2022 ANNUAL MEETING & EXPOSITION
Sept. 28–Oct. 1, Los Angeles

Los Angeles

Program Book

#NCTMLA22
Bring your classroom to life and **celebrate student brilliance.**

Desmos Classroom lessons are powerful in their ability to surface student thinking and spark interesting and productive discussions. Use them as your core curriculum or add the lessons to your existing core curriculum to engage students and deepen their learning.

**Free teaching and learning platform and lessons**

**Grades 3+**

You can create your free account today to gain access to lessons and lesson building tools.

**Complete collection of core instruction lessons**

**Grades 6–Algebra 1**

Desmos Classroom lessons are comprehensive and customizable. Teachers across the country are using the Desmos Curriculum to bring conceptual learning to life in their classrooms.

**The heart of a comprehensive core program**

**Grades K–12 (Coming soon!)**

Amplify Desmos Math is the core program you’ve been waiting for. Talk to an Amplify representative for samples and more information.

Visit [teacher.desmos.com](http://teacher.desmos.com) and create your free account to gain access to lessons and lesson building tools and to learn more about Desmos Classroom today.

Interested teachers can sign up for a **free 30-day trial** of the complete collection of Desmos Classroom lessons.
Contents

HOST
California Mathematics Council, Southern Section

MEETING FACILITY
All Annual Meeting presentations will be held in the West Hall at the Los Angeles Convention Center (LACC) and the JW Marriott LA Live Hotel. See pages 116–120 for floor plans.

REGISTRATION
Tuesday 2:00 p.m. – 5:00 p.m. Express Reg Only
Wednesday 7:00 a.m. – 7:00 p.m.
Thursday 7:00 a.m. – 5:00 p.m.
Friday 7:00 a.m. – 5:00 p.m.

EXHIBITS
Wednesday 4:00 p.m. – 6:00 p.m.
Thursday 9:00 a.m. – 5:00 p.m.
Friday 9:00 a.m. – 5:00 p.m.

Dedicated exhibit hall time is scheduled from 12:00 p.m. to 1:00 p.m. on Thursday and Friday.

NCTM CENTRAL
Wednesday 10:00 a.m. – 6:00 p.m.
Thursday 9:00 a.m. – 5:00 p.m.
Friday 9:00 a.m. – 5:00 p.m.

nctm.org/losangeles2022

The publications and programs of the National Council of Teachers of Mathematics present a variety of viewpoints. The content, affiliations, and views expressed or implied in this publication, unless otherwise noted, should not be interpreted as official positions of the Council. References to particular commercial products by a speaker should not be construed as an NCTM endorsement of said product(s). NCTM reserves the right to change speakers, change facilities, or modify program content.

National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 20191-1502; Telephone (703) 476-4000; Fax (703) 476-2970; E-mail nctm@nctm.org;
Web nctm.org.
Printed in U.S.A.
Welcome to Los Angeles and the NCTM 2022 Annual Meeting and Exposition. Known as a city of creativity, opportunity, and experience, there is no better place to unite our community around teaching and learning mathematics. After all we’ve been through over the past couple of years, we are thrilled to be presenting an in-person Annual Meeting. It is exciting and gratifying to see all the program committee’s planning come to fruition. They’ve worked tirelessly and through unprecedented challenges to put together a program to empower and raise the voice of teachers in a time of change. Whether you choose to follow one of the seven strands or hand pick sessions for your own customized experience, you are in for a professional learning treat. As always, you’ll find a wide variety of sessions, workshops, bursts, and networking opportunities to arm you with ideas, resources, tools, and materials to use with your students and share with colleagues. And let’s not forget about the additional celebratory activities, including attempting a GUINNESS WORLD RECORDS™ title for the largest pattern blocks mosaic, celebrating NCTM.

Trena L. Wilkerson  
PRESIDENT  
NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS;  
BAYLOR UNIVERSITY, TEXAS

Mike Flynn  
PROGRAM COMMITTEE CHAIR  
FLYNN EDUCATION INC.,  
MASSACHUSETTS

Carol Treglio  
HOST AFFILIATE LIAISON  
PRESIDENT, CALIFORNIA MATHEMATICS COUNCIL—SOUTHERN SECTION
Program Information

Types of Presentations

All presentations are open to all conference participants. Admission is on a first-come, first-served basis. Reserving spaces in line or saving seats is not permitted.

- **Sessions** (60 minutes) allow speakers to convey information about multiple topics or broad ideas in lecture format. Rooms are set in either theater or classroom style.
- **Workshops** (75 minutes) allow speakers to engage participants in an interactive environment. Rooms are set with round tables for interaction.
- **Bursts** (30 minutes) allow speakers to quickly convey information on a specific topic or idea. Rooms are set with round tables.
- **Exhibitor Workshops** (60 minutes) allow exhibitors to showcase their products and services. Look for the symbol indicating exhibitor workshops in the program book. Rooms are set in either theater or classroom style.

Insightful Education Sessions, Dynamic Exhibits

NCTM Annual Meeting & Exposition is an opportunity to share knowledge and learn with leaders in mathematics education. Gain new strategies to unleash the mathematical mind of each and every student.

- **Improve** your knowledge and skills with high-quality professional development and hands-on activities.
- **Connect** and share with peers from throughout the region.
- **Collect** free activities to engage and excite your students.
- **Explore** an exhibit hall packed with exciting learning and giveaways.
- **Learn** from education leaders and test the latest educational resources.

You will walk away with the following:

- Innovative ideas you can immediately use
- Updates on classroom best practices from recognized innovators
- In-depth discussions about the latest education resources
- Knowledge-sharing with like-minded peers
- Interaction with the latest tools and products in the Exhibit Hall

Tips for a Rewarding Annual Meeting & Exposition

- Access the conference app for program and speaker information, to connect with other attendees, and to share your feedback. Visit nctm.org/confapp.
- Get available speaker handouts at nctm.org/planLA.
- Keep the conversations going, connect with other attendees and speakers, access and share session resources, ask questions, and more in the MyNCTM online community at my.nctm.org/LA2022.
- If you’re experiencing the conference with your colleagues, attend different presentations and share your learnings with one another after the conference.
- Silence your cell phone during presentations.
- **Be safe!** Remove your name badge when you leave the conference facilities. In addition, safety guards are available to attendees to walk to and from hotels and convention center. Visit the Information Booth for more details.
- Coffee, snacks and lunch are available for purchase inside Galaxy Court across from Registration. Please use QR code for menu selections.

Registration and Access to Presentations

Registration is located in the West Hall lobby at the Los Angeles Convention Center. You must wear your badge to attend all presentations and to enter the NCTM Exhibit Hall. You will need to show a picture ID to have your badge reprinted.

By registering and attending the NCTM 2022 Annual Meeting & Exposition, participants grant NCTM the right to use their likeness or voice as recorded on, or transferred to, video, social media, photographs, websites, electronic reproductions, audio files, and/or other media of such events and activities.

Event Code of Conduct

All communication at NCTM events should be appropriate for a professional audience, including people of many different backgrounds regardless of gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, race, ethnicity, or religion. By attending an NCTM event, you agree to adhere to our Code of Conduct policies. nctm.org/policies

Annual Meeting Overview & Orientation

Whether this is your first NCTM Annual Meeting or your twentieth, we have something for you! Hosted by members of the Board of Directors, this orientation will help you get the most out of your time at the NCTM 2022 Annual Meeting. Learn about the new features of this year’s meeting or discover something you missed at previous ones. Find out how to navigate presentations, learn to use our conference app, and network with other attendees.

- **Wednesday**
  - Presentation #1 4:00 p.m.–4:30 p.m. 152 Los Angeles Convention Center (LACC)
- **Thursday**
  - Presentation #3 7:15 a.m.–7:45 a.m. 152 Los Angeles Convention Center (LACC)
Program Information

NCTM’S Plans for a Healthy and Productive Event
Updated August 5, 2022 – We continue to monitor the global and regional response to public health emergencies and may adjust our plans accordingly.

LA County Department of Public Health
NCTM is committed to holding a successful in-person meeting at the Los Angeles Convention Center (LACC) and encourage all attendees to visit the Los Angeles County Department of Public Health for news and updates on staying healthy and safe in Los Angeles.

Covid Policies and Protocols
By registering for an event, you acknowledge that you will be required to comply with all NCTM safety precautions as well as specified safety precautions by the venue, state, and/or local government. As part of our COVID health and safety policies, NCTM will require all attendees and exhibitors, regardless of vaccination status, to show proof of a negative COVID test within 48 hours before badge pick up. At-home tests will be acceptable, and attendees will upload test results via the Crowdpass app on behalf of NCTM. Specific instructions for downloading the app and uploading test results will be shared no later than September 14.

Masks
NCTM follows the Centers for Disease Control and Prevention and local and state guidelines for health and safety at in-person events. Per the most recent guidance protocols from the CDC, counties are assessed based on multiple factors and classified by Green, Yellow, or Red. NCTM will follow the guidance which could include masks being required by all attendees. View current information on wearing masks in LA County http://publichealth.lacounty.gov/acd/docs/WhenToWearAMask.pdf

Venue
The Los Angeles Convention Center has put enhanced safety protocols in place to help guide the event experience.

Contactless Payments
As part of our health and safety protocols, NCTM will provide contactless payment options at NCTM registration, the NCTM Bookstore and NCTM Central. Accepted credit card payments will include any US- and most internationally-issued magstripe or chip cards bearing a Visa, Mastercard, American Express, or Discover logo. Checks may be accepted for exact amount at registration only. All payments are to be made in United States Dollars (USD$). No cash payments. Please check with individual exhibitors and sponsors for their onsite payment policies.

Cleaning
The Los Angeles Convention Center will implement increased cleaning and sanitation in all high touch building areas, including but not limited to the following:
- Restrooms
- Escalator and stair handrails
- High touch points in meeting rooms (door handles, podiums, chairs etc.)
- Hospital-grade air filters and 24/7 air circulation during events
- Increased cleaning and disinfection with the Clorox 360 system

Food
- Tables and chairs will be spaced to allow for social distancing during meals and disinfected on a regular basis.
- Modified food service policies, including touchless payment options

LACC Staff
- All convention center employees have received training regarding coronavirus safety. Individuals performing cleaning and housekeeping duties have received additional training regarding cleaning methods, product use, and other activities.

Hand Sanitizer
- Contactless hand sanitizing stations are available throughout the building for use by all individuals.

On-Site Medical
- First-aid staff will be located at stations in the convention center and will be able to assist attendees or exhibitors as needed.

Exposition Hall
- To accommodate social distancing, NCTM will increase the aisle width in the exposition hall to allow for less congested traffic flow between booths.
- Signage will be put in place to remind attendees and exhibitors of social distancing and hygiene recommendations.

Hotels
Hotels that implemented enhanced rigorous cleanliness protocols were identified for NCTM’s hotel block.

Social Distancing
- Avoid physical contact, including hugs and handshakes.
- Signage and floor decals will be used to encourage social distancing in common areas.

Los Angeles
- View the latest information at the LACC Convention Center site.
Program Information

Grade Bands
To help you find appropriate presentations to attend, each presentation lists the presentation’s target grade band audience:
- PreK–Grade 2
- Grades 3–5
- Grades 6–8
- Grades 8–10
- Grades 10–12
- Higher Education—university- and college-level issues (including both two-year and four-year institutions)
- Coaches/Leaders/Teacher Educators
- General Interest—issues of interest to multiple grades and audiences
- Research

World Record
GUINNESS WORLD RECORDS™ Title Attempt
Sponsored by hand2mind
Join us in the NCTM Exhibit Hall on Thursday, September 29th, starting at 9:00 a.m. as we attempt a GUINNESS WORLD RECORDS™ title for the largest pattern blocks mosaic.

Sunrise Yoga
Namaste! On Thursday, September 29, and Friday, September 30, from 6:00 a.m. to 7:00 a.m., come start the day off with fellow yogis. The hour-long, all-levels yoga flow class will be located in Petree Lobby. Classes are limited to 50 attendees. The class fee is $20, which includes a yoga mat designed for math lovers. Advance registration is required. Space is limited, with on-site registration available. To register, please visit the NCTM Registration Desk the day prior to your class.

Set Up A Meeting Spot
Our diverse community holds many interests through and beyond mathematics education. The Meeting Spot in NCTM Central is a way to find those with shared interests at the Annual Meeting. From meeting up to find a local Karaoke spot to getting a small group together to collaborate on one of the conference strands. YOU choose the topics. All who want to participate are invited.

If you’re interested in organizing or joining a Meeting Spot, click on the Meeting Spot tile in the NCTM Mobile app and learn more!

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Visit us at Booth 925 for a license through December 31, 2022!

7 million users
Join our growing community
Average 4.7/5 user rating
Program Information

Focus Strands

**BROADEN THE PURPOSES OF LEARNING MATHEMATICS**

Our personal stories have never been more important in giving us a sense of identity and belonging in our fragile and changing world. They have become needed catalysts and levers to reexamine the purposes of learning mathematics for all our students. Sessions in this strand will not only support the critical emergence of anti-racist math education but will also examine the universal and historic themes of joy and wonder that have crossed all cultures, civilizations, and socioeconomic situations. Mathematics must be seen through a prism that refracts all its possibilities and enchantments. Through powerful narrative, we can ensure that all our students can find their unique voice and purpose in learning mathematics.

**CREATE EQUITABLE AND ANTI-RACIST STRUCTURES IN SCHOOLS AND SYSTEMS**

Educational policies that have the power to shape students’ experiences, opportunities, and outcomes must be interrogated and revised as we strive for equitable and anti-racist schools. Presentations in this strand will look beyond the structures of the classroom to explore ways to intentionally disrupt systemic barriers to success so that we can ensure high-quality mathematics instruction for all learners. Sessions may focus on strategies for advocating for or effecting change within national, state, district, or school policies and practices. We also welcome presenters to share approaches and lessons learned by educators in advocating for themselves, students, colleagues, or larger communities.

**DEVELOP DEEP MATHEMATICAL UNDERSTANDING**

NCTM positions the development of deep mathematical understanding as a key lever in anti-racist teaching because a deep understanding of fundamental concepts provides access to other disciplines and prepares students to understand and critique their world. Sessions in this strand will model teaching practices that help build a strong foundation of deep mathematical understanding, use the history of mathematics to support students in reimagining their own mathematical futures, and share tasks that provide rich problem-solving environments for all students.

**IMPLEMENT EQUITABLE MATHEMATICS INSTRUCTION**

The effective use of inclusive practices can be told through stories that show how intentionality, thoughtfulness, and care ensure that all students are seen and heard in the mathematics classroom. Sessions in this strand may focus on teaching practices that are anti-racist; nurture students’ positive mathematical identities; disrupt systems of oppression by challenging spaces of marginality and privilege within classrooms; respond to and sustain students’ cultural and linguistic resources; and foster all students’ mathematical agency, belonging, and joy.

**POSITION ASSESSMENT TO PROMOTE EQUITABLE PRACTICES AND SUPPORT STUDENT LEARNING**

This strand positions assessment in mathematics as a means for eliciting and capturing students’ thinking in order to gauge progress toward mathematical understanding and adjust instruction to support and extend learning. It should contribute to students’ identities and sense of agency or efficacy. Sessions in this strand will focus on assessment as the vehicle to gain insights into students’ thinking, to empower students to use feedback as they continue their own learning, and as a resource for planning next steps in instruction to strategically meet the needs of each and every student.

**REIMAGINE THE ROLE OF TECHNOLOGY IN MATHEMATICS EDUCATION**

The pandemic put technology front and center in education, and we each experienced our own sets of challenges and successes. How have the last two years affected how we see the role of technology in math education? Sessions in this strand will support our community in taking stock of all that we have learned through the pandemic. They may focus on particular technological tools, best practices for teaching with technology, or design considerations for developing high-quality mathematical tasks and assessments for remote settings. A focus on strategies for cultivating equitable access to technology is encouraged.

**TEACH EQUITY-CENTERED MATHEMATICS BY ATTENDING TO SOCIAL-EMOTIONAL LEARNING**

The social-emotional needs of students, educators, and caregivers has always been important, but it was especially heightened during the pandemic. What have we learned during the last two years to help us better meet the needs of our school community? How do we ensure we are using best practices that prioritize belonging and agency for all learners of mathematics? Sessions in this strand could include topics such as current brain research, identity work, establishing positive relationships and their impact on students’ learning of mathematics, strategies to decrease stress and promote healing and wellbeing, and supporting the development of the whole child to be successful in mathematics and beyond.
Program Information

Wi-Fi Access
Complimentary Wi-Fi will be available throughout public spaces of the Los Angeles Convention Center (LACC) and the JW Marriott LA Live Hotel.

Username: NCTM
Password: NCTM2022

Mobile App
The NCTM app keeps you connected with every aspect of the Annual Meeting including sessions, speakers, and exhibits. This free app allows you to view the Exhibit Hall floor plan, highlight your favorite presentations, get a Twitter feed update (hashtag #NCTMLA22), rate presentations, and connect with other attendees. Visit nctm.org/confapp for more information.

In addition, the NCTM app connects to the conference itinerary planner so you can personalize and keep track of everything in one convenient place.

Speaker Handouts
Attendees can access available electronic speaker presentation handouts through the conference app and itinerary planner.

Itinerary Planner
The itinerary planner is a great way to search the conference program book, set up your schedule, and download presentation handouts. The itinerary planner is updated with the latest program changes and presentation information. Visit www.nctm.org/planLA.

Program Updates
Visit nctm.org/LA2022 for program updates, including all the latest changes, cancellations, and additions. You can also follow along with the conference app to view event alerts and up-to-the-minute information.

MET Celebration
Attend the Mathematics Education Trust (MET) Celebration, sponsored by Forrest T. Jones & Company, on Wednesday evening after the Opening Keynote. Toast the 2022 NCTM Lifetime Achievement Award recipient (Tickets can be purchased through registration; limited supply.)

NCTM Central
Visit NCTM Central at the Los Angeles Convention Center (LACC) in West Hall A during exhibit hours to learn how NCTM supports you and the field of mathematics education:

- Get sample journals and more at Member Services.
- Update your membership information and learn about your benefits.
- Discover available funding and resources to support you in your career and professional development through the Mathematics Education Trust (MET).
- Explore NCTM’s Classroom Resources and learn about NCTM’s collection of lesson plans, problems, and more.
- Connect with peers, social media, speakers, NCTM committee members, and authors in the Networking Lounge.
- Learn about NCTM’s Professional Development offerings, including upcoming events (Annual Meetings, Regional Conferences, and Virtual Conferences) and NCTM’s Professional Learning Services.
- Visit all centers in NCTM Central and place your name into a drawing for a chance to win a $50.00 NCTM Gift Certificate!

Infinity Bar
The Infinity Bar gives you an opportunity to talk directly with highlighted conference speakers about issues related to mathematics education. As space is limited, you must sign up in advance.

The BOOKMOBILE at NCTM Central
Check out the totally redesigned, and cashless, Bookmobile at NCTM Central. Shop NCTM’s newest titles, best-sellers, and math-themed products for great gifts and incentives. Get your Notice and Wonder merch here! Save up to 30% off list-price books and free shipping* on all books purchased through the Online Bookstore. Preview at nctm.org/catalog.

NEW! Get customized NCTM Annual Meeting apparel printed right in front of you! Select the design, color, and style that’s uniquely you! Notice and Wonder tees—Annual Meeting shirts—so many colors and styles!

*Bookstore discounts and free standard shipping are limited to NCTM Los Angeles 2022 Annual Meeting Badge Holders who purchase from the online NCTM bookstore from September 28 through October 1, 2022. Free shipping limited to the contiguous United States. Discounts and free shipping do not apply to bulk or purchase orders, individuals only, please.
Program Information

The Bookstore on Wheels!
We bring the bookstore to you with our NEW BOOKMOBILES! Find them at NCTM Central in the Exhibit Hall and in the West Hall Lobby near Registration. Shop for books and products with the same great discounts as the bookstore at up to 30% off and free book shipping* for online bookstore purchases.

**Hours:**

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<th>EXHIBIT HALL</th>
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<tr>
<td>Wednesday</td>
<td>10:00 a.m. – 6:00 p.m.</td>
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<tr>
<td>Thursday</td>
<td>9:00 a.m. – 5:00 p.m.</td>
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<tr>
<td>Friday</td>
<td>9:00 a.m. – 5:00 p.m.</td>
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<tr>
<td>Saturday</td>
<td>Closed</td>
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**Note on Sales Tax Exemptions:** To qualify for sales tax exemption in the NCTM Bookstore, you must provide NCTM with a copy of a tax exemption certificate, ST-5, issued by the state of California at the time of purchase, which they will retain for their records.

The NCTM Bookstore is not equipped to handle shipping from the meeting site. The Business Service Center in the Los Angeles Convention Center can assist you with your shipping needs.

Information Booth
The NCTM Information Booth is located in West Hall lobby. Staff can answer your questions about the conference program and assist you with housing questions, directions and local information from transportation and historical sites to shopping and entertainment.

Lost-and-Found
You may retrieve or turn in lost-and-found items at the NCTM Information Booth in West Hall Lobby. At the end of the conference, lost-and-found items will be turned over to Convention Center Security.

Lactation Room
A lactation room is located in Room 101 in the West Hall Lobby.

All Gender Restroom
All gender restrooms are located throughout the Los Angeles Convention Center. See floorplans on pages 114 and 116 for locations.

Bag and Coat Check Service
Bag and coat check service is available for you to store your belongings during conference hours for a nominal fee. During conference hours Wednesday–Saturday, 1:00 p.m., you can check your items in the Business Service Center located in the Concourse Foyer in West Hall at the Los Angeles Convention Center. Please pick up all items each day by closing time; you may not leave items overnight.

