefits

By Evan Throop Robinson (St. Francis Xavier University), Marc Husband (St. Francis Xavier University), Matthew Little (Halifax Regional Centre for Education Mathematics Coach) and Erin Agar (Halifax Regional Centre for Education grade 4 teacher).

What would you do if you were to add 27 and 39 mentally? Close your eyes and picture this in your mind. What does the process look like for you? Before reading further, draw a quick image to show what you did.

The Number-Talk Inquiry Project (N-TIP)

N-TIP is a provincially funded initiative to gain a deeper understanding of Number Talks and how they can be used to support all learners. In short, a Number Talk is an activity where the teacher is facilitating and listening while students talk about mentally solving a question involving an operation (e.g., +, –, ×, ÷). Our team consists of two StFX mathematics teacher educators (MTEs), a math coach, and a classroom teacher from HRCE. We initiated this partnership to build a bridge between the work that pre-service teachers (PSTs) do in a methods course and what actually happens in an elementary mathematics classroom. Our work in this project uses the following teaching actions to engage students in a Number Talk:

- Posing a question about a mathematics topic, typically a calculation;
- Eliciting students' ideas, without showing or telling them what to do;
- Making students' ideas visible to all, using tools like a number line; and
- Facilitating discussions and comparing student ideas to deepen understanding.

As part of N-TIP, we asked students in a grade 4 classroom their mental math strategy for 27 + 39. We aimed to elicit two strategies and record them for students to discuss. Below we will share strategies that we heard from students, how we made those strategies visible, and our reflections on how we could improve on making mental math strategies visible.

Preparing for a number talk

Before the Number Talk, the team met to decide on the mental math question and anticipate student responses to that question. We chose 27 + 39 because the teacher wanted to see if her students would use strategies they had been exploring during previous lessons. We anticipated that students might: a) decompose numbers (e.g., splitting the numbers into tens and units) and b) change numbers to make them easier to add (e.g., 27 + 39 = 26 + 40). We planned to pose the question orally and use teaching moves to provide individual Think Time before Turning & Talking to an elbow partner about their strategy. We also planned to use an open number line to represent mental math strategies because the tool is helpful in showing quantity and making the numbers that students see in their minds visible for whole-class discussion.

The number talk: Nadeeka, Niall and Nic's strategies

Of the many students eager to share their strategy, Nadeeka was selected to share first. She said, "9 plus 7 equals 16, but I can't just put 16 there, so I'm going to have to put 1 on top of 3 and 2 to equal 66". Although her thinking reflects what happens using a traditional algorithm (i.e., stacking the numbers one on top of the other), we recorded Nadeeka's idea on a number line (Figure 1A). The first two jumps on the number line shows 9 + 7. The third jump on the number line shows the five 'tens.'

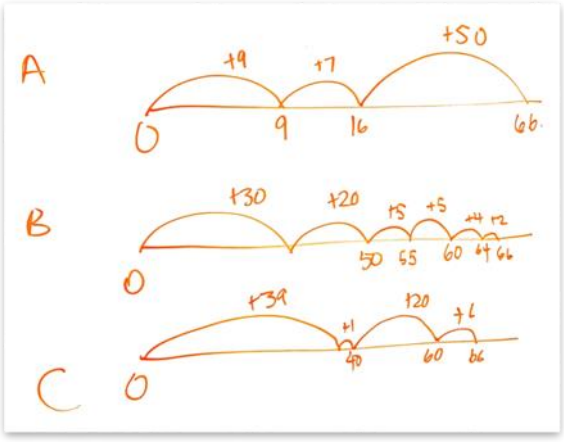


Figure 1—Number Lines on the whiteboard documenting students' ideas

Next, Niall described his strategy. First, he regrouped the tens "blocks" he saw in his head to get 50 (Figure 1B). "I subtracted how many of the blocks from 7 and 9 to

Making mental math strategies

Continued from page 9...

make 5s. I added two 5s to make ten and then added 10 to 50." This landed him on 60. Finally, he joined the remaining units from each addend (4 + 2) and combined them with his total (60 + 6).

When the teacher asked the class if anyone changed the numbers to make them easier, Nic shared, "I subtracted 1 from the 7, and that became 6, and I gave it to the 39, which gave it a 10" (Figure 1C). Then he added the remaining two tens to make sixty before joining on the units that were left (60 + 6).

Since a Number Talk takes about 10 minutes, we used the remaining time to discuss the ideas on the whiteboard. Follow-up questions encouraged learners to analyse the strategies (e.g., look for similarities and differences). We asked:

- If your strategy is not on the board, which one is it most like?
- How is the 27 being split differently in each strategy?
- What strategy do you like the best?

We think the discussion benefited learners who shared similar strategies and also those who saw a new way to think about the number relationships.

After the number talk

We used the audio recordings of the Number Talk in our methods course so PSTs could practice listening to and recording Nadeeka, Niall and Nic's strategies on an open number line. Taking time to listen and re-listen to learners' voices benefited PSTs as they considered ways to make these strategies visible other than their own preferred strategies (Figure 3). Upon comparing how PSTs recorded strategies to the way that the teacher recorded the strategies during the Number Talk, we were fascinated by the differences:

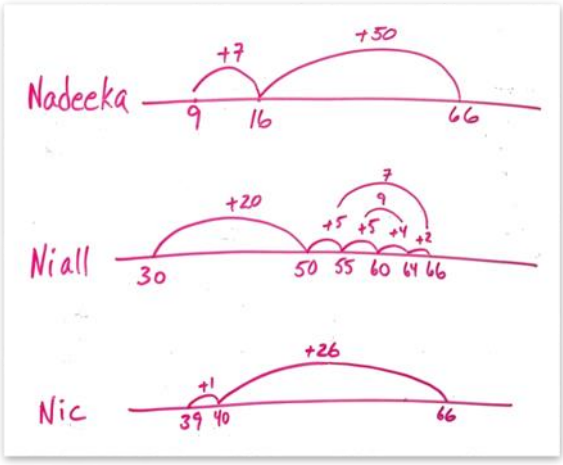


Figure 2—PSTs making strategies visible

Making mental math strategies visible: a challenging pursuit

Our attention is drawn to the challenges that teachers face in listening to and making sense of learners' mental math strategies, especially in the moment. It should be noted that during the Number Talk, the teacher requested learners to repeat their strategies several times so they could record it. Additionally, after listening multiple times to the recording with PSTs, we noticed that our representations of their strategies got closer to what learners are actually saying is happening in their minds. Indeed, making students' mathematical ideas visible is a challenging practice.

Give it a try

We encourage all teachers to try Number Talks in their classroom. Here are some pointers to get started:

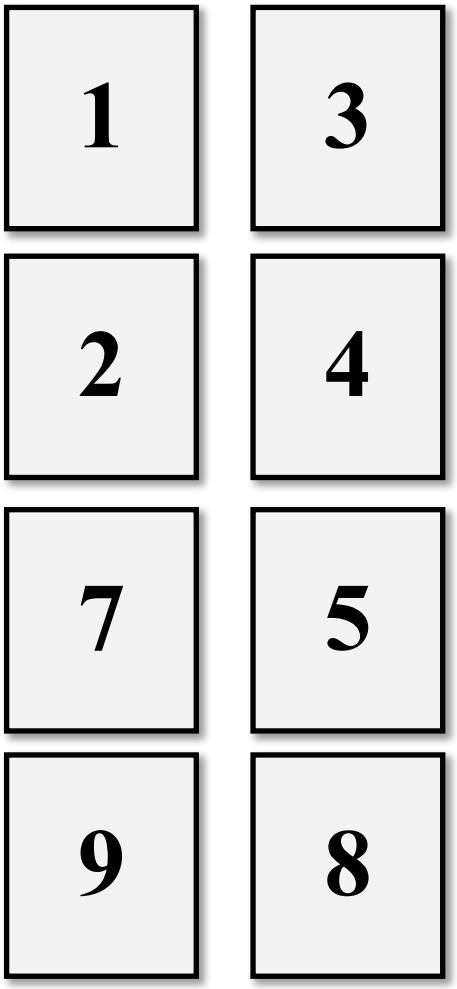
1. Choose numbers and an operation that you think will elicit strategies.
2. Share the question orally and provide think time before turning and talking.
3. Document 2-3 learners' strategies, making quantities visible for them to see. Be careful not to interpret their ideas. Ask for clarification when you don't know.
4. Compare the strategies by asking questions (e.g., how is the number 27 broken down differently).

We would love to hear from you! Tell us about your Number Talks (e.g., What benefits are you noticing? What do you find challenging?) or ask us a question about N-TIP. Please email us (mhusband@stfx.ca; erobinso@stfx.ca) – we are interested in continuing this conversation with teachers across NS.

Adventures in Logic and Reasoning

"The Eight Cards"

This is a classic puzzle from the prolific English puzzle creator, Henry Earnest Dudeney.



The eight numbered cards are placed in two columns as shown here.

It can be seen that the numbers in the left and right columns add up to different totals.

The object of the puzzle is to rearrange these cards moving as few as possible so that each of the two columns fives the same total. Can it be done?

Purple Comet Math Meet 2023

The Purple Comet Math Meet is an annual free online team math contest that takes place in April. Here are two problems for the 2023 Middle School contest that gave students a challenge. How would you solve them? What problem solving strategy might help students work towards an answer?

Problem 3—Mike has two similar pentagons. The first pentagon has a perimeter of 18 and an area of 8 7/16. The second pentagon has a perimeter of 24. Find the area of the second pentagon.

Problem 13—In convex quadrilateral *ABCD*, angle *BAD* = angle *BCD* = 90°, and side *BC* = side *CD*. Let *E* be the intersection of diagonals *AC* and *BD*. Given that angle *AED* = 123°, find the degree measure of angle *ABD*.

Nova Scotia Math Teachers Association Executive

Below are the current members of the NS MTA Executive. The membership and the positions of the executive change each year at the Annual General Meeting held at the MTA Provincial Conference (The MTA provincial conference is on the fourth Friday in October of each year).

Name	Position	Contact
Erick Lee	President / Communications	eplee@nstu.ca
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Special Projects

The MTA strives to give back to its membership by making funding available for special projects developed by class-room teachers. If you have an innovative math education project taking place in your classroom(s), MTA may be able to offer some financial assistance to help develop the project. Information on funding can be obtained by contacting any member of the Executive.

Call for Contributions

We are better together. Mathematics Matters, the MTA newsletter, is looking for a variety of contributions from classroom teachers, math mentors and coaches, math support/intervention teachers and others who are interested in the teaching and learning of mathematics. Please consider sharing a favorite lesson or activity, a reflection or blog post, a book or technology review, or another work of interest to mathematics teachers in Nova Scotia and beyond. Sharing your ideas and reflections with other teachers is a great way to contribute to a vibrant and dynamic community of mathematics educators in our province.

If you are interested in contributing, please contact me at eplee@nstu.ca. We look forward to hearing from you!

The MTA Newsletter is published by the NSTU for the Mathematics Teachers Association, Erick Lee, Editor.
The opinions expressed are not necessarily those of the Editor, the NSTU, or the MTA.