First Aid
A first aid station will be located outside West Exhibit Hall A. If you need medical services while in California, please check with your hotel concierge for the closest medical facilities. For any medical emergency, call 911 without hesitation.

For Your Child’s Safety
During installation and dismantle, no one under the age of 16 will be allowed in the Exhibit Hall. Due to the size and professional nature of the conference, and for your child’s safety, children under the age of 16 are not permitted in the Exhibit Hall during show hours. Exceptions to this rule will be made for nursing mothers and their infants.

Exhibit Hall
Visit the NCTM Exhibit Hall to explore, try out, and purchase products and services for your classroom or to help you meet your career goals. Meet the people who produce these products, get fresh ideas, and see how products work. The hall will be open on:

- Wednesday 4:00 p.m.–6:00 p.m.
- Thursday 9:00 a.m.–5:00 p.m.
- Friday 9:00 a.m.–5:00 p.m.

Dedicated Exhibit Hall time is scheduled 12:00 p.m.–1:00 p.m. on Thursday and Friday. Concessions will be available in the back of the NCTM Exhibit Hall. Check out the map of the Exhibit Hall on page 118 and the Exhibitor Directory on pages 119–126.

Exhibitor Workshops
Do you want more in-depth, personal interaction with exhibitors? If so, plan to attend the Exhibitor Workshops. These workshops are held on Thursday and Friday and offer a wide variety of topics. For exhibitor workshop offerings, look for presentations in this program marked with the symbol.

Shuttle Service
Attendees who reserved their hotel room through NCTM’s official housing company will receive complimentary shuttle service from hotels in the NCTM housing block to the Los Angeles Convention Center. Hotels that are within walking distance of the convention center will not have shuttle service. Routes and schedules will be posted in your hotel lobby and can be found online at nctm.org/annualhousing. If you have questions, please visit the NCTM Information Desk in the West Hall Lobby of LACC.

Parking
Parking at the Los Angeles Convention Center is open from 5:30 a.m.–9:00 p.m. daily. The average rate to park at is $20 per day. The closest parking garages to the West Exhibit Hall are the West Hall Garage and Parking Lot C. If there is an event at Crypto Arena that evening, pricing increases after 4:00 pm. Credit cards and debit cards (Visa, MasterCard, American Express and Discover) are accepted as payment at the garage entry kiosk. Cash or checks are not accepted as the LACC operates a non-contact, cashless garage. Use Spot Hero and save time by booking your parking ahead of time. Parking rates vary daily.
Coronavirus Health & Safety Tips

- Wear a mask that covers your nose and mouth
- Maintain proper social distancing of 6 feet/2 meters
- Wash your hands often
- Use hand sanitizer
- Avoid shaking hands, high-fives, and hugs
- Clean your electronics
- Use your own supplies
Regional Caucuses
The NCTM Affiliates’ Region Caucuses and Delegate Assembly provide a forum for sharing information on emerging issues. See Session 4 for the Delegate Assembly information. The Regional Caucuses information is below.

ALL REGIONAL CAUCUSES WILL BE HELD AT THE JW MARRIOTT LA LIVE HOTEL. THE JW MARRIOTT IS CONVENIENTLY LOCATED WITHIN WALKING DISTANCE TO THE LOS ANGELES CONVENTION CENTER.

Check in for all Caucuses is from 1:30-2:00 p.m. in Platinum Ballroom D. Individual Caucus rooms open at 2:30 p.m.

<table>
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<tr>
<th>REGION</th>
<th>PRESIDERS</th>
<th>ROOM</th>
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| Affiliate-at-Large & Canada | Paul Alves, Resource Teacher – Mathematical Literacy, Peel District School Board, Ontario, Canada  
Carol Matsumoto, Retired, Winnipeg, Manitoba, Canada  
Dianna M. Sopala, Northern Valley Regional High School New Jersey, Demarest, New Jersey | Atrium 1 |
| Central | Ben Lawson, Student Affiliate Representative, Bowling Green State University Graduate Student  
Jackie Murawski, STEM Instructional Coach, Skokie/Morton Grove School District 69, Skokie, Illinois  
Marci Ostmeyer, Professional Development Director, Columbus, Nebraska | Platinum D |
| Eastern | Joanna Burt-Kinderman, District Math Coach, Pocahontas County Schools, Buckeye, West Virginia  
Jeffrey Corbishley, 6-12 Math and Science Supervisor Ridgefield Public Schools, Ridgefield, Connecticut | Georgia |
| Southern | Ryan Nivens, Professor, Clemmer College at ETSU, Johnson City, Tennessee  
Bernard Frost, Executive Director of Curriculum and Instruction, Moore, South Carolina | Platinum FG |
| Western | Sean Nank, Teacher in Residence and Adjunct Professor at California State University San Marcos  
Kim Zeydel, Educational Therapist/Dyslexic Specialist, McCall, Idaho | Platinum E |
Wednesday Afternoon Session  4:00 p.m.–4:30 p.m.

1  Annual Meeting Overview and Orientation
   General Interest Session
   LA Convention Center, 152
   Whether you are new to NCTM or a seasoned veteran, there is something new at the conference for everyone! Hosted by members of the Board of Directors, this session will show you how to maximize your overall conference experience. Learn all the new, innovative aspects this year’s meeting is showcasing or discover something you’ve missed in the past. Find out how to navigate presentations, learn to use the Conference App, and take the opportunity to network with other attendees.
   Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia

Wednesday Evening Session  5:30 p.m.–7:00 p.m.

2  Opening Session: Making Numbers Count
   General Interest Session
   LA Convention Center, Hall B
   Chip Heath, one of the authors of Making Numbers Count: The Art and Science of Communicating Numbers, will share his perspective on communicating and understanding numbers and data. While understanding numbers is essential, historically humans have struggled to understand them.
   Chip Heath, Stanford Graduate School of Business, California
   Opening Session Sponsored by Big Ideas Learning

Don’t miss the Mathematics Education Trust Celebration Party sponsored by Forrest T. Jones & Company on Wednesday evening after the Opening Session.
Thursday Morning Session

3  Annual Meeting Overview and Orientation
   General Interest Session
   LA Convention Center, 152
   Whether you are new to NCTM or a seasoned veteran, there is something new at the conference for everyone! Hosted by members of the Board of Directors, this session will show you how to maximize your overall conference experience. Learn all the new, innovative aspects this year’s meeting is showcasing or discover something you’ve missed in the past. Find out how to navigate presentations, learn to use the Conference App, and take the opportunity to network with other attendees.
   NCTM Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia

Thursday Morning Session

4  Seventy-First Annual Delegate Assembly
   General Interest Session
   LA Convention Center, 151
   This session is a forum for designated delegate leaders of NCTM Affiliates to make recommendations to the NCTM Board of Directors concerning activities and policies of NCTM and mathematics education.
   Member and Affiliate Relations Committee, National Council of Teachers of Mathematics, Reston, Virginia
   Delegate check-in from 7:00 a.m. – 7:25 a.m. Coffee and tea will be served.
Thursday Morning Sessions

8:00 a.m.–9:00 a.m.

5  (En)visioning Mathematical Tasks through Culturally Rich, Content-Invisible Literature
   PreK–2 Session
   LA Convention Center, 501 A
   The design of a paramount task is an extension of a worthwhile task that allows children to explore connections to community and culture. In this session, teachers will have the opportunity to build a foundation for students’ algebraic thinking by creating a paramount task from a culturally rich, content-invisible children’s book.
   Kelley Buchheister, University of Nebraska-Lincoln
   Twitter: @kelleybuck07
   Christa Jackson, Saint Louis University, St. Louis, Missouri
   Cynthia Taylor, Millersville University of Pennsylvania

6  In Their Own Words: Getting the Most out of the Lesson Objective
   PreK–2 Session
   LA Convention Center, 411
   “Today we are going to learn about…” Isn’t that how most lessons begin? Let’s shift the paradigm to refrain from announcing the objective, and instead close with a “Math Meeting” where students debrief the lesson experience. The result is reflective students arriving at an authentic understanding of concepts expressed in their own words.
   Melanie Gutierrez, Great Minds, Philadelphia, Pennsylvania

7  All Kids Are Math Kids: Exploring Strategies for Equitable Engagement in Math Learning
   3–5 Session
   LA Convention Center, 150 A
   For so many students, math learning is burdened by counterproductive struggle rooted in systems of inequity. This session explores two principles of equitable student engagement: (1) All students should be represented in math learning; and (2) asking “friendly questions” as on-ramps to complex problems helps all students feel safe in math learning.
   Shaka Phillips, Zearn, New York, New York

8  In Their Shoes: Journey Mapping a Mathematics Lesson
   3–5 Session
   LA Convention Center, 410
   Are you prepared to meet the needs of all students, especially multilingual learners and students who need support to stay engaged? Do you ever wonder what lessons are like for your students? Interactive Journey Mapping will explore common learning barriers and how to use the Universal Design for Learning Guidelines to address variability.
   Laura Marie Coleman, Great Minds, Washington D.C., District of Columbia
   Twitter: @teach2abilties
   LaTonya Snell-Lockhart, Great Minds PBC, Plaquemine, Louisiana

9  Using Technology to Support Inclusive and Accessible Math Instruction
   3–5 Session
   LA Convention Center, 511 AB
   Technology has an amazing potential to help students learn, but many digital products aren’t built on the research-based approaches teachers use every day in the classroom. This session explores how we can assess and leverage engaging educational technology that builds deep understanding and facilitates inclusive and accessible math learning.
   C. Kyle Falting, Zearn, New York, New York

10 Opening Math Pathways to Each Student: Our Journey from One School to District Wide
    6–8 Session
    LA Convention Center, 511 C
    North Clackamas, South Dakota, is constructing a more equitable mathematics pathway for all learners. Two teachers and one district coach will share our ongoing journey as we have moved from a grassroots movement at one school to a district-wide initiative to change mindsets, teaching practices, and district structures, highlighting our successes and struggles.
    Kristen Faust, North Clackamas School District, Happy Valley, Oregon
    Twitter: @kristen_faust
    Mary Richards, Alder Creek Middle School, Milwaukie, Oregon
    Tracy Fischer, Alder Creek Middle School, Milwaukie, Oregon

Need funding for professional development? Check out grant opportunities from the Mathematics Education Trust at nctm.org/grants. The next deadline to apply is November 1. Visit the MET area in NCTM Central to learn more.
11 Supporting Language Learners Using Desmos: Vignettes from the Classroom
   6–8 Session
   JW Marriott, Platinum D
   Bellevue School District has been focused on supporting language learners in mathematics. In partnership with Desmos, we have been working on amplifying students’ voices to ensure each and every student has a way to access and engage in learning mathematics. Vignettes of teacher and student voices tell the story of success and lessons learned.
   Paul Conley, Bellevue School District, Washington
   Stephanie Blair, desmos, San Francisco, California

12 Teaching Proportional Relationships: A Japanese Perspective
   6–8 Session
   JW Marriott, Georgia
   In a typical middle-grades curriculum, proportional relationships are formally discussed after ratios and rates. In contrast, the Japanese curriculum begins the study of this topic before students learn ratios. The Japanese approach may offer some insights into teaching of proportional relationships as well as ratio/rate reasoning.
   Tadanobu (Tad) Watanabe, Kennesaw State University, Georgia
   Twitter: @watanabeKSU

13 Transforming Mathematics through Culturally Responsive Instruction
   8–10 Session
   JW Marriott, Atrium III
   In this session, the presenters will share the work of the Tri-County Culturally Responsive Mathematics Institute. This collaborative project with teachers and students was designed to provide opportunities to learn how to engage all students in meaningful culturally responsive mathematics, to increase engagement and relevance to all students.
   Jennifer Banks, Washtenaw Intermediate School District, West Bloomfield Township, Michigan
   Cherron Ramsey, Wayne RESA, Michigan
   Yarisha Johnson, Farmington Hills, Michigan

14 Using Pictures to Teach Math
   8–10 Session
   JW Marriott, Platinum $
   We discuss how to use visualizations like tables and animations to teach math across the K–12 curriculum. Visual tools keep all students actively engaged and strengthen mathematical confidence. Sharing student examples and experiences from our teaching, we will show how these strategies foster a common mathematical language across grade levels.
   Bobson Wong, NYC Department of Education, Whitestone, New York
   Twitter: bobsonwong
   Larisa Bukalov, NYC Department of Education, Flushing, New York

15 The Status Quo in High School Mathematics Is Unacceptable
   10–12 Session
   LA Convention Center, 405
   Today, it seems as if nearly everyone agrees that mathematics needs to change. For far too long, math has not worked for far too many students. Math has not changed substantially in my lifetime, nor has it changed substantially for most students, teachers, and schools. It is clearly an issue—and it is time to discuss and make serious changes.
   Eric Milou, Rowan University, Sewell, New Jersey
   Twitter: @drMi

16 What Is an Infinite Series, and Why Is It Important?
   10–12 Session
   JW Marriott, Platinum FG
   What is an infinite series, and why is it important? Students can work with them, but do they understand what the things are? Combine History with arithmetic, analysis, technology, and symbolic representation to develop a visceral understanding of what a series is and why they are ever so cool, including the tricky ideas of error and convergence.
   Ruth Miller, Kent Denver School, Englewood, Colorado
   Twitter: @rm11235813
Thursday Morning Sessions 8:00 a.m.–9:00 a.m.

17 Improving Instruction and Identity: Lessons Learned from Student Math Portfolios
Coaches/Leaders/Teacher Educators Session
LA Convention Center, 503
What can we learn from using student portfolios? In 2021 algebra teachers from across the country took part in a cohort dedicated to collaboratively designing tasks and analyzing student work to make instructional decisions. This session shares the learning from participants about growing students’ math ability and identity through math portfolios.
Geoff Krall, University of Wyoming, Laramie
Twitter: @geoffkrall

18 The Journey toward Equitable and Anti-Oppressive Mathematics in Canada’s Largest School District
Coaches/Leaders/Teacher Educators Session
JW Marriott, Platinum E
The Toronto District School Board is dismantling systemic barriers to high-quality mathematics that have disproportionately harmed racialized students. In this session, the presenters describe the district’s eight-year journey to eliminate tracking/streaming, the learning of its teachers, and the promise detracking brings for students in mathematics.
Jason To, Toronto District School Board
Alison Gaymes San Vicente, Toronto District School Board, ONT Northwest Territories

19 Equity and Access in the Thinking Classroom
General Interest Session
LA Convention Center, Hall B
In this talk I will look specifically at the ways in which the Building Thinking Classroom practices help to create greater equity and access in the classroom. The practices discussed will intertwine with the recently published book Building Thinking Classrooms in Mathematics (Grades K–12): 14 Teaching Practices for Enhancing Learning.
Peter Liljedahl, Simon Fraser University, Burnaby, British Columbia
Twitter: @pgliljedahl

21 UDL Math: A Framework for Designing Inclusive Mathematics Classrooms
General Interest Session
LA Convention Center, 404
Universal Design for Learning presents a vision of math classrooms without barriers for students with disabilities, but how do we put this vision into practice? UDL Math is a framework and design process created by Dr. Rachel Lambert to align UDL principles with best practices in mathematics education, with strategic sense making at the center.
Rachel Lambert, University of California Santa Barbara, Isla Vista
Twitter: @mathematize4all
22.1 One Task, Many Ways to Solve

PreK–2 Exhibitor Workshop
LA Convention Center, 513

In this session, we focus on a classroom routine that explores multiple approaches to solving a given problem. This lesson helps teachers differentiate as well as make connections between current learning and prior learning. By employing various methods, students use creative thinking and listening to iterate ideas offered by their peers.

Think! Mathematics, Neptune Beach, Florida

22.2 What Does Problem-Based Learning Unlock for Students? Presented by Kristin Gray

General Interest Exhibitor Workshop
LA Convention Center, 510

Problem-based math instruction helps teachers set the stage for memorable learning experiences and transfer the responsibility for the learning to students. Doing so helps develop students’ problem-solving and reasoning skills. Learn how this type of instruction engages all students in grade-level math, every day.

Amplify, Brooklyn, New York

22.3 CATS CATS CATS: Using Math and MATLAB to Model Stray Cats

10–12 Exhibitor Workshop
LA Convention Center, 514

We’ll discuss (unpaid) cats and overpopulation to demonstrate the math modeling process with computing tools like MATLAB. Open-ended problems are a hallmark of M3 Challenge (ex: modeling substance abuse, value of STEM degree, optimum recycling strategy, placing internet cell towers, more). Free resources and participation prizes for attendees.

MathWorks Math Modeling Challenge, a program of SIAM, Philadelphia, Pennsylvania

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Visit the NEW NCTM BOOKMOBILE! Conveniently located in Hall A, shop for books and products and save up to 30% plus get free book shipping* for online bookstore purchases.
### Thursday Morning Workshops

8:00 a.m.–9:15 a.m.

#### 23 Counting and Place Value: How Are They Connected?
- **PreK–2 Workshop**
- LA Convention Center, 409

We will examine K–1 video to unpack the many aspects of counting—by 1s and groups—and to think about how this work builds a foundation for and supports students in making sense of place value. We will also think about how lingering and going deep with these ideas can support K–1 students in developing a strong sense of agency and identity.

**Megan Murray,** TERC, Cambridge, Massachusetts  
**Karen Economopoulos,** TERC, Cambridge, Massachusetts

#### 24 Let’s Give Them Something to Talk About: Facilitating Meaningful Mathematical Discourse in PK–2
- **PreK–2 Workshop**
- JW Marriott, Platinum H13

To support the mathematics learning of all students, effective teachers establish an environment where students regularly engage in productive mathematics discourse. Attend this workshop to learn strategies to facilitate productive discourse and promote problem solving, reasoning, and critical-thinking skills in a student-centered classroom.

**Latrenda Knighten,** N/A, Baton Rouge, Louisiana  
Twitter: @Latrendak

#### 25 Play and Learn Math: Number Sense
- **PreK–2 Workshop**
- LA Convention Center, 502 B

Learn engaging activities and strategies to guide all students in developing robust number sense. Discover ways to strengthen student understanding of foundational number concepts, including number meaning and relationships, subitizing, early operations, patterns, and place value. Turn math learning into child’s play in your classroom!

**Susan Kunze,** Bishop Unified School District (retired), California  
Twitter: @CAMathqueen

#### 26 Empower All Student Voices! Facilitating a Mathematical Community That Lets Your Kids Talk!
- **3–5 Workshop**
- LA Convention Center, 408 B

Ensure that all student voices are heard by nurturing their ideas, questions, and arguments as budding mathematicians using talk moves. See how rich tasks foster all students’ mathematical agency, belonging, and joy. Learn how to engage students in mathematical discourse during your first 20 days of math class!

**Barbara Blanke,** Cal Poly, San Luis Obispo, California  
Twitter: @bblankedph  
**Kimberly Kelly,** San Luis Coastal Unified School District, San Luis Obispo, California

#### 27 Leveraging the SMP for Equity and Positive Math Identity
- **3–5 Workshop**
- JW Marriott, Platinum C

The goal of this session is to examine the Standards for Mathematical Practice and to connect each practice to instructional moves that support the development of positive math identity and equitable math practices. By engaging in math routines that focus on these standards, participants will discover the untapped power of the SMP.

**Deborah Peart,** UnboundEd, St Petersburg, Florida  
Twitter: @dpearth1  
**Adrienne Baytops-Paul,** UnboundEd.org, Upper Marlboro, Maryland

#### 28 Opening the Middle: Diverse Solution Paths to Enhance Mathematical Meaning (3–5)
- **3–5 Workshop**
- LA Convention Center, 403 B

Students may use their burgeoning number sense, familiar tools, and new strategies to crack open an unfamiliar problem. In this session, explore a framework to share, compare, and connect strategies that can lift and support divergent thinking, address common misconceptions, and make visible the efficiency of various problem-solving methods. (CGI)

**Jonelle Godfrey,** Great Minds, Washington, District of Columbia

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Broaden the Purposes of Learning Mathematics  
Create Equitable and Anti-Racist Structures in Schools and Systems  
Develop Deep Mathematical Understanding  
Implement Equitable Mathematics Instruction  
Position Assessment to Promote Equitable Practices and Support Student Learning  
Reimagine the Role of Technology in Mathematics Education  
Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
Thursday Morning Workshops

29. Bring the Standards of Mathematical Practices (SMPs) to Life!
   6–8 Workshop
   LA Convention Center, 403 A
   Sara Odioso, Nativity Prep Academy, San Diego, California
   Twitter: @Ms_Odisoso

30. Incorporating Mechanical Engineering into the Math Classroom to Develop Global Citizens
   6–8 Workshop
   LA Convention Center, 501 BC
   Krystal Carter, Hoover Middle School/ San Jose Unified School District, San Jose, California

30.1 Engaging ALL Students in Discourse with Math Language Routines
   6 – 8 Workshop
   LA Convention Center, 515 B
   Morgan Stipe, Open Up Resources, Carroll, Iowa
   Twitter: @mrstipi3emath
   Brooke Powers, Open Up Resources, Lexington, Kentucky

31. “Dear Math”—Understanding Student Math Identities through Storytelling
   8–10 Workshop
   JW Marriott, Platinum AB
   Sarah Strong, High Tech High, San Diego, California
   Twitter: @sstrong57

32. Designing for Joy and Thinking
   8–10 Workshop
   LA Convention Center, 502 A
   Kirsten Dyck, Prairie Spirit School Division, Warman, Saskatchewan
   Twitter: @KirstDy

33. Utilizing the History of Math to Teach Algebra and Geometry
   8–10 Workshop
   LA Convention Center, 152
   Matthew Beyranevand, Chelmsford Public Schools, Massachusetts
   Twitter: @mathwmatthew

34. Industry-Inspired Activities That Connect Industry to Mathematics Instruction
   10–12 Workshop
   LA Convention Center, 406
   Jay Martin, Wake Technical Community College, Willow Springs, North Carolina
   Julia Smith, Wake Technical Community College, Raleigh, North Carolina
Thursday Morning Workshops

8:00 a.m.–9:15 a.m.

35 Making Sense of Inference for Sampling and Experiments
10–12 Workshop
LA Convention Center, 402
How can we help students make sense of important statistical concepts like margin of error and P-value? In this session, we’ll explore two simulation activities—one for sampling and one for experiments—that help students unravel the logic of confidence intervals and significance tests, as well as the appropriate scope of inference.
Daren Starnes, Independent Consultant, Hilton Head, South Carolina
Josh Tabor, The Potter’s School, Oro Valley, Arizona

36 SEL, PBL and Social Justice: The Right Combination for Empowering and Effective Mathematics Learning
10–12 Workshop
LA Convention Center, Petree C
In weaving social justice, SEL, and PBL as an integrative teaching and learning approach, students can be more engaged in the mathematics learning—not only better exploring and understanding cultural, community, and global problems, but can also be empowered to more appropriately use mathematics as a tool for affecting social change.
Lorraine Howard, Women and Mathematics Education, Seattle, Washington

37 CANMEE Lesson Study: Focal Students Becoming Proficient in Grade-Level Mathematics
Coaches/Leaders/Teacher Educators Workshop
LA Convention Center, 515 A
CANMEE lesson study incorporates the dual focus of mathematics excellence and equity in order for focal (underserved) students to become grade-level proficient. This session will highlight the roles and responsibilities of teachers and teacher leaders in the lesson study cycle to enhance and maintain the dual focus.
Susie Hakansson, Independent Consultant, Venice, California
Twitter: @SusieHakansson
Doreen Lance, California Mathematics Project: North Coast
Santa Rosa, California

38 Digital Classrooms and OER with GeoGebra for Formative Assessment and Student Collaboration
Coaches/Leaders/Teacher Educators Workshop
LA Convention Center, 308
This interactive workshop will address how to use free software like GeoGebra with open educational resources (OER) so teachers can incorporate digital tools for a modern age. We will cover how to create online synchronous interactive lessons with a variety of features and how to smoothly integrate these technologies into various classroom formats.
Monique Zhou, GeoGebra Foundation, San Jose, California
Twitter: @math_monique

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NCTM District Solutions
Strengthen Mathematics Teaching and Learning

New! ESSER Product Packages

NCTM's publication and professional resource packages align with ESSER Funding uses, focus on systemic change and support teachers for improved instructional practices and better student experiences and outcomes.

The U.S. Congress has allocated $190 billion in funding for schools through the Elementary and Secondary School Emergency Relief (ESSER) Fund. There is a significant portion of these funds that have been designated for addressing and responding to the impacts on student learning influenced by COVID.

ESSER Funding Supports

- Assessment and Engagement
- Instructional Materials
- Professional Development

Visit NCTM District Solutions nctm.org/districtsolutions for information on available products.
Thursday Morning Sessions

39 Number Bonds: The Foundation of Number Sense
PreK–2 Session
LA Convention Center, 410
Composing and decomposing numbers is a critical component of number sense. Let’s explore how to introduce number bonds to our youngest learners using the concrete-pictorial-symbolic model and learn new strategies to include number bonds daily—in number talks, problem solving, and fact fluency. Learn ways to build flexible, fluid learners.

Ricky Mikelman, Great Minds, Houston, Texas

3–5 Session
LA Convention Center, 306
This proposal features GeoComputation, integrated mathematics and computer science curriculum developed by an author’s research lab for an elementary geometry class. This curriculum stems from a critical inquiry model aimed to cultivate equitable opportunities. Teachers will learn the specific mathematical tasks for grade 4–6 classrooms.

Eunhye Flavin, Boston College, Quincy, Massachusetts
Twitter: @unhye Cho Flavin

41 The Power of CGI and Multiplication Fluency.
3–5 Session
LA Convention Center, 410
Multiplication fluency no longer needs to be the crutch in a student’s mathematical journey. With the use of CGI, learn concrete and permanent strategies that work with all students.

Jason Holloway, Lake Elsinore Unified School District, California
Twitter: @cgijason

42 Catalyzing Change: Broaden the Purposes of Learning Mathematics in Middle School
6–8 Session
LA Convention Center, 151
Join us for a closer look at the first key recommendation of Catalyzing Change in Middle School Mathematics: Broaden the Purposes of Learning Mathematics. We will engage in the different purposes and discuss beginning action steps for building them into your mathematics program!

Sarah Bush, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; University of Central Florida, Winter Park
Twitter: @sarahbush

Christa Jackson, Saint Louis University, St. Louis, Missouri
George Roy, University of South Carolina, Columbia

43 Engaging All Learners in Doing Mathematics
6–8 Session
LA Convention Center, 405
If we believe that learning mathematics is social, then we need to provide tasks that allow for discussions among students. Selecting better tasks and asking better questions to engage all learners must be at the forefront of our pedagogical content knowledge. What types of tasks are better than others? I hope we strive to find some answers!

Fawn Nguyen, Rio School District, Somis, California
Twitter: @fawnnguyen

44 Strategies to Enhance Long-Term Learning
6–8 Session
LA Convention Center, 150 A
Do your students forget what they have learned? Are you interested in strategies that will boost student learning and can be implemented in your limited class time? In this session, explore powerful strategies to improve learning retention and to develop a process to include these strategies in your classroom.

Emily Koesters, Great Minds, Dandridge, Tennessee

45 Creating Mathematical Possibility by Constraining Mathematical Possibility
8–10 Session
LA Convention Center, Hall B
Rich mathematical activity is often associated with open problems, and we rarely pair the limits on student actions with an increase in mathematical possibility. However, in this session we consider how playing with what is forbidden in a mathematical task can help us design and use problems that open doors to deep mathematical understanding.

Nat Banting, Saskatoon Public Schools, Saskatchewan
Twitter: @NatBanting

46 STEMpowering Student Learning with Motion Tracking Software, Spreadsheets, and Mathematical Modeling
8–10 Session
LA Convention Center, 511 AB
Make classroom mathematics mirror the mathematics of today’s technological world. Participants in this session will learn how to implement high-quality tasks using free motion-tracking software, spreadsheets, and forms. Student data creation, collection, and modeling will culminate with student questioning and connection of representations.

Alexander Fischer, H.D. Jacobs High School (CUSD#300), Algonquin, Illinois
Adam Stromberg, H.D. Jacobs High School (CUSD#300), Algonquin, Illinois
Thursday Morning Sessions

47  Using a Blended Learning Model to Create a Language-Rich Classroom in Which All Students Can Thrive
8–10 Session
LA Convention Center, 501 A
Teachers can harness the capabilities of technology to personalize instruction for students and support students’ linguistic background. We will use Desmos Activities to help create language-rich, interactive, blended mathematics classrooms.
Martin Cardenas, Grand Prairie ISD, Texas
Twitter: @MartyCMath

48  Building Student Agency through HS Math Pathways
10–12 Session
JW Marriott, Atrium III
Participants will be introduced to an initiative to modernize HS math pathways; examine design principles to guide critical conversations happening at schools and districts about pathways; and hear students’ perceptions of pathway courses such as data science to identify how they experience agency, authority, and identity within these courses.
Erica Heinzman, UC San Diego, EDS, California
Twitter: @eheinzman1
Josh Recio, Dana Center at UT Austin, Texas

49  Mastery-Based Learning with Twists: A Student Success Story
10–12 Session
JW Marriott, Georgia
Mathematics is a lifelong learning process, and the time needed to master concepts varies. This presentation focuses on the evolution of mastery-based learning at St. Peter HS, which combines student agency, nonpermanent vertical learning, triangulation of evidence, and growth mindsets to ensure student success by eliminating timing parameters.
Mark Couturier, OCSB, Orleans, ONorthwest Territories

50  Project-Based Assessment in the Math Classroom
10–12 Session
LA Convention Center, 411
This session aims to look at how we successfully implemented project-based assessments into our math courses that made students excited about applying their knowledge from the course to a practical topic. Participants will see a sample project that can be used as a base for bringing project-based assessments to their hybrid classrooms.
David Postlethwait, Gar-Field High School, Woodbridge, Virginia
Twitter: @MrPostGFHS
Jeannette Newman, Gar-Field Senior High School, Woodbridge, Virginia
Shannon Miller, Gar-Field High School, Woodbridge, Virginia

51  Teaching Calculus Starts in Algebra 1: How We Can Better Prepare All Students for Calculus
10–12 Session
LA Convention Center, 407
The conceptual understandings of calculus start as early as algebra 1, and the way that we teach certain concepts such as slope matter a great deal for how students understand and conceive of these ideas. Being more intentional with how we discuss algebra 1 content can help all of our students be better prepared to be successful in calculus.
Joseph Obrycki, Niles Township Schools #1F, Skokie, Illinois

52  Harnessing the Power of Teacher Collaboration through Unit Planning
Coaches/Leaders/Teacher Educators Session
JW Marriott, Platinum D
Join us as we model unit planning to foster teacher collaboration over standards. This process ensures teachers walk away with a common understanding of learning expectations for students. We will use the tenets of backward design and a universal template to increase teacher clarity. You’ll walk away ready to facilitate this process with teams!
Austin Greene, Greenville County Schools, South Carolina
Twitter: @austingeene5
Stephanie Burdette, Greenville County Schools, South Carolina
Kristen Griffin, Greenville County Schools, South Carolina

Broaden the Purposes of Learning Mathematics
Create Equitable and Anti-Racist Structures in Schools and Systems
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9:30 a.m.–10:30 a.m.
Thursday Morning Sessions

9:30 a.m.–10:30 a.m.

53  Number Lines and Grids as Math Objects That Support Students in Building Deep Math Understanding
    Coaches/Leaders/Teacher Educators Session
    LA Convention Center, Petree D
    This session will illustrate the purpose and value of number lines and grids as objects-to-think-with. These spatial objects help all students access complex mathematics ideas so that they are personally relevant and meaningful. Participants will go on a journey of epic visual-spatial proportions from research to classroom implications!
    Catherine Bruce, Trent University, Peterborough, ON
    Twitter: @drcathybruce
    Jessica Bodnar, Waterloo District School Board, ON Northwest Territories

54  Grants, Scholarships, and Awards for NCTM Members
    General Interest Session
    JW Marriott, Platinum FG
    Looking for funding for a special project, coursework, or professional development? NCTM’s Mathematics Education Trust (MET) has over 30 different grants, scholarships, and awards available to NCTM Members. Get information on all of these different opportunities to improve the mathematics teaching and learning in your classroom, school, or district.
    Laurie Boswell, MET Board of Trustees, Reston, Virginia

55  Honoring Student Thinking
    General Interest Session
    JW Marriott, Platinum E
    Students have brilliant mathematical ideas. How do we create an environment where we honor student thinking to help show that math belongs to everyone? This session will review ways of showing that everyone is a math person.
    Howard Hua, Fresno State, California
    Twitter: @howie_hua

56  Standing Room Only: Use Vertical Whiteboards to Transform How Students Interact with Each Other
    General Interest Session
    LA Convention Center, 503
    Do you want a classroom buzzing with student math discussion day after day? Do you want your students to look to one another for support before they look to the teacher? Using standing whiteboards and randomized groups, the teacher can transform how students interact with the math, with one another, and with the teacher. See one implementation here.
    Dan Anderson, Shenendehowa High School, Clifton Park, New York
    Twitter: @dandersod

57  Expand K–12 Teachers’ Mathematics Content Knowledge with an Interactive Online Tool
    Higher Education Session
    LA Convention Center, 511 C
    Come experience an online learning platform that we use to help prospective teachers expand their understandings of math content and how to use online learning tools using best practices in K-12 settings. Details of how we use the platform, data on successes, and other possible uses for ongoing teacher professional development will be shared.
    Babette Benken, California State University, Long Beach, Seal Beach
    Steve Alfi, California State University, Long Beach

Mingle, explore, and learn in the Exhibit Hall and NCTM Central!
Thursday Morning Sessions

9:30 a.m.–10:30 a.m.

57.1 Break the Forgetting Cycle with Get More Math! Josh Britton Shares Long-term Retention Strategies

*General Interest Exhibitor Workshop*
LA Convention Center, 512

By the end of the school year, students have already forgotten many of their hard-won math concepts. How can we break the forgetting cycle and make math stick? In this session, veteran math teacher Josh Britton will share his proven model for driving long-term retention through use of Get More Math software.

**Get More Math!,** Sonora, California

57.2 Hands-On Manipulatives + Real-Time App Feedback = An Equation for Success with Owlet Math Tools

*Coaches/Leaders/Teacher Educators Exhibitor Workshop*
LA Convention Center, 514

Developed as part of a 5-year NSF-funded research study, Owlet’s two manipulatives, Glow and Cube, combine with digital apps to make abstract math concrete for grades K-5. Get hands-on with us and learn how these brand-new manipulatives can provide safe, fun, and interactive explorations of math concepts for your students.

**BirdBrain Technologies,** Pittsburgh, Pennsylvania

57.3 How to Put the “Productive” into the “Struggle” in the Math Classroom

*3–5 Exhibitor Workshop*
LA Convention Center, Exhibit Hall 1

Join us in diving through the process of productive struggle. Help students face problems in math and develop grit and creative problem solving techniques. Learn how to provide your students with opportunities to share their reasoning and celebrate the different ways of thinking.

**STEMscopes,** Houston, Texas

57.4 No More “I’m not a math person”: How Your Students Can Gain Fluency and Confidence in Math

*Coaches/Leaders/Teacher Educators Exhibitor Workshop*
LA Convention Center, 510

Everyone learns in different ways and IXL has everything you need to make math more approachable for a variety of learners. Through an easy-to-use, all-inclusive platform, IXL provides a robust K-12 math curriculum and instructional resources, actionable analytics, and a state-of-the-art assessment suite. Join us to learn how you can uncover hidden potential.

**IXL Learning,** San Mateo, California

57.5 Effectively Incorporating the 5 Practices into Daily Math Instruction

*Coaches/Leaders/Teacher Educators Exhibitor Workshop*
LA Convention Center, 513

Promoting productive conversations between students and teachers is essential to success in a problem-based classroom. The 5 Practices for Orchestrating Productive Mathematical Discussions can be used to build a class community where students enjoy math and make connections. Attendees will learn how to guide discourse and synthesize understanding.

**Imagine Learning,** Scottsdale, Arizona
### Thursday Morning Workshops

#### 9:45 a.m.–11:00 a.m.

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<td>What We’re Learning to Ask about Weaving Mathematics and Equity during Classroom Talk: Grades 3–5</td>
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<td>LA Convention Center, Petree C</td>
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Thursday Morning Workshops

9:45 a.m.–11:00 a.m.

64. Analyzing Contexts and Models: A Reasoning Routine to Ensure All Students Can Mathematize Their World

6–8 Workshop
LA Convention Center, 515 A

Modeling with mathematics develops student agency and prepares them to engage in a complex, ever-changing world. Learn a reasoning routine that explicitly and repeatedly leverages students’ diverse experiences to interpret a real-world situation and analyze a mathematical model of it— with inclusive strategies to provide access for all students.

Amy Lucenta, Fostering Math Practices, Natick, Massachusetts
Twitter: Amy C Lucenta

Grace Kelemanik, Fostering Math Practices, Natick, Massachusetts

65. Promoting Mathematical Identities through Questioning; A Formative Exercise

6–8 Workshop
LA Convention Center, 308

Good formative questions promote thinking and engagement. Teachers gain valuable insight into the depth of understanding of math content and can offer scaffolding and feedback that is specific and timely. Formative practice assists teachers in understanding their students’ identity overall, and more specifically, their mathematical identity.

Tammy Baumann, NWEA, Erie, Pennsylvania
Fenesha Hubbard, NWEA, Portland, Oregon

66. Scaling It Up: Modeling with Scale and Dilation in the Middle Grades

6–8 Workshop
LA Convention Center, 408 B

Mathematical modeling increases students’ ability to apply the reasoning they learn in math class to situations in the real world, but finding authentic low floor/high ceiling tasks can be daunting. Experience two open-ended modeling tasks focused on scale and dilation in the middle grades that are based on students’ everyday experiences.

Chris Black, Great Minds, Washington, District of Columbia
Leah Childers, Great Minds/Eureka Math, Pittsburg, Kansas

66.1. Marriage of Mathematics Education and Special Education: Supporting Students Who Struggle in Mathematics

Linking Research and Practice Workshop
LA Convention Center, 153 BC

The achievement gap between high-performing and low-performing has surpassed historical levels due to recent events. This collaborative problem-solving session is a call to action for strong collaborations between the fields of math ed and special ed. This session is a call to action and an opportunity for teachers and researchers in math ed and special ed to come together to 1) identify interest; 2) brainstorm potential areas of need and associated research questions; and 3) start to catalyze high-priority research studies in a collaborative way that honors the integrity of each discipline.

Barbara Dougherty, Retired, University of Hawaii, The Villages, Florida
Karen Karp, Johns Hopkins University, Baltimore, Maryland
Asha Jitendra, University of California-Riverside
Russell Gersten, University of Oregon, Instructional Research Group, Los Alamitos, California

67. Prompting Students to Create Story-Based Math Tasks from the Problems of Their Lives

8–10 Workshop
LA Convention Center, 502 B

Students ask, “When will I use this?” We can help them answer this question themselves. In this session, we will use the framework of reversibility, flexibility, and generalization questions with cognitively demanding tasks to guide our students’ creation of story-based math tasks that integrate mathematical concepts into their daily lives.

Bill DeLeeuw, Brigham Young University – Idaho, Rexburg

68. So Much Is Out There! Evaluating Tasks We Find Online

8–10 Workshop
LA Convention Center, 409

Mathematical learning hinges on selecting a good task. Given the volume of tasks and lessons available online, we often have to sort through many tasks or lessons just to find one to use with students. I will share techniques to find, evaluate, and implement high cognitive-demand tasks that attend to learning goals of a lesson and students’ needs.

Jenny Sagrillo, University of Wisconsin–Milwaukee
Twitter: @jsagrillo

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9:45 a.m.–11:00 a.m.

69 Enhancing Secondary Math Instruction with Scratch Coding
10–12 Workshop
LA Convention Center, 152
Coding is a great way to encourage, explore, and assess mathematical thinking. This hands-on, minds-on session will lead participants in various activities from a three-course hybrid math and computer science curriculum (algebra, geometry, and algebra 2). Lessons will include instruction using Scratch, the popular online coding platform.
Dan Shuster, Simi Valley USD, California
Twitter: @DanShuster

70 Multiple Representations = More Reasoning, More Sense Making, and Deeper Mathematical Understanding
10–12 Workshop
LA Convention Center, 150 BC
Engage in rich tasks that surface key concepts about what it means for a function to be quadratic. The low-threshold and high-ceiling tasks that are shared will promote access and equity through the use of multiple representations. Student work and classroom video will illustrate the nature of student engagement and learning task-based learning progressions.
Travis Lemon, Alpine School District, Lehi, Utah
Twitter: @TravisLemon

71 Student Grouping Structures That Support Discourse and Peer Feedback
10–12 Workshop
LA Convention Center, 501 BC
Are your high school students reluctant to explain their thinking, defend their conjectures, and listen to their peers? Come to this session to experience classroom structures that will empower students to talk about mathematics and provide feedback to peers. A collection of open-ended questions and problems that stimulate discourse will be shared.
Connie Horgan, Self, Sun City West, Arizona
Amy Herman, HMH, Boston, Massachusetts

72 Math for All: Universal Design for Learning in a Standards-Based Classroom
Coaches/Leaders/Teacher Educators Workshop
JW Marriott, Platinum C
Comprehension of mathematics can be improved for all students by using principles of universal design for learning in a unified approach of curriculum planning and pedagogy. The presentation will show how support practices traditionally used for accommodations to specialized subpopulations can benefit the entire spectrum of learners.
Naomi Church, Growing Minds Consulting, LLC, Deerfield Beach, Florida
Twitter: @growingleads12

73 Reimagining the Role of Technology in Math Class
Coaches/Leaders/Teacher Educators Workshop
LA Convention Center, 406
Engage students with technology that incorporates virtual manipulatives and rigorous math tasks. Brainincamp’s synchronous tool allows educators to view, assess, and provide feedback for every student while using our virtual manipulatives. Intuitive and engaging, it is perfect for online, hybrid, and in-person instruction. Bring a device!
Dan Harris, Brainincamp, Austin, Texas
Mark Schmit, Brainincamp, Austin, Texas

74 Toward a Queer PK–12 Mathematics
Coaches/Leaders/Teacher Educators Workshop
JW Marriott, Platinum AB
This workshop will move beyond conversations of “LGBTQ+ 101,” creating physically safe/tolerant classrooms, and entering queer trauma to justify the need for such supports. Instead we will consider how mathematics reinforces heteronormativity and the use of queer pedagogy to create humanizing mathematics experiences for LGBTQ+ students.
Brandie Waid, The Queer Mathematics Teacher/Radical Pedagogy Institute, West Orange, New Jersey
Twitter: @MathTeach_BEW

75 New Teacher Kickoff
General Interest Workshop
LA Convention Center, 408 A
Do you have questions on how to make it all work? Together we have answers and ideas on management, parents, homework, keeping your sanity, and more. Join other early-career teachers and those still in school to learn some strategies for addressing your most pressing problems. We’ll have prizes and good ideas! All are welcome!
David Barnes, National Council of Teachers of Mathematics, Reston, Virginia
New Teacher Strand sponsor Knowles Teacher Initiative

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Thursday Morning Sessions

11:00 a.m.–12:00 p.m.

76 Creating Equitable Systems for the Struggling Student

PreK–2 Session
LA Convention Center, 511 AB
How can we create an environment in which all students are successful in grades K–2? We will look at systematic ways that we can improve learning in math classrooms. We will focus on creating equitable practices in the math classroom for the teacher and the learner.

Jonathan Regino, Marple Newtown School District, Newtown Square, Pennsylvania
Twitter: @jred530

77 A Place of Belonging

3–5 Session
LA Convention Center, 150 A
Math is for everyone, therefore students should feel a sense of belonging in the classroom. In this session, we will suggest easy-to-implement teaching practices that support a diverse student population. Creating an inclusive environment takes intentional decision-making, which will be at the heart of these fundamental practices.

Marni Driessen, Omaha Public Schools, Nebraska
Twitter: @MarniDriessen
Lisa Holland, Omaha Public Schools, Nebraska
Anthony Moss, Omaha Public Schools, Nebraska

78 Empower or Bust: Affirmations, Engagement, Content, and Relationship with Students

3–5 Session
LA Convention Center, 503
The speaker will provide a shared vision into equitable mathematics instruction via classroom video, then showcase four strategies for this effort, and introduce specific challenges for effecting change. The four strategies include (1) communicating unique affirmations, (2) using engaging discourse, (3) selecting meaningful content, and (4) building relationships with students.

Thomasenia Lott Adams, University of Florida, Gainesville
Twitter: @TLAMath

79 Let’s Start with a Story! Using Story Context to Ignite Deep Understanding of Fractions and Decimals

3–5 Session
JW Marriott, Platinum FG
How can we help students deepen their understanding of fractions and decimals? How can we help them move beyond numbers and algorithms? Join us to explore the benefits of teaching through context as we focus on story-related math explorations. Gather ideas for providing rich experiences that challenge students to make sense of the mathematics.

Susan OConnell, Quality Teacher Development LLC, Millersville, Maryland
Twitter: @SueOConnellMath

80 Fostering Intervention Equity in a Core Middle School Mathematics Classroom

6–8 Session
LA Convention Center, 407
Do you struggle finding ways to provide intervention to students in your core middle grades math classroom? With only so much time in the day, we often have to provide intervention in the every day classroom. We will take a look at ways to intervene and resources to help students needing Tier 2 and Tier 3 supports in the everyday classroom.

Michael Wagner, Houghton Mifflin Harcourt, Bethlehem, Pennsylvania

81 Practical Measures to Promote Equitable Middle-Grades Math Instruction

6–8 Session
JW Marriott, Atrium III
Practical measures are essential tools for teachers engaged in creating equitable classrooms that promote agency for all students. Participants will learn about a free repository of practical measures for middle school teachers. This easy-to-use repository includes measurement tools, measurement guides, and cases from authentic classroom settings.

Kirk Walters, WestEd, Hyattsville, Maryland
Angela Knotts, WestEd, San Francisco, California
Sola Takahashi, WestEd, Oakland, California
Rebecca Perry, WestEd, Oakland, California

A big thank-you to our exhibitors, sponsors, volunteers, and speakers!
Thursday Morning Sessions

11:00 a.m.–12:00 p.m.

82  The Relationship Factor: Leveraging Belonging to Increase Rigor in the Math Classroom
   6–8 Session  LA Convention Center, 404
   Academic rigor without relationships, relevance, and real-life connections to the students’ lived experiences will typically lead to resistance. Dive beyond the “fluff” and discover the power and process of intentionally creating a math classroom where every student feels a strong sense of belonging, allowing for true learning partnerships.
   Toni Harrison-Kelly, School Leadership for Social Justice, Desoto, Texas
   Twitter: @SLSJust
   Sharla Horton-Williams, School Leadership for Social Justice, Desoto, Texas

83  Culturally Responsive Assessment
   8–10 Session  LA Convention Center, 306
   Culturally responsive teaching is not enough. If the purpose of assessment is to learn what our students know and can do, how can we make our assessments culturally responsive? We will discuss more culturally responsive assessment alternatives, the shortcomings of traditional testing, and ways to support all students in coping with those tests.
   Judith Kysh, San Francisco State University, California

84  Math 1 + Math Foundations = Our Success Formula for Math Intervention
   8–10 Session  JW Marriott, Georgia
   The key to our math intervention program is the partnership between two teachers with the fundamental belief that all students can learn at high levels, teaching two classes in concert with each other. This session will outline the model we have created, components we have found to be most successful, lessons learned, and plans for future improvement.
   Kristie Donavan, Woodbridge High School, Irvine, California
   Twitter: @kristiedonavan

85  Writing Great Problems (and Teaching Your Students to Do So)
   8–10 Session  JW Marriott, Platinum E
   Writing a great math problem takes special care and a particular type of problem-solving skill. Often, time or other circumstantial restrictions tempt us to grab the first problem(s) we can search and find, despite being boring or a poor fit. Come learn from a professional problem-writer. Start building your own problem library!
   Mike Reiners, Christ’s Household of Faith School, Saint Paul, Minnesota
   Twitter: @MrReiners

86  S3D: Fostering Equitable Small-Group, Student-to-Student Discourse
   10–12 Session  LA Convention Center, 511 C
   Placing students in small groups does not automatically imply that the students will be able to productively interact with each other about the mathematics. In this presentation, you will learn about strategies and tools to examine and improve your practice with respect to fostering equitable small-group, student-to-student discourse.
   Sarah Quebec Fuentes, Texas Christian University, Fort Worth

87  Toss the Sheet, Get up out of Your Seat!
   10–12 Session  LA Convention Center, 405
   Are you tired of making yet another activity sheet and having your students stuck in their seats? Come learn some fun ways to transform your activity sheets and get students actively engaged. Activities will focus on starters, motivating unmotivated students, walk-arounds, card sorts, and more. All activities can be adapted to multiple levels and learners.
   Casey Stradley, Pittsford Sutherland High School, Henrietta, New York
   Twitter: @StradleyCasey
   Christina Andre, Pittsford Sutherland High School, New York

88  An Equitable Approach to Addressing Missed Learning Opportunities
   Coaches/Leaders/Teacher Educators Session  JW Marriott, Platinum D
   Every year, educators face the challenge of supporting students who lack the prerequisite knowledge and skills for success in current grade-level curriculum. During the last couple of years, we have witnessed an increase in the number of students who are experiencing these learning barriers; most students have missed significant instructional time because of school closures during the COVID-19 pandemic. To address these missed learning opportunities and ensure all students learn current essential curriculum, schools must develop a highly effective system of interventions, beginning by providing targeted supports as part of core instruction. Join this presentation to hear how one school district used lessons learned from the pandemic to equitably and inclusively “widen the zone of learning” in math for students.
   Rhonda Hewer, Waterloo Region District School Board, Kitchener, ONorthwest Territories
   Twitter: @rhondahewer

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89 Fractals and Iteration: From Middle School to High School

General Interest Session
LA Convention Center, 411

Iteration is a powerful tool that shows up in math and many related fields. We will explore fractals and iteration through both hands-on activities and technology. Appropriate for those introducing iteration early in math and those interested in helping students recognize the importance, usefulness, and fun that comes from understanding iteration.

Cheryl Gann, NC School of Science and Mathematics, Durham, North Carolina
Twitter: @hypatia314

Katherine Lavine, The Expedition School, Hillsborough, North Carolina

90 Making Assessment an Integral Part of Instruction: A Focus on Numerical Reasoning Grades K–8

General Interest Session
LA Convention Center, Hall B

Effective instruction begins with what students know and builds on their knowledge to develop new understandings and skills. One-on-one interviews as an assessment practice provide in-depth information to inform teaching decisions. Video clips demonstrate how to assess students’ number sense and numerical reasoning strategies.

Marilyn Burns, Joint, Sausalito, California
Twitter: @mburnsmath

91 Mathematics Educators Connecting with the Membership and Affiliate Relations Committee (MARC)

General Interest Session
LA Convention Center, 501 A

Come chat with your representatives on NCTM’s Membership and Affiliate Relations Committee (MARC). You will learn about available resources to support your Affiliates and how active participation as an Affiliate improves mathematics education for your members and their students. Tips for affiliate grants and publications will be shared.

Marci Ostmeyer, Educational Service Unit 7, Columbus, Nebraska
Jeffrey Corbishley, Ridgefield Public Schools, Connecticut

92 What Does Math Understanding Look Like?

General Interest Session
LA Convention Center, Petree D

This session is designed to address two issues:
1. How do we look at a standard and make thoughtful decisions about what ideas involved in that standard need to make sense to students?
2. How do we create questions for which correct responses require understanding why and not just how?

We will explore these issues using content from many grades.

Marian Small, One,Two... Infinity Llc., Ottawa, ONorthwest Territories
Twitter: marian_small

92.1 Old Trails to New Pathways to a Highway for the Future—Our Journey through Secondary Mathematics

General Interest Session
LA Convention Center, 151

After decades of framing HS math in CA/US, what have we gained; where do we fall short? Will we keep trudging along the same path, hoping it will yield different results? Let’s think about how we teach, place students, and organize HS math, so every student is prepared for a math-enriched future.

Cathy Seeley, Past President, National Council of Teachers of Mathematics, Reston, Virginia; Self, McDade, Texas
Twitter: @cathyseeley

93 You Have to Choose: Disrupting Systemic Barriers to Success through Reflective Vignettes

General Interest Session
LA Convention Center, 410

Profound advocacy occurs when it is proactive. Come engage in “You Have to Choose,” where we use vignettes of actual occurrences in education to foster discussions about lessons learned while disrupting systemic barriers through reflection on your stories. Vignettes will address covert and overt racism, bullying, identity, belonging, and other topics.

Sean Nank, California State University San Marcos, Carlsbad
Twitter: @Sean_Nank

Jaclyn Murawska, Skokie/Morton Grove School District 69, Palos Park, Illinois

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### Thursday Morning Sessions

**11:00 a.m.–12:00 p.m.**

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<th>Session</th>
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</thead>
</table>
| **93.1** | An All Access Pass to Meaningful Math | 3–5 Exhibitor Workshop | 11:00 a.m.–12:00 p.m. | LA Convention Center, 512 | Utilizing rich open tasks that allow for equitable engagement does not need to be intimidating. This session will support the active equity and engagement of all students by working with low floor, high ceiling activities that allow for meaningful mathematical involvement.  
Presenter: Kurt Whited  
**Savvas Learning Company,** Paramus, New Jersey |
| **93.4** | Leveraging Rich Prompts to Drive Mathematical Discourse for Multilingual Learners (MLLs) | Coaches/Leaders/Teacher Educators Exhibition Workshop | 11:00 a.m.–12:00 p.m. | LA Convention Center, Theater 2 | Explore how MLLs can leverage newly-learned language and math concepts to participate more meaningfully in grade-level math discourse. With Ellevation Math, educators can support students in exercising the authentic academic language functions of inform, explain, and argue through prompts that encourage communication and idea building.  
**Ellevation,** Boston, Massachusetts |
| **93.2** | Assess Yourself: An Interactive Discussion on Mastery and Innovative Approaches to Assessment | 8–10 Exhibitor Workshop | 11:00 a.m.–12:00 p.m. | LA Convention Center, 510 | The best part of a math conference is learning from our peers. Join us for an interactive session where we’ll discuss the meaning of mastery and share experiences and best practices when it comes to assessing learning. You’ll also get a sneak peak at the latest innovation in digital continuous assessment resources!  
**Mathspace,** New York, New York |
| **93.5** | Success is in the Numbers: Building Fact Fluency on a Foundation of Number Sense | Coaches/Leaders/Teacher Educators Exhibition Workshop | 11:00 a.m.–12:00 p.m. | LA Convention Center, 513 | Learn how to systematically build basic fact fluency based on number sense and strategies. This presentation will explain the concepts behind fact fluency. With an approach based on establishing facts and then evolving those facts from short to long-term memory, students will be engaged and motivated to learn their basic math facts.  
**Legends of Learning,** Washington, District of Columbia |
| **93.3** | Exploring Computational Thinking and Coding in Math Class | 10–12 Exhibitor Workshop | 11:00 a.m.–12:00 p.m. | LA Convention Center, 514 | Coding is a skill that is in high-demand for STEM careers. But how does computational thinking connect to the big ideas in my math class? See how to use this different representation of mathematics to promote critical thinking and boost engagement in your algebra classes. No prior programming experience is required.  
**Texas Instruments,** Sachse, Texas |
| **93.6** | The Concrete-Pictorial-Abstract Approach to Learning Mathematics | 3–5 Exhibitor Workshop | 11:00 a.m.–12:00 p.m. | LA Convention Center, Theater 2 | We focus on an approach that is an essential feature of mathematics learning in Singapore based on Bruner’s theory on representations. In this session, teachers use fraction ideas to embed abstract concepts through activities that students manipulate in connecting the concrete with the symbolic meaning.  
**Think! Mathematics,** Neptune Beach, Florida |

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Stop by NCTM Central to ask questions and learn about Mathematics Teacher: Learning and Teaching PK–12!

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Thursday Morning Bursts

94 Creating a Math Inquiry Lab to Achieve Student Engagement through Differentiation, K–Grade 2
PreK–2 Burst
LA Convention Center, 403 A
The primary goal for this burst is to inspire other instructors of mathematics to build a Math Inquiry Lab specifically for K–2 students that centers on differentiated instruction and in-the-moment professional development for teachers. The lab is currently operating successfully in all elementary school buildings within our district.

William Marzillier, Farmingdale Union Free School District, New York
Twitter: @MarzillierL
Jennifer Olsen, Farmingdale Public Schools, New York
Dina Carlucci, Farmingdale Public Schools, New York

97 The Power of Digital Tools in Estimation Work
3–5 Burst
LA Convention Center, 408 B
This presentation introduces Innovamat’s digital platform and the advantages such an environment offers in terms of learning math. We will talk about the personalization of the learning process and how technology is useful when it comes to the specific topic of estimation.

Laura Morera Ubeda, Innovamat & Universitat Autònoma de Barcelona, Cerdanyola del Vallès
Twitter: Laura Morera Ubeda
Robert Llorente Barrio, Robert Llorente, Sant Cugat del Vallès, Spain
Blanca Souto, Innovamat & Universitat Autònoma de Barcelona, Sant Cugat del Vallès, Spain
Alba Torregrosa, Innovamat & Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Spain
Judith Fabrega, Innovamat/Universitat Autònoma de Barcelona

98 Where Are We, and Where Do We Want to Go? Assessing Students’ Level of Geometric Reasoning
3–5 Burst
 JW Marriott, Platinum C
Let’s look at the development of geometric reasoning in children. We will discuss open-ended geometry tasks and a research-based framework for examining children’s thinking elicited in these tasks. We will also discuss how this information can be used in lesson planning to better individualize instruction.

Thomas Fox, University of Houston Clear Lake, League City, Texas

99 The Faucet Task: Using a Desmos Activity to Support Students’ Graphing Understandings
6–8 Burst
LA Convention Center, 501 BC
Attendees will learn about the Faucet task, which is designed to support students’ understandings of graphs and graphing. The task, situated in the Desmos environment, builds on students intuitive experiences with faucets to support them in considering how quantities in the situation can be represented on coordinate systems and via graphs.

Teo Paoletti, University of Delaware, Newark
Twitter: drtpaoletti

100 Transformations as a Tool to Connect Algebra to Geometry
8–10 Burst
LA Convention Center, 502 A
Participants will take a short dive into both rigid and nonrigid transformations and how they connect algebra and geometry. A sequence of ideas will be explored starting with linear equations, to slope, to dilations and similarity, to right triangle trigonometry.

Claire Verti, Bonita High School, La Verne, California
Twitter: Claire Verti

101 The Financial Life Cycle: Centering a Math Curriculum on Financial Applications
10–12 Burst
LA Convention Center, 308
Do you want to incorporate meaningful applications of math into your curriculum? Finance is an application all students know is important and will find valuable. This session shows how you can create a coherent, relevant, and engaging mathematics curriculum for high school that teaches the central precepts of personal finance.

Jack Marley-Payne, FiCycle, New York, New York
Twitter: @ficycleedu
Philip Dituri, FiCycle, New York, New York

102 Vianca’s Story: Learning Mathematics In a Pandemic Era
10–12 Burst
LA Convention Center, 402
This session interrogates the mathematical and personal identity of a Latina female during the Covid-19 pandemic and heightened by the murder of George Floyd. This is done through the lens of an opt-in mathematics tutoring program. This presentation introduces you to Vianca, her story, and the ways in which mathematics plays a role in her journey.

Elena Gullickson, Harvest Best Academy, Inver Grove Heights, Minnesota
Twitter: ester
Lesa Covington Clarkson, University of Minnesota, Saint Paul

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103 Building a Math Talk Community Inclusive of Culturally and Linguistically Diverse Learners

**General Interest Burst**
LA Convention Center, 515 A

In this session participants will hear about strategies used to modify traditional math talk practices to address the needs of an English language learner population for a more equitable education community. Resources inclusive of imagery and visual representation will be shared at the end of the session.

Jennifer Mitchell, East Aurora School District 131, Illinois
Twitter: @gottmitch12

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104 NCTM’s Resources for the Elementary Classroom

**General Interest Burst**
LA Convention Center, 502 B

As busy teachers, finding the best resources for your classroom can be difficult. NCTM offers members a wealth of high-quality resources from apps and online games to lesson plans and complete lesson arcs. Come learn about NCTM’s online Classroom Resources collections for the elementary classroom.

Monica Tienda, Oak Park School District, Royal Oak, Michigan
Twitter: @matienda

Mario Valdez, Alpaugh Unified School District, Porterville, California

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**Reimagine Mathematical Fluency**

*for middle school students!*

EdGemsMath's fluency routines engage students in mathematical discourse and build number sense.

**DISCOVER our new FLUENCY BOARDS**

Visit us at Booth #310

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Thursday Afternoon Sessions

1:00 p.m.–2:00 p.m.

105  Rehumanizing Assessment: Eliciting and Leveraging the Thinking of Young Mathematicians

PreK–2 Session
LA Convention Center, 404
Looking to rehumanize math teaching and learning in your classroom? Explore the work of one math community to elicit student thinking within assessments and use an asset lens to identify what students know and can do instead of what they don’t. We’ll share tasks, processes, and examples that get at the why and how of rehumanizing assessments.

Jody Guarino, Orange County Department of Education, San Clemente, California
Twitter: @jody_guarino
John Drake, Newport Mesa Unified School District, Costa Mesa, California
Michelle Sperling, Newport Mesa Unified School District, Costa Mesa, California


3–5 Session
LA Convention Center, 411
Join us in learning how to use student math journals as a vehicle for assessment. Participants will learn how to design and implement student journals as a way to capture their students’ “thinking,” give positive and constructive feedback, and allow students to reflect on or correct their thinking.

Gregory Bertha, Saint Andrew’s School, Coral Springs, Florida
Mary Ahern, Saint Andrews, Boca Raton, Florida

107  Creating Strong Math Identities

3–5 Session
LA Convention Center, 151
This session will explore how to create (or enhance) a math classroom where students see themselves as capable and powerful mathematicians by focusing on student thinking, engaging routines, and other tasks that help create math positive identities for each and every student.

Zachary Champagne, The Discovery School, Jacksonville Beach, Florida
Twitter: @zakchamp

108  How Will We Ignite? Centering Student Identity by Knowing Our Students and Students Knowing Themselves

3–5 Session
LA Convention Center, 511 C
How can we ignite math learning by centering student identity? Learn how Collaborative Action Research forged changes to curriculum and pedagogy in two NYC classrooms. You will learn about “heart-and-mind work,” elevating student preference in/out of school and professional feedback grounded in Muhammad’s HRL framework and Aguirre’s Equity Practices.

Rachel Benoff, New York City Department of Education, Brooklyn
Nekia Wise, New York City Department of Education
Joanna Ezratty, New York City Department of Education

109  In Their Own Words: Getting the Most out of the Lesson Objective

3–5 Session
LA Convention Center, 503
“Today we’re learning about. . . .” Lessons often begin this way, expecting students to make meaning of the day’s work before engaging with the lesson. Let’s examine a structure in which students self-monitor throughout. Students arrive at authentic understanding, become aware of incremental complexity between lessons, and recognize their own growth.

Lauren Moore, Great Minds, Washington, District of Columbia

110  Tapping Into the Power of Students’ Thinking

3–5 Session
LA Convention Center, 511 AB
We can empower students by recognizing their mathematical knowledge and strengths and connecting them to more complex and diverse mathematical representations. Instead of asking students to begin again when they have inaccurate answers, we can allow for revisions or connections to new ideas based on their current understandings.

Danielle Moore, Teaching One Moore, Torrance, California
Twitter: Teaching1Moore

Broaden the Purposes of Learning Mathematics
Create Equitable and Anti-Racist Structures in Schools and Systems
Develop Deep Mathematical Understanding
Implement Equitable Mathematics Instruction
Position Assessment to Promote Equitable Practices and Support Student Learning
Reimagine the Role of Technology in Mathematics Education
Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
Thursday Afternoon Sessions

111  Fostering Student Agency with Assessments

**6–8 Session**
LA Convention Center, 405

Join us as we discuss how to leverage assessments to understand students’ thinking, inform instruction, and promote student agency, which is more important than ever as we work to catch up students and move them forward in their learning.

*C. Kyle Falting,* Zearn, New York, New York

112  Proportional Reasoning: Keeping It All in Good Proportion

**6–8 Session**
JW Marriott, Platinum D

High-quality mathematics instruction involves combining ways of doing with ways of thinking. Yet, discussion on the topic of proportional reasoning often resorts to procedure and doing versus natural thinking. Let’s pull out the joyful, common-sense reasoning for this important topic and see how it makes natural sense of it all.

*Ted Coe,* NWEA, Scottsdale, Arizona
Twitter: drtedcoe

*Kyle Pearce,* Greater Essex County District School Board, Belle River, ON

113  The Power of Storytelling: Using Stories to Support Girls and Struggling Learners in Algebra

**6–8 Session**
LA Convention Center, 501 A

“To involve people at the deepest level, you need stories” (Harvard Business Review). Join us while we share our endeavor to reconceptualize algebra through the power of story. We will share research-based practices for supporting girls and other struggling students in mathematics.

*Heather Crawford-Ferre,* University of Nevada, Reno

*Monica Colbert,* Montgomery County Public Schools, Rockville, Maryland

*William Liu,* University of Nevada, Reno

*Stephanie Vega,* Washoe County School District, Reno, Nevada

114  Developing Deeper Understanding: A Problem-Posing Approach

**8–10 Session**
JW Marriott, Platinum FG

Participants will learn how to uncover mathematics and understand deeper content through problem posing. Together we will solve problems, alter attributes, and explore new problems to grow conceptual understanding. Attendees will engage in problem posing, examine problem-posing explorations, and consider how to help develop deeper understanding.

*James Fetterly,* University of Central Arkansas, Conway

115  A Two-Ton Problem: Using Hippos to Promote Student Choice

**10–12 Session**
LA Convention Center, 306

In this session, participants will examine a model-building activity through the lens of student choice. This activity will allow participants to analyze the hippopotamus crisis caused by Pablo Escobar and his four hippos. Participants will engage with data analysis, exponential functions, and a discussion about how student choice affects modeling.

*Ashley Loftis,* North Carolina School of Science and Mathematics, Durham
Twitter: AshleyLoftis

*Mahmoud Harding,* North Carolina School of Science and Mathematics, Durham

116  What Old You Is Trying to Tell Young You: An Investment Project Using Exponential Growth

**10–12 Session**
LA Convention Center, 410

In this project students explore their financial futures by comparing investment strategies. They work with Excel, regression equations, exponential functions, graphing with Desmos, and making predictions as they research a variety of careers. Students remember this project as they experience, firsthand, the reality of functions modeling growth.

*Nicole Dubler,* Kent Denver School, Cherry Hills, Colorado

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117 Reimagining Equity in Mathematics Teaching and Learning

*Coaches/Leaders/Teacher Educators Session*

JW Marriott, Platinum E

The session will challenge colonial perceptions of the neutrality of math and invite participants to consider how their social identities, privilege, and power constructively affect the way they perceive the world, interpret the math curriculum, and interact with learners in the math classroom.

**Octavia Beckles,** York Region District School Board, Newmarket, Northwest Territories

Twitter: @BecklesOctavia

118 Message out of Bottle: Stories of Learning, Still in Progress

*General Interest Session*

JW Marriott, Georgia

For 30 years, I have stayed connected with a group of my students. Their stories of learning have taught me about the purposes of school mathematics and the teaching practices that matter. Learn about the what, when, why, and how of the math activities these students still talk about years later, and how to attend to your own students’ ideas today.

**Ralph Pantozi,** Kent Place School, Summit, New Jersey

Twitter: @mathillustrated

119 President Address: The Journey of Catalyzing Change in Mathematics Teaching and Learning: Sharing My (Our) Stories

*General Interest Session*

LA Convention Center, Hall B

Join me in reflecting on mathematics teaching and learning since Catalyzing Change. What are we learning? Where are we now, and where do we go next on this journey? When I began my presidency, I talked about how excited I was to be taking this journey together, with you. It has been an amazing learning journey during my term as NCTM president. I have met outstanding, creative, resilient mathematics teachers along the way, and I have encountered so many who are doing the serious, challenging work of addressing the recommendations in Catalyzing Change. The conference strands focus on the four key recommendations and aspects, so we all have stories to share and are sharing them here. I invite you to come and share in this journey during this session as we share our stories and consider next steps for ourselves and NCTM in advocating for high-quality mathematics teaching and learning.

**Trena L. Wilkerson,** President, National Council of Teachers of Mathematics, Reston, Virginia; Baylor University, Waco, Texas

Twitter: @TrenaWilkerson

120 The Changing Face of PK-12 Statistics Education: Two Most Important Things in Statistics Education

*General Interest Session*

LA Convention Center, Petree D

NCTM’s Catalyzing Change series and ASA’s GASE II propose essential statistics concepts and processes for all PK–12 students. This presentation engages participants in exploring two big statistics ideas at various grade levels. Claim: A PK–12 statistics trajectory is more important for the future of all students than a calculus trajectory.

**J. Michael Shaughnessy,** Past President, National Council of Teachers of Mathematics, Reston, Virginia; Portland State University, Oregon

120.1 Expanding the Frontiers of Math Class

*General Interest Session*

LA Convention Center, 407

Do you want math class to feel more energizing and memorable? Would you like to help improve the quality of American discourse? By using math as a lens to explore authentic issues in the world, you can turn your classroom into a forum for life’s most interesting conversations. You can help students think critically about real issues and discuss them thoughtfully and respectfully. Mathematics is bigger than we’ve traditionally defined it. So are you.

**Karim Ani,** Citizen Math, Austin, Texas

Twitter: karimkai

120.2 Bring Math to Life with Virtual Manipulatives. Now I See It!

*General Interest Session*

LA Convention Center, 150A

The use of manipulatives to build conceptual understanding is well researched and documented. How can students use virtual manipulatives to represent mathematics? What changes have been accelerated by the pandemic? How can Technology/Virtual Manipulatives engage students? We’ll explore these questions, and dive into some resources. Bring a device!

**Mark Schmit,** Brainincamp, Saint Charles, Illinois

121 Transadaptation in Assessments of Mathematics for Multilingual Learners and English Learners

*General Interest Session*

JW Marriott, Atrium III

This session explores and presents concepts for consideration in the Culturally Responsive-Sustaining Education Framework, an overview of transadaptation, and moving concepts to practices in mathematics assessment. It is also a call for action that focuses on the Inclusive Curriculum and Assessment principle that various stakeholders can do.

**Jian Liu,** New York State Education Department, Brooklyn

Twitter: @LJSMonk

**Andrea Diaz,** TNTP, New York, New York

1:00 p.m.–2:00 p.m.
Thursday Afternoon Sessions

121.1 Math Moments: Harnessing Fun to Build Grit and Understanding
Coaches/Leaders/Teacher Educators Exhibitor Workshop
LA Convention Center, 512
Math can be fun and challenging! Using game-based learning, see how students persevere through challenges and are self-motivated to advance through harder math concepts. Legends of Learning, Washington, District of Columbia

121.2 NBA Math Hoops: Creating the Next Math Champion!
Coaches/Leaders/Teacher Educators Exhibitor Workshop
LA Convention Center, 513
NBA Math Hoops leverages the game of basketball and the NBA/WNBA to engage students with math and social-emotional learning skills through a digital/physical board game, curriculum, mobile app, and community program. The presentation will detail all aspects of the program experience. All resources are completely free of cost for educators. Learn Fresh, Philadelphia, Pennsylvania

121.3 The Solution: The Secret to Hardwiring Math Learning
General Interest Exhibitor Workshop
LA Convention Center, Exhibit Hall 1
Join us as we uncover a strategy for creating deep and lasting mathematical understanding for all students: solutions! We’ll show you how written solutions bring together vocabulary, representations, and calculations, creating neural networks between three vital regions of the brain. Participants will receive tools to get started right away. Exemplars, Underhill, Vermont

121.4 What’s the Point of Mathematics? Presented by Philipp Legner
General Interest Exhibitor Workshop
LA Convention Center, 510
While useful in science and engineering, the real value of making every student learn mathematics are skills like creativity, problem-solving, critical thinking, and logical reasoning. In this talk, we will explore how these skills can be brought into more classrooms, and how our curriculum needs change to be more relevant to what students need. Amplify, Brooklyn, New York

121.5 Doing and Talking STEM
General Interest Exhibitor Workshop
LA Convention Center, 514
In this session, participants will discuss strategies to support STEM classroom experiences that position all students as thinkers and problem-solvers. Participants will also reflect on peer experiences as they consider their own implementation of ideas that ensure the inclusion of all learners in authentic STEM focused tasks. Imagine Learning, Scottsdale, Arizona

121.6 Nearpod Math in the Elementary Classroom
3–5 Exhibitor Workshop
Exhibitor Workshop Theatre 2
Nearpod Math, our new supplemental K-8 math program, provides the content, organization and exclusive tools teachers need to maximize student learning and engagement. In this session, you will learn how to use Nearpod Math to strengthen your mathematics teaching practices while building student confidence and understanding. Nearpod, Dania Beach, Florida

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### Thursday Afternoon Workshops

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<thead>
<tr>
<th>Workshop Number</th>
<th>Title</th>
<th>Type</th>
<th>Date/Time</th>
<th>Room/Site</th>
<th>Speaker(s)</th>
<th>Twitter(s)</th>
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<tbody>
<tr>
<td>122</td>
<td>Accelerating Learners with Number Lines: Visual Models to Support Equity and Access for Students</td>
<td>PreK–2 Workshop</td>
<td>1:00 p.m.–2:15 p.m.</td>
<td>LA Convention Center, 408 B</td>
<td>Andrea Kotowski, ORIGO Education, Placitas, New Mexico</td>
<td>@dreamathchick</td>
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<tr>
<td>123</td>
<td>Beyond Literature Connections: Storytelling in Math</td>
<td>PreK–2 Workshop</td>
<td></td>
<td>LA Convention Center, 403 B</td>
<td>Teresita Cuesta, Sidwell Friends School, Gaithersburg, Maryland</td>
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<tr>
<td>124</td>
<td>See It, Move It, Grasp It: Math with Virtual Manipulatives</td>
<td>PreK–2 Workshop</td>
<td></td>
<td>JW Marriott, Platinum C</td>
<td>Chrissy Newell, Desmos Classroom at Amplify, Turlock, California</td>
<td>@MrsNewell22</td>
</tr>
<tr>
<td>125</td>
<td>Catalyzing Change: Developing Identity, Agency, and Deep Understanding through Equitable Instruction</td>
<td>3–5 Workshop</td>
<td></td>
<td>JW Marriott, Platinum AB</td>
<td>Nicole Rigelman, Portland State University, Oregon</td>
<td>@nrigelman</td>
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<td>DeAnn Huinker, University of Wisconsin–Milwaukee</td>
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<tr>
<td>126</td>
<td>Connecting Children’s Literature and Math to Build Equitable Access in Math Class</td>
<td>3–5 Workshop</td>
<td></td>
<td>LA Convention Center, 502 B</td>
<td>Ashley Marlow, All Learners Network, Burlington, Vermont</td>
<td>@MarlowMathVT T J Jemison, All Learners Network, Burlington, Vermont</td>
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<tr>
<td>127</td>
<td>Developing Students to Become Analytical Problem Solvers</td>
<td>3–5 Workshop</td>
<td></td>
<td>LA Convention Center, Petree C</td>
<td>Katherine Horak Smith, Tarleton State University, Stephenville, Texas</td>
<td>@horaksmit Michael Warren, Tarleton State University, Stephenville, Texas Eileen Faulkenberry, Tarleton State University, Stephenville, Texas Beth Riggs, Tarleton State University, Stephenville, Texas</td>
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<tr>
<td>128</td>
<td>Statistics and Data Science in the Elementary Grades</td>
<td>3–5 Workshop</td>
<td></td>
<td>LA Convention Center, 501 BC</td>
<td>Anna Bargagliotti, Loyola Marymount University, Manhattan Beach, California</td>
<td>Jeffrey Shih, University of Nevada, Las Vegas</td>
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**Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning**
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>Using Discourse Actions to Promote Access and Student Voice in Mathematics Classrooms</td>
<td>1:00 p.m.–2:15 p.m.</td>
<td>3–5 Workshop LA Convention Center, 152</td>
<td>Participants use rubrics to identify and discuss how discourse actions in example videos elicit deeper student thinking when solving cognitively challenging tasks. Participants consider how using discourse actions in their own classrooms provides evidence of students’ thinking and opportunities for more student voice in mathematical discussions.</td>
<td>Amber Candela, University of Missouri – St. Louis Twitter: @AmCan36 Melissa Bost, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; Duquesne University, Ellwood City, Pennsylvania</td>
</tr>
<tr>
<td>130</td>
<td>Engaging Students to Positively Change How They Relate to Math</td>
<td>8–10 Workshop LA Convention Center, 403 A</td>
<td>They relate to Math</td>
<td>Hate is a strong word, yet it is many students’ choice descriptor of everything math. Join this session as educators learn how to engage even the most reluctant learners to help them realize their mathematical potential, to be intentional about shifting student mindset, and to create a classroom culture conducive to growth.</td>
<td>Claudisha Harriel, Abundant Fruit Educational Services, Memphis, Tennessee</td>
</tr>
<tr>
<td>131</td>
<td>Mathematical Language Routines: Cultivating Conversation in Middle School Classrooms</td>
<td>10–12 Workshop LA Convention Center, 502 A</td>
<td>Creating Discipline-Rich, Standards-Aligned End Products in Project-Based Learning</td>
<td>Participants will leverage standards and practices to create a discipline-rich, standards-aligned end product for a PBL project. They will work collaboratively to brainstorm common pitfalls with end products in PBL and how to address them. They will learn about and use our Project Planning Pyramid Framework to ensure project success in their classroom.</td>
<td>Sarah DiMaria, Cedars International Next Generation HS, Austin, Texas Twitter: @MsDiMaria Carlee Madis, Knowles Teaching Foundation, Cherry Hill, New Jersey Sheila Orr, Knowles Teaching Foundation, Cherry Hill, New Jersey Monica Sircar, Stanford University, Science Education, Woodside, California</td>
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<td>132</td>
<td>Ethnomodeling: Connecting Art, History, Culture, and Mathematical Modeling</td>
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<td></td>
<td>During this session, participants engage in ethnomodeling tasks that integrate art, culture, history, and mathematical modeling to share unseen stories. Our primary focus will be on supporting students’ mathematical learning and identifying ways that such tasks foster and promote a sense of belonging for all students within mathematics classrooms.</td>
<td>Siddhi Desai, University of Central Florida, Orlando Twitter: @SiddhiDesai311 Aline Abassian, Seminole State College, Casselberry, Florida Farshid Safi, University of Central Florida, Orlando Brianna Kurtz, Mary Baldwin University, Staunton, Virginia</td>
</tr>
<tr>
<td>133</td>
<td>Nurturing Mathematical Identity and Agency: Empower and Engage Students</td>
<td>1:00 p.m.–2:15 p.m.</td>
<td></td>
<td>Learn how effective instructional habits, combined with the purposeful use of Desmos, can promote a positive mathematical identity and can nurture mathematical agency. Teachers will participate in learning activities that can be used in their classrooms to engage students in making and exploring conjectures about important mathematical ideas.</td>
<td>Dewey Gottlieb, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; Hawaii Dept. of Education, Honolulu Twitter: @dewgott Yannabah Weiss, Waiakea High School, Desmos Studio, Hilo, Hawaii Nikki H S Chiba, Chiefess Kamakahelei Middle School, Lihue, Hawaii</td>
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135  Problem Solving and Problem Posing: One Mathematics, Several Points of View
10–12 Workshop
LA Convention Center, 406
Engage in problem solving, pose significant questions, learn different approaches, adapt instruction, and use technology (GeoGebra and Desmos). We demonstrate various techniques to blend problem solving, problem posing, and assessment. Topics include polynomials, polygons, congruence, similarity, Pythagorean theorem and others. BYOD.

Armando Martinez-Cruz, California State University Fullerton
Nick Saire, California State University Fullerton

136  Reimagining Math Class: Teacher Moves to Increase Mathematical Agency and Access
10–12 Workshop
LA Convention Center, 515 B
What does our current teaching practice communicate about what it means to learn and do math? In this workshop, we will explore how to create meaningful learning experiences that foster sense making, establish a culture of risk-taking, and position students as capable knowers and doers of mathematics.

Sarah Stecher, Math Medic, Grand Rapids, Michigan

137  Using Contextual Activities to Help Students Develop Deeper Understanding of Linear Relationships
10–12 Workshop
LA Convention Center, 408 A
There’s no more foundational concept in high school math than linear functions. How do we student teachers develop an understanding of slope as a constant of proportionality and work fluently with other forms of linear equations? In this workshop, we will work through contextual activities that harness students’ intuitive thinking about slope, patterns, and lines.

Lindsey Gallas, Math Medic, Caledonia, Michigan
Luke Wilcox, Kentwood Public Schools, Grand Rapids, Michigan

137.1  Engaging Teachers and Coaches in Using Learning Trajectory-based Resources for Asset-Based Instruction

Linking Research and Practice Workshop
LA Convention Center, 153 BC
How can researchers and mathematics teachers and coaches collaborate on making LT research more usable in teaching, assessing, and developing curricular resources to strengthen student learning? This interactive session is designed to engage the research and school communities, including teachers, coaches and administrators, in using learning trajectories for instructional purposes to see the strength in students and build on their mathematics proficiencies.

Jennifer Suh, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; George Mason University, Stone Ridge, Virginia
Theresa Wills, George Mason University, Fairfax, Virginia
Sara Kirschner, George Mason University, Fairfax, Virginia
Maureen Vora, George Mason University, Fairfax, Virginia

138  Strategies to Promote Discourse in Math Classrooms
10–12 Workshop
JW Marriott, Platinum H1J
In many classrooms, students sitting together in teams does not guarantee effective mathematical discourse. Activities will be modeled that encourage students to talk, write, and share ideas. Attendees will participate in study-team and teaching strategies that particularly deal with discourse while working on math problems.

Darrell Trussell, CPM Educational Program, Elk Grove, California

139  The 100 Bead String: A Tool You Can Count On (and More!)
10–12 Workshop
LA Convention Center, 409
The 100 bead string is a versatile tool that helps students develop conceptual understanding, procedural fluency, and the application of a wide range of mathematics concepts in first through fifth grade. This tool also develops fluency by bridging from the concrete to the abstract while making connections between and within representations.

Kristen Mangus, Howard County Public School System, Elkridge, Maryland
Twitter: @kristenmangus

140  Vamos A Jugar! Games for Your Elementary ELL Families
10–12 Workshop
LA Convention Center, 308
You will play our favorite elementary math games that we shared with over 100 schools and their families at our virtual math nights during COVID-19. They are presented in English with Spanish support/gameboards and strategies to share at your school. Come see how we included all families during virtual instruction, especially ELL parents.

Jane Felling, Box Cars and One Eyed Jacks, Edmonton, Alberta

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Thursday Afternoon Sessions 2:30 p.m.–3:30 p.m.

141 Once upon a Time: The Magical Power of Mathematical Storytelling
PreK–2 Session
LA Convention Center, 151
The splendor of mathematics lies in its stories. The awe and wonder for it is fully contained in this human narrative. Often we find math at the intersection of mythology and mystery. Our deepest, most lasting understanding and appreciation of mathematics as a soulful, lifelong journey is transferred here through the energy of storytelling.
Sunil Singh, Amplify, Toronto, ONorthwest Territories
Twitter: @Matharden

142 Assessment Interviews: Moving beyond Timed Tests
3–5 Session
LA Convention Center, 150 A
Most fluency assessments focus on accuracy of facts. This session will highlight how to use student interviews to assess the other components of fluency: flexibility and efficiency. Tools for creating and conducting these assessments as well as data tracking tools to target specific needs and provide prescriptive instruction will be shared.
Susan Loveless, Rutherford County Schools, Murfreesboro, Tennessee
Twitter: @susanloveless23

144 Mathematizing Children’s Literature: Sparking Connections, Joy, and Wonder through Read-Alouds
3–5 Session
LA Convention Center, Petree D
Within the pages of children’s literature lie vibrant opportunities for young mathematicians to make connections among stories, their lives, cultures and communities, and the world. Join us to think about how to approach stories with a mathematical lens and build on student and family knowledge and cultural ways of being mathematical.
Allison Hintz, University of Washington, Bothell
Twitter: @allisonhintz0124
Antony Smith, University of Washington Bothell

146 Making Grades Meaningful: A Pitch for Proficiency in a Sea of Percentages
6–8 Session
LA Convention Center, 411
A student who earns 6 points out of 10 on a quiz typically walks away with one message: I failed. But that student earned more than half of the points possible, and likely showed signs of proficiency with some concepts. This session explores key elements that comprise a proficiency-based grading system and what it looks like in practice.
Jennifer Tadlock, Great Minds, Lafayette, Louisiana

147 Unlocking Brilliance: How Executive Functions Support Success in Problem Solving
6–8 Session
JW Marriott, Platinum FG
Teaching through problem solving is a powerful instructional model that facilitates deeper learning, but how do we support students in learning in this way? This session explores how teachers can build the executive function and metacognition skills that undergird problem solving to ensure that all students can effectively showcase their thinking.
Sam Rhodes, Georgia Southern University, Statesboro
Twitter: srhod
Rick Bryck, Landmark College, Putney, Vermont
Allison DePiro, CueThink, Barboursville, Virginia

148 Catalyzing Change When Change Is Hard
8–10 Session
LA Convention Center, 407
Catalyzing Change in High School Mathematics presents a clear and urgent call for educators to think and act differently about school mathematics, but what happens when some want to refuse that call? This presentation will discuss the challenges faced by one suburban high school district and will suggest opportunities to persevere through the struggle.
Mark Russo, Pascack Valley Regional High School District, Montvale, New Jersey

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148.1 From Marshmallows and Chance, to Making Change

10 – 12 Session
LA Convention Center, 405
Statistics addresses the collection and analysis of numerical data. This session is designed to provide ideas on how to engage students with both novel contexts and use statistics to facilitate relevant, difficult conversations.
Joshua D. Sawyer, Elizabeth City-Pasquotank Public Schools, North Carolina

149 Doing Problems That Matter in Math Class

10–12 Session
LA Convention Center, 503
Too often, students become disengaged when we focus on answer getting and procedures. How can we open their eyes to see where math can help answer questions that actually matter in daily life? We’ll see how investigating messy, real-world problems with the help of technology engages students in meaningful mathematics and taps into their curiosity.
Curtis Brown, Texas Instruments, Sachse

150 After Rehumanizing Then What? Toward Mathematics for Multispecies’ Flourishing

Coaches/Leaders/Teacher Educators Session
LA Convention Center, Hall B
Widespread and sustained human flourishing does not ever happen without simultaneous attention to the flourishing of our multispecies kin. We will explore a deep ethics for mathematics education, making connections to financial literacy and familial curriculum as a necessary and fundamental aspect of culturally responsive justice work.
Steven Khan, Brock University, St Catharines, ONorthwest Territories
Twitter: @Khanteachmath

151 Math Therapy: A Crash Course in Becoming a Math Therapist

Coaches/Leaders/Teacher Educators Session
LA Convention Center, 511 AB
Did you know almost everyone who thinks they’re “not a math person” has math trauma they haven’t worked through yet? We’ve all had math teachers before, but how many of us have had a math therapist? Through teaching math, we can empower our students to believe they are capable of anything, and that everything is possible. Get ready to dig deep!
Vanessa Vakharia, The Math Guru, Toronto, Northwest Territories
Twitter: @themathguru

152 Hanging Math Out to Dry: Using K–6 Clotheslines to Build Number Sense

General Interest Session
JW Marriott, Atrium III
Do you know that number line appears in the standards more than 26 times? This workshop is designed to explore how the clothesline (an open number line) creates the opportunity for all students to engage in discourse that promotes the development of number sense. Participants will investigate how this tool is used in K–grade 6.
Kristen Acosta, West Covina USD, West Covina, Upland, California
Twitter: @kristenmacosta

Interested in speaking at the 2023 NCTM Annual Meeting & Exposition in Washington, DC? Submit your proposal nctm.org/speak by October 7, 2022 at 11:59 PM PST.

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153 Intersectionality and Mathematics Achievement: A Place We Should All Meet
General Interest Session
JW Marriott, Georgia
We will explore the relationship between intersectionality and math achievement. We will define intersectionality as a construct to frame math achievement for minority students. Participants will engage in activities to help themselves and their students self-identify intersectionalities. Specific strategies are given for math achievement.

Peter Eley, Fayetteville State University, Summerfield, North Carolina
Twitter: @drpeteraley

154 Leverage the Repeatable Nature of Reasoning Routines to Develop Equitable Mathematics Instruction
General Interest Session
LA Convention Center, 404
Developing equitable mathematics instruction requires intentionally incorporating strategies that ensure all students' math ideas are taken up and taken seriously. Learn how to capitalize on the repeatable nature of reasoning routines and five high-leverage teaching strategies built into them to build students' positive math identity and agency.

Grace Kelemanik, Fostering Math Practices, Natick, Massachusetts
Twitter: @gracekelemanik

Amy Lucenta, Fostering Math Practices, Natick, Massachusetts

155 Metaphors in Mathematics
General Interest Session
JW Marriott, Platinum E
What if the math in our curriculum didn’t look so much like “math”? This session will introduce the role that metaphor plays in design and then apply those principles to math education. We will ask big questions and play with big ideas but leave with next steps for building metaphor into our pedagogy.

Chris Nho, Desmos, San Diego, California
Twitter: @nhoskee

156 Oppression to Success: A Current Student’s Narrative on Finding Her Mathematical Voice and Purpose
General Interest Session
LA Convention Center, 511 C
All students deserve equitable existence in fragile classroom structures. Come hear the story of a 16-year-old’s journey through school, developing joy and wonder despite multiple systemic barriers to success. We talk a lot about student voices. Let’s pause to hear Keiran’s voice as told through stories of thriving despite an undiagnosed disability.

Keiran Nank, Carlsbad High School, California
Twitter: @Keiran_Nank

Sean Nank, California State University San Marcos, Carlsbad

156.1 Setting an Agenda for Action: Supporting Mathematics and Special Education
General Interest Session
LA Convention Center, 501 A
How can we better support teachers and students who have identified learning disabilities? Come to this panel session to engage in discussions regarding future directions of mathematics education and special education instructional practices and research working together to provide more learning opportunities to improve student performance in math.

Barbara Dougherty, Retired, University of Hawaii, The Villages, Florida

Cathery Yeh, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; University of Texas at Austin

Karen Karp, Johns Hopkins University, Baltimore, Maryland

Asha Jitendra, University of California-Riverside

Naomi Jessup, Georgia State University, Atlanta

157 Unfinished Learning: How to Move Forward When Your GPS Is Telling You to Make a U-Turn
General Interest Session
JW Marriott, Platinum D
Are you under pressure to teach your current content while trying to address unfinished learning from previous years? Learn how to focus on the learning goal while attending to key prerequisites in real time. This session examines planning, implementation, and assessment using tasks that engage learners while providing scaffolding just in time.

Juli Dixon, University of Central Florida, Indialantic
Twitter: @thestrokeofluck

Broaden the Purposes of Learning Mathematics
Create Equitable and Anti-Racist Structures in Schools and Systems
Develop Deep Mathematical Understanding
Implement Equitable Mathematics Instruction
Position Assessment to Promote Equitable Practices and Support Student Learning
Reimagine the Role of Technology in Mathematics Education
Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
**Thursday Afternoon Sessions**

2:30 p.m.–3:30 p.m.

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**157.1 Be inspired with CPM’s New Curriculum Inspiring Connections!**

*10–12 Exhibitor Workshop*
LA Convention Center, Exhibit Hall 1

CPM has taken the latest research and created a new curriculum, Inspiring Connections. Learners will experience more movement, more opportunities to hear a variety of perspectives, and more ownership of their learning in this bi-media course. Students utilize technology and print in tandem, in a student-centered, problem-based classroom.

_**CPM Educational Program**, Elk Grove, California_

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**157.2 Classroom Practices that Respect ALL Learners and Ensure Everyone Has a Voice**

*PreK–2 Exhibitor Workshop*
LA Convention Center, Exhibit Hall 2

When we ask children to notice (What do YOU see?) and describe in their own words (Say or Show), everyone is successful, and everyone belongs. This removes barriers and maximizes learning. Kathy Richardson and Sue Dolphin share ways to make this happen with every child in the class by shifting interactions during number talks and independent work.

_**Didax Inc**, Rowley, Massachusetts_

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**157.3 Exploring Function Transformations**

*10–12 Exhibitor Workshop*
LA Convention Center, 514

Provide your students the opportunity to explore and discover the effects changing parameters has on a parent graph. We will utilize the graphing feature and the transformational graphing app on the TI 84 Plus CE to help your students build a conceptual understanding of transformations.

_**Texas Instruments**, Sachse, Texas_

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**157.4 Routines Don’t Have To Be Routine**

*3–5 Exhibitor Workshop*
LA Convention Center, 512

Classrooms are full of students with diverse backgrounds and varying levels of prior education. Explore a variety of daily routines and teaching strategies focusing on the “not-so-simple” skills of counting and building number sense and work through concepts essential to foundational mathematics.

Presenters: Jaime Hill & Chris D’Erasmo

_**Savvas Learning Company**, Paramus, New Jersey_

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**157.5 Solving the Fractions Problem: From Research to Classroom**

*3–5 Exhibitor Workshop*
LA Convention Center, 510

Fractions knowledge by grade 5 uniquely predicts success in higher mathematics. Yet, tests show that it’s a struggle for many from grade 3 on. Fortunately, new research has revealed instructional strategies that work. Join us to explore how applying an adaptive, game-based technology can help more students succeed.

_**ExploreLearning**, Charlottesville, Virginia_

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**157.6 The POWER of SEL and Grit in the Math Classroom**

_by Dr. India White_*

*Coaches/Leaders/Teacher Educators Exhibitor Workshop*
LA Convention Center, 513

Dr. India White, Big Ideas Learning author and Florida Council of Teachers of Mathematics Equity and Access Chair, presents “The POWER of SEL and Grit in the Math Classroom.” This session will feature strategies teachers can use to incorporate SEL and grit in their classroom in a way that produces measurable results.

_**Big Ideas Learning**, Erie, Pennsylvania_

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**Broaden the Purposes of Learning Mathematics**

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JOHN J. SANGIOVANNI, SUSIE KATT, LATRENDA D. KNIGHTEN, GEORGINA RIVERA, FREDERICK L. DILLON, AYANNA D. PERRY, ANDREA CHENG, JENNIFER OUTZS
Actionable answers to your most pressing questions about teaching elementary and secondary math
Elementary, Secondary

JENNIFER M. BAY-WILLIAMS, JOHN J. SANGIOVANNI, ROSALBA SERRANO, SHERRI MARTINIE, JENNIFER SUH, C. DAVID WALTERS
Because fluency is so much more than basic facts and algorithms
Grades K–8

COURTNEY KOESTLER, JENNIFER WARD, MARIA DEL ROSARIO ZAVALA, TONYA GAU BARTELL, CATHERY YEH, MATHEW D. FELTON-KOESTLER, ROBERT Q. BERRY III, BASIL M. CONWAY IV, LATEEFAH ID-DEEN, MARY CANDACE RAYGOZA, AMANDA RUIZ, JOHN W. STALEY, EVA THANHEISER, BRIAN R. LAWLER
Connect content to students’ daily lives, fortify their mathematical understanding, and expose them to issues that will support them in becoming active citizens and leaders
Early Elementary, Upper Elementary, Middle School, High School

JOHN J. SANGIOVANNI, SUSIE KATT, LATRENDA D. KNIGHTEN, GEORGINA RIVERA, FREDERICK L. DILLON, AYANNA D. PERRY, ANDREA CHENG, JENNIFER OUTZS
Actionable answers to your most pressing questions about teaching elementary and secondary math
Elementary, Secondary

SARA DELANO MOORE, KIMBERLY RIMBEY
A journey toward making manipulatives meaningful
Grades K–3, 4–8

LOU EDWARD MATTHEWS, SHELLY M. JONES, YOLANDA A. PARKER
Design inspiring mathematics learning experiences driven by high-quality and culturally relevant mathematics tasks that connect students to their world
Elementary and Secondary

KIMBERLY RIMBEY
The need for focused small group math instruction has never been greater
Grades K–5

Enter to win a $300 Corwin Math Library at booth #327
corwin.com/math
Thursday Afternoon Workshops

2:45 p.m.–4:00 p.m.

158 Counting Money: Make Money Make Cents
PreK–2 Workshop
LA Convention Center, 406
The presentations will provide participants with different research-based strategies that will help students learn how to count money fluently. Participants will use ten-frames, number charts, and coin visuals to explore how counting money strategies are similar to strategies used to help students skip-count and build groups of ten.

Shana Swain, Vontoure Learning, LLC, Humble, Texas
Twitter: @Swain117
Dana Enriquez-Vontoure, Vontoure Learning, LLC, Humble, Texas
Shaneka Thomas, Vontoure Learning, LLC, Katy, Texas

161 Engaged Practice Makes Perfect Sense for Permanent Learning
3–5 Workshop
LA Convention Center, 150 BC
Just practicing math is not adequate to move learning into permanent memory. Engaged practice is one of the most efficient means for students to move their learning into permanent memory (mastery). Learn engaging, easily differentiated math games that teachers can use to quickly implement hands-on math practice into their classroom.

John Felling, Box Cars And One Eyed Jacks, Edmondton, Alberta

162 Moving Past Our “Struggle with Struggle” to Ensure Learning with Productive Struggle for All
3–5 Workshop
LA Convention Center, 408 A
Supporting productive struggle in learning mathematics is an essential consideration in providing equitable instruction for all. In this session, participants will be provided the opportunity to reflect on their own “struggle with struggle,” as well as engaging in anticipation, planning, and responding to struggle in learning mathematics.

Erin Edgington, University of Wisconsin – Platteville, Cobb
Twitter: @ErinEdgington
Kristin Pavelec, Middleton-Cross Plains Area School District, Wisconsin

163 Supporting Culturally Responsive Pedagogy with IM K–5 Math™
3–5 Workshop
JW Marriott, Platinum H13
Districts across the country are addressing inequities in math education by implementing culturally relevant and responsive pedagogy. In this session, we will explore the design features of IM K–5 Math™ that support this effort.

LaToya Byrd, Illustrative Mathematics, Conyers, Georgia
Twitter: @byrdteaching

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Thursday Afternoon Workshops

164 Using Empathy Interviews to Center Student Stories for Inclusive Mathematics
3–5 Workshop
LA Convention Center, 515 A
Drawing from our work engaging mathematics teachers in designing inclusive classrooms, we describe the use of Empathy Interviews. These are one-on-one interviews with students in which they share their math experiences. We will listen to empathy interviews, hear narratives of teachers using these interviews, simulate the process, and create an empathy map.
Avery McNiff, University of California Santa Barbara, Isla Vista
Twitter: Avery McNiff
Rachel Lambert, University of California Santa Barbara, Isla Vista
Kara Imm, Hunter College, School of Education, New York, New York

165 Big Beautiful Problems: It’s All about the Joy!
6–8 Workshop
LA Convention Center, 502 A
Big Beautiful Problems can be life changing for teachers and students alike as they experience the challenge, excitement, and flow of meaningful learning. Deepen your skills, confidence, and joy as we explore some of our favorite, most beautiful problems. See math come to life and get caught up in the beauty of it all!
Alicia Burdess, Grande Prairie and District Catholic Schools, Alberta
Twitter: @BurdessAlicia
Jessie Shirley, Grande Prairie and District Catholic Schools, Alberta

166 Technology That Supports Collaboration, Exploration, and Problem Solving in Mathematics
6–8 Workshop
LA Convention Center, 152
How do you use technology in your math class? Does it include student-to-student collaboration, problem solving, and exploration of math concepts? Learn the pedagogy behind how to choose the right tech tools for your math class, and get a comprehensive list of websites and apps that motivate students to doers of mathematics.
Theresa Wills, George Mason University, Fairfax, Virginia
Twitter: @theresawills

166.1 NASA Explore Humans in Space: The Mathematics Behind Space Food and Nutrition
6–8 Workshop
LA Convention Center, 409
Explore NASA’s Space Food using math to investigate nutritional needs for astronauts on the International Space Station. See how body type, age & exercise changes caloric needs. Investigate how food packaging & serving size relate. Come explore a menu of inquiry activities integrating math, nutrition, and science as you satisfy your MATH appetite!!
Barbara Buckner, NASA Goddard Space Flight Center, Laurel, Maryland
Twitter: @bbuckner
J M Jutila, Antelope Valley Union High School District, Palmdale, California

167 Optimization Problems: The Best Way for Students to Appreciate the Wonder, Joy, and Beauty of Math
8–10 Workshop
JW Marriott, Platinum AB
Usually optimization problems are dessert, enjoyed by some students at the end of a long meal served over many courses. But students do not have to wait until their final year of school to experience the joy and wonder of these practical problems. Using technology, models, and math, they can taste the beauty of math during their meal and not after.
Ron Lancaster, University of Toronto, Hamilton
Dan Butler, The Lovett School Institution, Atlanta, Georgia

168 Sharing Skepticism and Arguing Constructively in Math Class
8–10 Workshop
LA Convention Center, 408 B
Do you want students to argue in class and build their capacity to construct and critique mathematical arguments? In this workshop, we will experience the Sharing Skepticism instructional routine designed to inclusively develop all students’ ability to argue mathematically. We will unpack the routine together and prepare to enact it ourselves.
David Wees, DreamBox Learning, Bellevue, Washington
Twitter: @davidwees

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## Thursday Afternoon Workshops

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<tr>
<th>Workshop</th>
<th>Title</th>
<th>Time</th>
<th>Location</th>
<th>Description</th>
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<tr>
<td>170</td>
<td>Man-Made and Natural Disasters: Experimental Simulations for Algebra Classes</td>
<td>2:45 p.m.–4:00 p.m.</td>
<td>LA Convention Center, 502 B</td>
<td>Are you looking for some activities to help your algebra students understand linear, quadratic, and exponential functions? Come to this workshop and engage in some experiments simulating disasters. You will collect data, convert data into multiple representations, and analyze the results. Questions that promote student discourse will be considered.</td>
<td>Amy Herman, Math Solutions, Louisville, Kentucky&lt;br&gt;Connie Horgan, Self, Sun City West, Arizona</td>
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<tr>
<td>171</td>
<td>Mathematical Language Routines: Cultivating Conversation in High School Classrooms</td>
<td>2:45 p.m.–4:00 p.m.</td>
<td>LA Convention Center, 402</td>
<td>Let’s explore how math language routines create space for student voice, simultaneously fostering mathematical understanding. We’ll experience these routines and look at student work to understand the power of these structures to (re)humanize mathematics teaching and learning for all students.</td>
<td>Vanessa Cerrahoglu, Orange County Department of Education, Huntington Beach, California&lt;br&gt;Jennifer Wilson, Illustrative Mathematics, Black Mountain, North Carolina&lt;br&gt;Elizabeth Ramirez, Illustrative Mathematics, Long Island City, New York</td>
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<td>172</td>
<td>Probability without Formulas</td>
<td>2:45 p.m.–4:00 p.m.</td>
<td>LA Convention Center, 403 B</td>
<td>In this workshop, we will argue that students need to have an experience thinking and reasoning about probability before being provided with algorithms and formulas. Participants will experience three ready-for-the-classroom probability activities that will highlight several problem-solving strategies that students can use instead of formulas.</td>
<td>Luke Wilcox, Kentwood Public Schools, Grand Rapids, Michigan&lt;br&gt;Lindsey Gallas, Math Medic, Caledonia, Michigan</td>
</tr>
<tr>
<td>173</td>
<td>A Systemic Approach to Access and Equity in Mathematics</td>
<td>2:45 p.m.–4:00 p.m.</td>
<td>LA Convention Center, 403 A</td>
<td>The Clayton County Mathematics Department put social justice and equity in the hands of the students, using mathematical models to analyze social issues and a systemic structure that empowered the educators to implement the tools that promote equity and access in mathematics. The I’m W.O.K.E. project makes math matter for all students.</td>
<td>Tonya Clarke, Clayton County Schools, Jonesboro, Georgia&lt;br&gt;Twitter: @clarkegoteach&lt;br&gt;Charlene Matthew, Clayton County Schools, Jonesboro, Georgia</td>
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<tr>
<td>173.1</td>
<td>Utilizing PDSA Cycle to Revise Protocols for Identifying Equity-Based Teaching Practices and Mathematical Practices with a Lens of Equity Linking Research and Practice Workshop</td>
<td>2:45 p.m.–4:00 p.m.</td>
<td>LA Convention Center, 153 BC</td>
<td>Participants will learn about Plan, Do, Study, Act (PDSA) Cycles; the noticing indicator tool and its systematic use as part of Columbus State University’s teacher preparation program; and use the tool to debrief a Principles to Action Toolkit video. Session attendees will collaboratively participate in a PDSA cycle by utilizing current field data, reflecting on the current noticing indicator tool, and brainstorming potential next steps for implementation of the noticing indicator tool aimed to improve the practice of teacher educators and future teachers.</td>
<td>Basil Conway, Columbus State University, Georgia&lt;br&gt;Katherine Hammonds, Columbus State University, Georgia</td>
</tr>
<tr>
<td>174</td>
<td>Step Up or Step Aside: Got Technology, Now What?</td>
<td>2:45 p.m.–4:00 p.m.</td>
<td>JW Marriott, Platinum C</td>
<td>Now that I have technology, what do I do with this power? Join us for a highly interactive presentation geared toward erasing the digital divide for students of color. Our presentation will explore methods, techniques, and tools for students to explore and learn mathematics through technology.</td>
<td>Tujuana Hinton, Baltimore County Public Schools, Maryland&lt;br&gt;Kisha Maynard, West Georgia Technical College, Newnan&lt;br&gt;Courtenay Greene, Douglas County School System, Douglasville, Georgia</td>
</tr>
</tbody>
</table>

### Get social! Stay informed and get connected with attendees by following #NCTMLA22 on social media.
Thursday Afternoon Sessions

4:00 p.m.–5:00 p.m.

175 Ensuring Equitable Opportunities and Student Agency In Collaborative Early Elementary Mathematics

PreK–2 Session
JW Marriott, Platinum FG
Join in a discussion on attending to equitable opportunities for each and every student to engage in learning mathematics during small-group and partner collaborations in early elementary classrooms. Here, we share strategies to create student-centered approaches to position all students as capable doers of mathematics and increase student agency.
Daniel Edelen, University of Central Florida, Orlando
Twitter: @EdelenDan

176 Flexibility through Facts

3–5 Session
JW Marriott, Atrium III
Let’s explore the heart of flexible strategic thinking for each of the four operations. We will learn how to interview students to discover where to begin and then discuss how we can facilitate flexible thinking, starting with basic facts and then naturally applying them to various sets of numbers students will encounter on their K–5 math journeys.
AnnElise Record, Ann Elise Record Consulting LLC, Concord, New Hampshire
Twitter: @AnnEliseRecord

177 Supporting Equitable Discussions Using Practices That Leverage Student’s Cultural Resources

3–5 Session
LA Convention Center, 405
Broadening how students are supported to participate allows them to draw on their cultural and linguistic resources in math discussions. We share practices that can be used regularly to broaden and encourage meaningful student participation and examples of ways that they align with and draw on students’ cultural resources and ways of knowing.
Meghan Shaughnessy, Boston University, Massachusetts
Nicole Garcia, University of Michigan, Ann Arbor
Aileen Kennison, University of Michigan, Ann Arbor

178 What Works? Exploring Effective MTSS Interventions for Students with Special Needs in Math

3–5 Session
LA Convention Center, 151
Explore the recommendations of the new What Works Clearinghouse Practice Guide on Assisting Students Struggling with Mathematics: Intervention in the Elementary Grades. This session will examine the importance of language precision, multiple representations, word problems, and systematic instruction as key components of MTSS Interventions.
Karen Karp, Johns Hopkins University, Baltimore, Maryland
Twitter: @ksquaredmath1
Russell Gersten, University of Oregon, Instructional Research Group, Los Alamitos, California

179 Algebots: Connecting the Hundred Grid to Algebraic Thinking

6–8 Session
LA Convention Center, 511 C
The hundred grid is often used to develop numeracy, and its use is limited to the primary grades. This session begins by exploring the patterns in the hundred grid and then moves to developing algebraic thinking by using those same problems. This session is appropriate for middle school or algebra 1 students.
Lesa Covington Clarkson, University of Minnesota, Saint Paul
Elena Contraras Gullickson, University of Minnesota, Saint Paul
Jessica Forrester, University of Minnesota, Saint Paul

179.1 CPR2: A Collaborative Partnership to teach Mathematical Reasoning through Computer Programming

6–8 Session
LA Convention Center, 503
Can we use computer programming to teach generalization to middle schoolers? The CPR2 instructional model (IM) promotes a deeper understanding of algebraic expressions by engaging students in writing programs to explore iterative processes. We share the IM that has proven successful engaging students and share how it can be applied in your class.
Cynthia Stenger, University of North Alabama, Florence
Andrea Beesley, SRI, Aurora, Colorado
Janet T Jenkins, University of North Alabama. Florence
Jessica Stovall, University of North Alabama, Florence

180 Is Your System Working? Rethinking Middle School Math Acceleration Practices

6–8 Session
JW Marriott, Platinum D
The rigor and coherence of college- and career-ready standards, and possible gaps from the pandemic, require school districts to adjust typical acceleration practices for enrollment in eighth grade algebra 1. In this session, we will look at data trends, curricular options, and next steps to ensure all students receive a complete K–8 curriculum.
Elizabeth Peyser, Educator in Kansas, Wichita

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Thursday Afternoon Sessions

181 New Twist on Tier 3 Interventions
6–8 Session
JW Marriott, Georgia
How do you teach math when the social emotional needs are overwhelming?
We will share our journey changing tier 3 intervention classes into environments that celebrate success, strategize emotional regulation, and promote growth mindsets. Our math focus is a deep dive into three skills: number sense, practical problems, and equation solving.
Mary Parrish, Newport News Public Schools, Virginia

182 Modeling as Storytelling: Developing Mathematical Identities with Students on the Margins of Algebra
8–10 Session
LA Convention Center, 150 A
“Algebra-as-gatekeeper” is a powerful paradigm that limits students’ experiences within math class, as well as their future educational trajectories. In this session, I will show how modeling—when conceived as a humanizing, culturally relevant practice—can support students to make sense of algebra and develop positive mathematical identities.
Kara Imm, Hunter College, School of Education, Brooklyn, New York
Twitter: @karalouiseimm

183 Using STEM Activities to Teach Middle and High School Mathematics
8–10 Session
LA Convention Center, 410
This session will explore STEM activities that can be used in the algebra 1, geometry, algebra 2, and precalculus classrooms. Connections to the standards will be given. These activities are a great way to personalize learning. Grading rubrics will also be given.
Dianna Sopala, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; Northern Valley Regional High School – Demarest, Fair Lawn, New Jersey
Twitter: @DiannaNJMathEdu

184 Go Dodgers: Exploring Data through Simulations
10–12 Session
LA Convention Center, 511 AB
This session will explore a classroom-ready mathematics lesson that investigates data through simulations in a baseball context, outlining principles from the UCLA Mathematics Department Curtis Center model lessons. Participants will learn mathematical and pedagogical understandings required to involve students in rigorous and engaging mathematics.
Michelle Sidwell, UCLA Curtis Center for Mathematics and Teaching, Lindon, Utah

185 Radical Curricular Change in High School: Detracking, Pathways, and Student Supports
10–12 Session
LA Convention Center, Petree D
NCTM’s Catalyzing Change in High School Mathematics makes a clear and compelling argument regarding the need for radical changes to high school mathematics to support more equitable outcomes for students. This presentation shares a framework for curricular change and shares data from efforts in Michigan, Indiana, and Ohio to promote equity.
Mike Steele, National Science Foundation, Zionsville, Indiana
Twitter: @midsteele47

186 The Effects of Unpacking Teacher Identity in the Classroom
10–12 Session
LA Convention Center, 306
Math is a language of power that has historically been tracked, granting access to certain groups. We will lead participants through the reflections, tools, and strategies we engaged in with our mentors that helped us inspect our identities and discuss the effects this had on our teaching, students, colleagues, and access in our classrooms.
Dwaina Sookhoo, NYC Lab School, New York, New York
Twitter: @mathprentice
Sarah DiMaria, Cedars International, Austin, Texas
Allie Webb, Columbus Alternative High School, Ohio

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187 Centering on Student Thinking during Vertical Articulation: Transforming the Mathematics Classroom
*Coaches/Leaders/Teacher Educators Session
JW Marriott, Platinum E
This session positions student thinking as a vehicle for change. Come join us as we develop our abilities to be listeners, sense makers, and more strategic in using student thinking for teaching and learning. Together we will connect math ideas in grades 4 through algebra 1, investigate teacher practice, and redefine what is mathematics and looks like.
Kristine Ho, UCLA, Torrance, California
Twitter: @khomath
Jennifer Hagman, UCLA Mathematics Project, Redlands, California

189 Debunking Myths about Mathematics that Marginalize Students: Implications for Equity and Inclusion
*General Interest Session
LA Convention Center, 501 A
For too long mathematics has served as a site of systematic exclusion for many students based on three myths that continue to influence policy and practice. What are the origins of these myths? Who do they privilege and marginalize? And how can we disrupt and replace them? We must understand the root causes if we are to lead radical transformation.
Mark Ellis, California State University Fullerton
Twitter: @EllisMathEd

190 Open the Gates: A Classroom Culture of Discussion for All
*General Interest Session
LA Convention Center, 407
Every classroom has a culture, and within our four walls, every teacher has routines that show students what is important to us. Let’s focus our efforts to show students how to talk to each other, show teachers how to listen, and open the gates so every student can take pride in their unique intelligence.
Matt Vaudrey, Fontana USD, California
Twitter: @mrvaudrey

191 Problem Solving in the Inclusive Classroom
*General Interest Session
LA Convention Center, 404
Making sense of problems is at the heart of high-quality mathematics curricula, often a challenge in classrooms with diverse learning needs. Marginalized communities are frequently excluded because of challenges with language processing. This session will explore techniques that can provide rich problem-solving learning environments for all students.
Andrew Gael, Cooke School and Institute, New York, New York
Twitter: @bkdidact

191.1 Developing Numerical Reasoning with Routines, Tasks, and Games
*3–5 Exhibitor Workshop
LA Convention Center, 513
Numerical reasoning is at the heart of the elementary math curriculum. Join us to experience routines, open tasks, and games that support the trajectory of student learning toward reasoning and numerical flexibility. You’ll gather content and strategies that enhance instruction and deepen student learning.
Heinemann Publishing, Portsmouth, New Hampshire

Join us at the 2022 NCTM Regional Conference in November! Baltimore Nov. 30–Dec. 2, 2022

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4:30 p.m.–5:00 p.m.

192 Beware of Alligators in the Mathematics Classroom
PreK–2 Burst
LA Convention Center, 408 B
Who hasn’t tried to make a concept easier by trying to make a connection to something kids love? Yet, in our attempt to help, we actually may hinder student learning. We address the dangers of allowing alligators to creep into instruction, provide a rationale for conceptual alternatives, and showcase strategies to enhance your instruction.
Stefanie Livers, Missouri State University, Springfield
Twitter: @LiversStefanie

192.1 I Beg to DIFFER-entiate
PreK–2 Burst
LA Convention Center, 403A
This Burst will empower primary teachers with the mindset to easily differentiate their math instruction to meet the diverse learning styles of their students. We will model the process that we employ to differentiate all math activities by modifying the numbers, changing the tools used, and altering the format to create multiple entry points.
Janice Puglisi, Farmingdale Public Schools, Massapequa, New York
Twitter: @AAEMath
Dina Carlucci, Farmingdale Public Schools, New York
Rebecca Camera, Farmingdale Public Schools, New York

193 Seeing and Representing Our World through Data and Drawings
PreK–2 Burst
LA Convention Center, 515 A
Flowers, daily routines, and social interactions can be counted, classified, charted, and measured. In this burst, we will engage in a social-emotional example to consider how to integrate data collection and data visualization in your classroom through observing, collecting, and drawing the world around us.
Amber Simpson, Binghamton University, New York
Signe Kastberg, Purdue University, West Lafayette, Indiana
Andrew Tyminski, Clemson University, South Carolina

194 Math as a Journey, Not a Destination: What We’ve Learned Using Performance Materials
3–5 Burst
LA Convention Center, 150 BC
This session will unpack the strategies, resources, and practical tips related to performance-based instruction and assessment. When Montecito Union embraced a performance-based approach, students felt their confidence soar, improved their ability to express themselves, and made incredible gains.
Jeff Linder, Montecito Union School, Santa Barbara, California
Twitter: @JeffLinder13

195 The Real Real World: From Problems to Scenarios
3–5 Burst
LA Convention Center, 152
Real-world problems anchor students’ conceptual understanding to the world that surrounds them. Through these problems, they develop an identity as both citizen and mathematician. But, what does it mean to write a real-world problem? In this session you will learn how to alter your existing curriculum to incorporate real real-world problems.
Nora Castiglione, Amplify, New York, New York

196 Relinquishing Power and Reimagining Assessment
6–8 Burst
LA Convention Center, 409
We have seen significant shifts toward student-centered math classrooms, yet still so many of us fall back on traditional forms of assessment. The purpose of this session is to offer perspective and examples of equitable assessments that truly support 21st century teachers and learners.
Jill Broderick, American School of The Hague, South Holland
Twitter: jillbroderick

196.1 What if Your Math Story is Traumatic? Turning Math Anxiety into a Curious Math Story
6–8 Burst
LA Convention Center, 406
Join a former math hater in exploring these questions: How do we show students with math anxiety the joy in math? What are some of the deceptive student behaviors that may mask a traumatic math experience? How can we include interventions for math anxiety in our teaching?
Heidi Sabnani, Self-Employed, Stoughton, Massachusetts
### Thursday Afternoon Bursts

**4:30 p.m.–5:00 p.m.**

| 197 | Secondary Math Teachers: What We Need to Learn from K–5 Mathematics  
*6–8 Burst*  
LA Convention Center, 502 A  
As a grades 6–8 math classroom teacher for 12 years, I didn’t know what I didn’t know about elementary math. When I became a K–8 coach/math coordinator, I learned so much that would have been so helpful! I’ll share with you the secrets of problem types, subitizing, and other interesting ideas explored in K–5 math that will help you be a better teacher in 6–12!  
**Annie Forest**, University of Illinois at Chicago, Brookfield  
Twitter: @mrsforest |
| 199 | Lecture Capture in the World of Digital Natives  
*General Interest Burst*  
LA Convention Center, 408 A  
Recent advances in technology have made recording what goes on in the classroom easier to do to address the issue of fast pace in college mathematics courses. This session details how lecture capture recording can be used in a mathematics classroom to record everything a teacher would write on a whiteboard, including graphing activities.  
**Jonathan Engelman**, Kettering College, Ohio  
Twitter: @mathrules05 |
| 200 | My Family Pizza Problem: The Challenges of Culturally Relevant Pedagogy  
*General Interest Burst*  
LA Convention Center, 515 B  
Culturally relevant pedagogy in mathematics education is analyzed through a problem about going out for pizza with your family. This is a pedagogy of opposition specifically committed to collective, not merely individual, empowerment. Hidden issues presented by the problem were analyzed by teachers; five themes were found and will be discussed.  
**Enrique Ortiz**, University of Central Florida, Oviedo  
Twitter: Enrique Ortiz |

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201  Circling through a Century of NCTM: A Celebration Sprinkled with Music

*General Interest Session*

JW Marriott, Platinum E

What led to NCTM’s birth and first annual meeting in 1920? How did NCTM and mathematics education fare through the Roaring ’20s, the Great Depression, WWII, Sputnik and the new math, the ’70s back-to-basics era, the ’80s problem-solving movement, the NCTM Standards and the ’90s, NCLB and the ’00s, and the current effects of the Common Core and the striving for equity? Although school mathematics has changed in significant ways in the past 102 years, some of the same issues that confront mathematics education today were front and center also in 1920 and reappeared throughout the years. This history will be covered in a presentation including songs and parodies and other music sprinkled throughout.

**Zalman Usiskin** is a professor emeritus of education at the University of Chicago, where he was an active faculty member from 1969 through 2007. In 1983 he helped initiate the University of Chicago School Mathematics Project (UCSMP) and he served as its overall director from 1987 until June of 2019. He is the author or co-author of over 150 articles and other papers on mathematics and mathematics education, dozens of books and book-length research monographs, including textbooks and their teachers’ editions for grades 7-12 and a college-level mathematics text for teachers. In 2014, NCTM published a book containing 38 of his talks and articles, the first time the organization published a collection of writings of one person. He received the Glenn Gilbert Award (now the Ross Taylor/Glenn Gilbert National Leadership Award) from NCSM in 1994, a Lifetime Achievement Award from NCTM in 2001, and the ISDDE Prize for Lifetime Achievement from the International Society for Design and Development in Education in 2018. Zal has been the banquet speaker, singing and presenting at the piano twice for NCTM annual meetings, but the first time collaborating with Andy Chukerman.

**Andrew Chukerman** is a composer, orchestrator, and pianist born in Chicago who attended Occidental College and then moved to Los Angeles. Andy has been an accompanist for David Foster, Carole Bayer Sager, Diahann Carroll, and Maureen McGovern among many others, and was the arranger and keyboardist on Rod Stewart’s Grammy-winning Great American Songbook Series, Vols. 1-3, and Carly Simon’s Grammy-nominated “Moonlight Serenade”. He has worked on the HBO series “Westworld”, and multiple episodes of “Frasier”, “Glee”, “Murphy Brown”, “Charmed”, and “Rob Dydek’s Fantasy Factory”. He has received the Richard Rodgers Award from the Academy of Arts and Letters, the Jonathan Larson Award from the American Theatre Wing, The Edgerton Award, and Grand Prize for “Best Score” at the Rhode Island International Film Festival.

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202  ShadowCon22

*General Interest Session*

LA Convention Center, Petree D

At ShadowCon22, you will get to learn with a wide variety of educational leaders. Each speaker will give a provocative 10-minute talk and challenge the audience with a call to action. As always, the goal of ShadowCon is to expand access to and extend your engagement with the speakers and their ideas. It is our hope that you will leave with a desire to take action and share your new ideas with colleagues and students. This event is organized and hosted by members of the NCTM community.

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203 Building Math Residue with Lessons That Stick
PreK–2 Session
LA Convention Center, Hall B
Many times throughout the school year, we teach a lesson and the understanding we thought students had is quickly forgotten. Let’s explore how task selection and intentional sequence of activities plays a pivotal role in helping students make connections, so that new understanding can stick.
Graham Fletcher, Math Specialist, McDonough, Georgia
Twitter: @gfletchy

204 Project-Based Learning (PBL): A Catalyst for Developing Deep Mathematical Understanding
PreK–2 Session
JW Marriott, Atrium III
Learn how PBL is used to develop deep mathematical understanding to empower students to reimagine themselves as mathematical doers in rich problem-solving environments. We share classroom-tested PBL units and reflect on successes and opportunities. Resources provided for participants to get additional ideas to incorporate into their own projects.
Jean Lee, University of Indianapolis
Twitter: @JeanLeeGalindo
Enrique Galindo, Indiana University – School of Education, Bloomington
Sara Lev, Early Childhood Project Based Learning (ECPBL), LLC, Los Angeles, California

205 A Fraction of What You Need to Teach
3–5 Session
LA Convention Center, 153 BC
Dive into the fraction standards in grades 3–5 and see how manipulatives can make the concept more concrete for students. Start with understanding fractions and work through division of fractions. Leave with examples of how to teach each concept with manipulatives and a variety of story problems you can use today.
Ryan Dougherty, Brainincamp, Fort Mill, South Carolina
Twitter: Ryan Dougherty

206 A Vision of the Future: Mathematics Paired with Computer Science in K–6 Learning
3–5 Session
LA Convention Center, 511 AB
In the case of mathematics and computer science in the K–6 mathematics classroom: 1 + 1 > 2. Allowing students to explore, explain, and create models of mathematical concepts through the naturally engaging medium of computer science creates a level of relevance and meaning that includes, rather than excludes, everyone in the learning community.
Jacqueline Weber, JWC Curriculum & Instruction Consultants, LLC, Bennettsville, South Carolina
Twitter: @jackieconsults

207 Alternative Algorithmic Techniques for Improving Procedural Fluency and Enriching Adaptive Reasoning
3–5 Session
JW Marriott, Platinum FG
Participants will learn how to identify common math errors of marginalized students. After identifying errors in computation, individuals will learn how to implement alternative algorithmic techniques for improving strategic competence and developing productive dispositions to empower students while creating equitable and inclusive environments.
Joseph Sencibaugh, Webster University, Saint Louis, Missouri
Jennifer Bond, Ferguson Florissant School District, Saint Louis, Missouri

208 Humanizing Math Intervention: Developing Mathematical Agency
3–5 Session
LA Convention Center, 404
We will present the results of two intervention studies with third through fifth graders that sought to engage students in meaningful mathematics and expand their sense of mathematical agency while increasing their computational fluency in multiplication and division.
Monica Mendoza, UCSC, Goleta, California
Tom Nguyen, UCSC, Santa Barbara, California
Rachel Lambert, University of California Santa Barbara, Culver City
Avery McNiff, UCSC, Santa Barbara, California

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<td>Lab Classrooms: Creating a Space for Immersive Learning in, from, and for Practice</td>
<td>Kristin Gray, Amplify, New York, New York; Faith Muirhead, University of Delaware Professional Development Center for Educators, Newark</td>
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<td>210</td>
<td>Look-Think-Talk: A Visual Mathematics Routine for Eliciting a Multiplicity of Student Thinking</td>
<td>Jen Munson, Northwestern University, Evanston, Illinois; Sarah Larson, Northwestern University, Chicago, Illinois; Mari Altshuler, University of Illinois at Urbana-Champaign, Chicago, Illinois</td>
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<td>211</td>
<td>Is Percent A Problem? Let’s Talk Decimals, Fractions, and Percentages</td>
<td>Shaneka Thomas, Vountoure Learning, LLC, Humble, Texas; Dana Enriquez-Vountoure, Vountoure Learning, LLC, Humble, Texas; Shana Swain, Vountoure Learning, LLC, Humble, Texas</td>
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<td>212</td>
<td>Math Games: No, Seriously . . . These are Games: Winners and Learners</td>
<td>Susan Chadaz, Box Elder School District, Tremonton, Utah</td>
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<td>213</td>
<td>The Tortoise and the Hare: How Math Class Missed the Moral and What We Can Do about It</td>
<td>Kyle Pearce, Greater Essex County District School Board, Belle River, ON; Jon Orr, Lambton Kent District School Board, Chatham, Ontario, Canada</td>
<td>JW Marriott, Platinum E</td>
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<td>214</td>
<td>Using Representations as a Tool for Sense Making and Justification in High School Algebra</td>
<td>Scott Hendrickson, Mathematics Vision Project, St. George, Utah</td>
<td>JW Marriott, Platinum D</td>
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**Friday Morning Sessions**

8:00 a.m.—9:00 a.m.

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| 215            | Access and Equity for Struggling Students: What All Teachers Should Know about Math LD/Dyscalculia | 503         | Access and equity for struggling students should start as early as possible. Teachers in PK and K should use age-appropriate number activities and be provided with easy-to-implement math screening instruments to limit the number of students who are behind and at risk entering first grade.  
  Anneke Schreuder, Dyscalculia Services, Katy, Texas  
  Twitter: @dyscalculiaserv                                                                                     |
| 216            | Helping Your Students S.H.I.N.E.® in Math                             | 511 C       | Students can quickly develop a fear of making mistakes in learning, especially in math. Students must feel psychologically safe for learning to take place. The S.H.I.N.E.® framework can help to prioritize belonging and agency for learners by helping them navigate their paths, keeping their strengths and passions for learning in mind.  
  Tamera Musiowsky-Borneman, Plan Z Professional Learning Services | Kokua Academy, Kailua-Kona, Hawaii  
  Twitter: @TMusi_Ed                                                                                           |
| 217            | President Series: STEM-ifying the Beauty of Mathematics              | 411         | How do students experience the beauty of mathematics? In what ways can we, as mathematics teachers, foster opportunities for students to see the beauty in mathematics? In this session, we engage in ways to STEM-ify our instruction that allows students to see the beauty in mathematics.  
  Christa Jackson, Saint Louis University, St. Louis, Missouri                                                  |
| 218            | Are We Listening? Creating Opportunities to Hear Student Mathematical Thinking | 150 A       | Are there ways to center students’ thinking and strengthen their identities through assessment? Yes! In this session we evaluate the cognitive complexity of mathematical opportunities given to students. Through formative conversations, we listen to students and leverage assets to determine the supports needed to access complex mathematical ideas.  
  Ted Coe, NWEA, Scottsdale, Arizona  
  Twitter: drtedco                                                                                             |
| 219            | Supporting Students’ Meaningful Active Learning of Mathematics      | 405         | In this session, I will discuss learner-centered approaches to actively and meaningfully engage all students at the beginning of a mathematics lesson. These approaches prepare students for the lesson as well as help them to develop skills to learn mathematics with understanding and experience the joy of mathematics.  
  Olive Chapman, University of Calgary, Alberta                                                                |
| 220            | Talk Number to Me: Mathematics and Mindfulness 2.0                  | Petree D    | Emotional Intelligence is the linchpin to building students’ identities as doers/lovers of mathematics. In 2020–2021, I was a first-time principal during a pandemic! Come hear my candid reflections and learnings as I applied my skill of integrating mathematics and mindfulness to engender formidable mathematical learning and a cohesive community.  
  Christina Lincoln-Moore, Los Angeles Unified School District, Hollywood, California  
  Twitter: @virtuouscm                                                                                         |
220.1 Igniting Agency and Equity with the Algebra Project, LA  
General Interest Session  
JW Marriott, Georgia I-II

The local alliance in Los Angeles – we call ourselves “Algebra Project LA” – is pursuing a two-pronged strategy. One is organizing within institutions, chiefly (but not restricted to) the University of Southern California (USC)’s Rossier School of Education, USC’s Neighborhood Academic Initiative, and the Los Angeles Unified School District (LAUSD). The other is organizing a group of teachers and young people who will gain experience in the Algebra Project, the Young People’s Project and other liberating pedagogies. The goal is to catalyze a transformation of how mathematics is taught and learned in LAUSD and to create employment opportunities for youth knowledge workers in LAUSD schools. Primary vehicles for this coordinated strategy are (1) a summer math academy for students and teachers, featuring the Algebra Project’s “Tripline” curriculum as well as an explicit organizing and math identity curriculum, and (2) bringing the Young People’s Project to each of the four sub-districts of LAUSD, in part but not only through a research study YPP is conducting, funded by the Gates Foundation.

Teachers and partners will share their experience with the Algebra Project LA work from The Summer Math Academy 2022.

Bootsie Battle-Holt, Los Angeles Unified School District, California  
Kyndall Brown, Board of Directors, National Council of Teacher Mathematics, Reston, Virginia; University of California, Los Angeles  
Cymra Haskell, University of Southern California, Los Angeles  
Alan Knoerr, Occidental College, Pasadena, California  
Kimi Wilson, Self-Employed, Los Angeles, California  
Robin Wilson, California State-Polytechnic University, Pomona

221 Supporting Spatial Visualization Using Tools for Digital Fabrication to Enhance Teaching and Learning  
Research Session  
LA Convention Center, 410

Spatial visualization strategies provide a foundation for multiple geometric concepts. Increased accessibility of digital fabrication tools allows students to improve spatial visualization. In this session we will share opportunities for enhancing teaching and learning geometric and measurement concepts through engagement in digital fabrication.

Anna Wan, The University of Southern Mississippi, Hattiesburg  
Twitter: @DocAnnaWan  
Jessica Ivy, Bellarmine University, Louisville, Kentucky

221.1 Helping Students Catch Up and Keep Up  
3–5 Exhibitor Workshop  
LA Convention Center, 513

Students who struggle with math need more than repeated instruction. They need to develop numerical reasoning. Designed around eight instructional principles, the lessons in Do The Math support explicit, intentional teaching that helps kids catch up and keep up. Join us to engage with Do The Math, intervention instruction that works!

Heinemann Publishing, Portsmouth, New Hampshire
Friday Morning Workshops 8:00 a.m.–9:15 a.m.

222 Games before Kindergarten  
PreK–2 Workshop  
LA Convention Center, 406  
Let’s play a game! To be successful in school, kids need math experiences. The game 1,000 Games before Kindergarten from the All Learners Network (ALN) supports access for all children to develop foundational number sense and math reasoning. Learn how to adapt and extend simple games to provide an abundance of joyful math experiences before entering school.  
K. Lilly DePino, All Learners Network, Dummerston, Vermont  
Twitter: LillyDePino  
Allison Donnelly, All Learners Network, Burlington, Vermont  
DeVeau Sleeper, All Learners Network, Woodstock, Vermont

223 Representing and Solving Addition and Subtraction Story Problems in PK–grade 2  
PreK–2 Workshop  
LA Convention Center, 408 B  
Participants will engage in writing, representing, and solving a variety of addition and subtraction story problems. We will play and analyze a computation game to examine ideas of fluency. A variety of students’ adding and subtraction methods will also be presented, examined, and explained.  
Signe Kastberg, Purdue University, West Lafayette, Indiana  
Amber Simpson, Binghamton University, New York  
Andrew Tyminski, Clemson University, South Carolina

224 Beyond Algorithms: Useful Reasoning Strategies for Decimals and Fractions  
3–5 Workshop  
LA Convention Center, 502 B  
When building procedural fluency with whole numbers, strategies such as Make Tens (Hundreds and Thousands) promote number sense and improve students’ skills. This strategy and others are also useful for fraction and decimal computation. Join us to explore significant strategies that support fraction and decimal fluency (and build number sense).  
Sherri Martinie, Kansas State University, Manhattan  
Twitter: Sherri Martinie  
Jennifer Bay-Williams, University of Louisville, Pewee Valley, Kentucky  
Jennifer Suh, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; George Mason University, Stone Ridge, Virginia

225 The Forgotten Standards: Engaging Students with the MPs in Grades 3–5  
3–5 Workshop  
LA Convention Center, 150 BC  
When planning lessons, we often focus on the content standards, but what about the Standards for Mathematical Practice (SMP)? Lessons grounded in the SMP provide students with opportunities to engage in mathematical thinking. Learn how to recognize and capitalize on opportunities for SMP engagement with a focus on grades 3–5.  
Kori Morrow, Great Minds, Flagstaff, Arizona

226 Using Digital Tools to Enhance Fraction Operation Conception  
3–5 Workshop  
LA Convention Center, Petree C  
If students learn only procedures and not the meaning behind them, they are more likely to make errors. Come explore how digital fraction strips/bars enhance the conceptualization of multiplication and division of fractions. We will show how digital tools enhance physical ones to first strengthen understanding and then streamline practice.  
David Petro, Windsor Essex Catholic District School Board, Harrow, ON  
Twitter: @davidpetro314

227 Engaging in Problem Solving as a Teacher Changes How We Look at and Analyze Student Work  
6–8 Workshop  
JW Marriott, Platinum HIJ  
Participants will engage in (1) Noticing and Wondering, problem solving, and thinking flexibly about their own work and that of others in preparation for thinking about and valuing students’ mathematical ideas; and (2) analyzing student work using Notice and Wonder as an assessment to understand students’ perspectives and guide instruction.  
Valerie Klein, School of Education, Drexel University, Philadelphia, Pennsylvania  
Amanda Reinsburrow, Drexel University, Philadelphia, Pennsylvania  
Jason Silverman, Drexel University School of Education, Philadelphia, Pennsylvania  
Anthony Matranga, California State University San Marcos

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228  Paper Airplanes: An Investigation in Statistics  
6–8 Workshop  
LA Convention Center, 308  
Engage in a World Paper Airplane Championship data investigation that promotes equitable mathematics teaching practices using principles from the UCLA Mathematics Department Curtis Center model lessons. Participants apply the “statistical problem-solving process” described in the Guidelines for Assessment and Instruction in Statistics Education II.  
Helen Chan, UCLA Curtis Center for Mathematics and Teaching, Los Angeles, California

229  R-E-S-P-E-C-T My Inner Mathematician!  
6–8 Workshop  
LA Convention Center, 402  
How do we create a learning environment that respects the brilliance of students and brings out the inner mathematician in all of us? We will consider the intersectionality of culture, race, gender, and how these play out as we engage in mathematics together.  
Yekaterina Milvidsiaia, High Tech High GSE, San Diego, California  
Curtis Taylor, High Tech High GSE, San Diego, California

230  Explore Algebra Modeling Problems Designed for Emergent Bilinguals  
8–10 Workshop  
LA Convention Center, 152  
Emergent bilinguals (EBs; ELLs) deserve to have challenging math problems. We will explore modeling tasks developed through a researcher-teacher collaboration for EBs in algebra 1. We developed Five-Act task, modified from Dan Meyer’s Three-Act task, for EBs, which are connected to the real world, aligned with CCSSM, and student centered.  
Ji Yeong I, Iowa State University, Ames  
Coskun Erden, Iowa State University, Ames, Iowa  
Betsy Araujo Grando, Iowa State University, Ames  
Jasmine Sourwine, Iowa State University, Ames

231  Kapa Kuiki and Tivaevae: Polynesian Quilting and Symmetry  
8–10 Workshop  
LA Convention Center, 403 A  
This workshop will highlight how a culturally relevant ethnomathematical lesson plan can be used to teach symmetry in a geometry class. Participants will create a kapa kuiki pattern of their own and leave with an editable lesson plan for their own use.  
Kristine Dahlquist, Hawaii Preparatory Academy, Kamuela

232  Talk Nerdy to Me  
8–10 Workshop  
LA Convention Center, 502 A  
Do you spend sleepless nights racking your brain to figure out how to get kids to engage in academic conversations or even how to just get some kids talking at all? Join this session to get a cool task and to learn a research proven strategy that works like a charm in getting authentic academic conversations started.  
Cassie Hohne, Porterville Unified School District, Visalia, California  
Twitter: Cassie Hohne

233  Fortifying the First Five Minutes of Any Math Class: Do Nows Done Better!!  
10–12 Workshop  
LA Convention Center, 408 A  
Build confidence, competence and interest using 19 formative strategies designed to fortify the first 5 minutes of class through prelesson information introduction, expansion, or assessment activities. These include using quotes, essential questions, other language texts, historical facts, partner problems, problem posing, quizzes, and more.  
Richard Sigroi, Bedford School, retired, Rhinebeck, New York  
Robert Gerver, North Shore Schools, retired, Kings Park, New York

234  Using Activities in AP Calculus to Link the Mathematical Practices with Differential Equations  
10–12 Workshop  
LA Convention Center, 515 A  
Delve into the AP Mathematical Practices (MPs) with differential equations. Using collaborative work structures, we will explore slope fields, Euler’s method, and separation of variables. Activities are from or inspired by the 2019 CED and include a card sort, VNPS (whiteboards), gallery walk, stand and talk, and a technology exploration.  
Karen Hyers, Tartan High School, Oakdale, Minnesota  
Twitter: Karen Hyers

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235  Continuing to Learn from the Past to Project the Future: Examining Social Justice from NCTM’s Lens
Coaches/Leaders/Teacher Educators Workshop
LA Convention Center, 403 B
Examine the gradual development of social justice in mathematics education in US schools by exploring the interaction between present and historical events with the response employed by NCTM through its annual yearbooks and annual perspectives. Experience engaging activities with social justice and anti-racist teaching themes.
Treshonda Rutledge, University of Central Florida, Orlando
Twitter: @Treshondar
Thomasenia Lott Adams, University of Florida, Gainesville

236  Hidden Mathematical Structures of Pineapples: Student Thinking, Identity, and Purpose
Coaches/Leaders/Teacher Educators Workshop
LA Convention Center, 515 B
The world of mathematics can be captured in a pineapple. Explore authentic mathematical connections: start with a pineapple; weave in patterns, nature, and science; and then discuss how students problem solve with a sense of joy and wonder to understand and critique their world. Leave with a renewed sense of purpose on why we teach mathematics for all.
Jaclyn Muraw ska, Skokie/Morton Grove School District 69, Illinois
Twitter: @murawskamath
Sean Nank, California State University San Marcos, Carlsbad

Rich Math Discourse and Problem Solving Begins With Engaging Performance Tasks

EXEMPLARS MATH OFFERS:
• 800+ authentic DOK 3 problems that captivate students’ interests.
• Differentiated “more accessible” and “more challenging” versions.

OUR ASSESSMENT RUBRIC PROMOTES:
• Clear and concise explanations of how problems are solved.
• Precise and effective use of mathematical terminology and notation.
• Use of mathematical presentations as a means of communicating ideas related to the solution of the problem.

OUR STUDENT ANCHOR PAPERS PROVIDE:
• Opportunities for teachers and students to discuss what work looks like that meets (and doesn’t meet) the standard.
• A tool for self- and peer-assessment.

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Friday Morning Sessions

237  Turn and Talk, Conversation Clubs, and Hands-Down Conversations: Tools for Building Student-Centered Talk
PreK–2 Session
JW Marriott, Platinum FG
Come learn about structures and tools for mathematical discourse in which students’ voices and ideas take the lead, building agency as mathematicians and developing strong content understanding. Participants will engage in discussion, analyze video, and learn some practical tips for getting started in this work right away.
Kassia Omohundro Wedekind, Math Coach, Arlington, Virginia
Twitter: @kassiaowedekind
Christy Thompson, Fairfax County Public Schools, Falls Church, Virginia

238  Breaking the Math Anxiety Cycle: Implementing Engaging Practices That Empower Young Minds
3–5 Session
LA Convention Center, 151
Do you have students in your classroom who have math anxiety? Ever wonder what you can do to help this fear subside? Or to help stop this anxiety before it ever starts? Join this session to learn three practices to implement tomorrow that build more positive math experiences for students in your face-to-face or virtual classroom.
Desiree Harrison, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; Farmington Public Schools, Southfield, Michigan
Twitter: @kidsmathtalk

239  Empowering Your Students: How to Support Student Agency in the Classroom
3–5 Session
LA Convention Center, 405
Students who feel empowered develop a stronger sense of ownership over their own learning. Join us in understanding the concept of student “agency” through student voice, choice, and ownership. Participants will learn how to intentionally and thoughtfully engage students in their own learning while creating a safe and nurturing environment.
Mary Ahern, Saint Andrews, Boca Raton, Florida
Gregory Bertha, Saint Andrew’s School, Boca Raton, Florida

240  “I Don’t Fit In”: Positioning Students as Capable Mathematicians
6–8 Session
JW Marriott, Atrium III
This session will focus on leading students through identity exploration to better connect with themselves, teachers, and each other in order to establish a safe and inclusive learning environment. We will discuss ways to decrease math anxiety in the classroom through strong relationships and a student-centered math space.
Crystal Watson, Cincinnati Public Schools, Ohio
Twitter: @_CrystalMWatson

241  Mathematical Lessons with Technological Transformations
6–8 Session
LA Convention Center, 306
More than ever before, technology is pervasive in our mathematics lessons. But is the technology transforming our instruction? This session will feature how to use the SAMR model and the m-learning framework for transforming mathematics lessons. Sample lessons will be shared.
Angela Barlow, University of Central Arkansas, Greenbrier
Twitter: @angelatbarlow
Elizabeth Barlow, Auburn University, Alabama

242  Planning and Reacting: How Do I Best Respond to Student Thinking?
6–8 Session
LA Convention Center, 410
How can questioning support student thinking? Questioning can aid student thinking, so students do the sense making or are guided to the ideas of the teacher. Explore planning questions, anticipating responses, and developing actions to engage students in learning. Tools are provided to create environments where students do the sense making.
Edward Nolan, Moravian University, Bethlehem, Pennsylvania
Twitter: @ed_nolan

Broaden the Purposes of Learning Mathematics
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Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
Friday Morning Sessions

243  Creating Mathematics Classrooms of Joy
8–10 Session
LA Center, 407
It’s time to rehumanize the mathematics classroom by empowering our learners to be curious, creative, and collaborative conjecturers. Math classrooms can be places of joy, and in this session, I’ll share the strategies and frameworks that lead to building communities of joy, from assessment to instructional practices and everything in between.
Melissa Dean, Hanover School Division, Steinbach, Manitoba
Twitter: @dean_of_math

244  Building a Mathematics Intervention Program in a Title I High School
10–12 Session
LA Convention Center, 411
This presentation will focus on the development of a math intervention program at a Title I school in NJ that focuses on Tier II intervention with supplementary standards-based instruction. The speaker will discuss collaborative program creation, identification of data, and development of relevant and engaging intervention materials.
Kara Teehan, Middletown High School North Middletown K12, Fair Haven, New Jersey
Twitter: Kara Teehan
John Kerrigan, Middletown BOE, New Jersey

245  Creating the Room Where It Happens: Developing and Fostering a Classroom of #DreamChasers
10–12 Session
JW Marriott, Georgia
In this session, Joanna Stevens will share how she helps all students chase their dreams in her secondary math classroom with the mindset of lifelong learners. The strategies will focus on establishing culture, engaging instruction, grading practices, and leading the learning as teachers to empower all students to call themselves mathematicians.
Joanna Stevens, Garrard County High School, Lancaster, Kentucky
Twitter: @MrsStevensMath

246  Should Calculus Be an Option for All Students?
10–12 Session
LA Convention Center, 501 A
Explore the answers to three questions:
“Should calculus be an option for all students?”
“What are the necessary concepts and skills that students must learn to have access to calculus?”
“How many years of high school math do students need to learn those concepts and skills?”
Unlock how to create equitable structures in high school math.
Michael Manganello, College Board, Jenkintown, Pennsylvania
Brenda Green, College Board, Stevenson Ranch, California

247  Using Technology to Visualize Dynamic Mathematical Concepts
10–12 Session
JW Marriott, Platinum E
Visual representations, along with other representations, play a vital role in understanding mathematical concepts. Paper and pencil provide us with static diagrams, but dynamic geometry software helps us more in exploring dynamic concepts such as sequences and series. This session focuses on using technology to visualize those dynamic concepts.
Shahabeddin Abbaspour Tazehkand, University of Central Florida, Orlando
Farshid Safi, University of Central Florida, Orlando

247.1  Creating Mathematical Success With 1:1 Devices in Your Math Classroom
10–12 Session
LA Convention Center, 503
Student devices can be used to explore and develop math topics not possible before! From using Desmos to explore function transformations to instant formative feedback on radical simplification with Quizizz or Classkick, this session will go over new ways you can take your students’ devices to new, innovative levels.
Johnathan Taylor, Community High School District 128, Libertyville, Illinois
Twitter: @tayloredu1

248  Creating Equitable Accessible Acceleration Pathways to Calculus
Coaches/Leaders/Teacher Educators Session
LA Convention Center, 404
Learn principles from the UCLA Curtis Center’s work with California districts to co-create high school acceleration pathways to calculus by grade 12 through the development of high-quality curricular sequences that offer multi-entry points, designed to maximize flexible access for all students.
Eden Murphy, UCLA Curtis Center for Mathematics and Teaching, Los Angeles, California

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Friday Morning Sessions

249.1 Success Stories for Catalyzing Change in School Mathematics

*General Interest Session*
JW Marriott, Platinum D

The Catalyzing Change series lays out clear recommendations for PK-12 to ensure mathematics education is working for each and every student. This session shares authentic stories of successful implementation at the classroom, school, district, and state levels. Participants will have an opportunity to reflect on and share their own stories.

Karen J. Graham, University of New Hampshire, Portsmouth, New Hampshire
Robert Q. Berry III, Past President, National Council of Teachers of Mathematics, Reston, Virginia; University of Arizona, Tucson
Sarah B. Bush, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; University of Central Florida, Orlando
DeAnn Huinker, University of Wisconsin Milwaukee

250 Math Workshop: A Joyful Place for All, Not Just for Some

*General Interest Session*
LA Convention Center, 511 AB

Every student deserves a math experience in which they are respected and valued; a place where they can take risks, have a voice, and find joy. There is no reason for a quiet classroom where students work in isolation. There is no excuse for a class where only a few students participate and only a select few can be successful. Math Workshop is for all!

Jennifer Lempp, Author & Consultant, Fairfax, Virginia
Twitter: @Lempp5

251 Mathematics Needs People: Lessons Learned in Mathematics Education through Our Mathematics Stories

*General Interest Session*
LA Convention Center, Petree D

What can mathematicians’ stories teach us about teaching K–12 students? In this session, participants will hear about three mathematicians and their stories. There is a lesson in each story for us to learn in helping our students to develop positive mathematics identities.

Shelly Jones, Central Connecticut State University, New Britain
Twitter: @ShellyMJones1

252 Mindfulness in Mathematics: Integrating Mindfulness Practices in the Mathematics Classroom

*General Interest Session*
LA Convention Center, 511 C

This session shares ways to incorporate mindfulness practices that support humanizing mathematics and building classroom community. These practices, which can take minimal time, can increase a learner’s ability to focus on and learn content in class more effectively. We will show how such practices can be integrated as a part of the daily routine.

Rachael Welder, University of Nevada, Reno
Megan Burton, Auburn University, Alabama
Heidi Eisenreich, Georgia Southern University, Statesboro, Georgia

253 NCTM Business Meeting

*General Interest Session*
LA Convention Center, 150 A

Join NCTM leadership for an overview of recent activities and strategic priorities for the coming year.

Trena L. Wilkerson, President, National Council of Teachers of Mathematics, Reston, Virginia; Baylor University, Waco, Texas
Twitter: @TrenaWilkerson

254 Six Signs of Unforgettable Lessons

*General Interest Session*
LA Convention Center, Hall B

Why is it that people hear an urban legend once and remember it forever? Why is it that students hear about a math concept many times and barely seem to remember anything? We’ll explore six differences so we can make our lessons unforgettable too.

Robert Kaplinsky, robertkaplinsky.com, Long Beach, California
Twitter: @robertkaplinsky

255 Aligning the Change We Want with the Change We Need: Reflections from a Developmental Math Program

*Higher Education Session*
LA Convention Center, 153 BC

This presentation will highlight the principles of a summer math program grounded in a developmental approach to teaching and learning by (1) fostering a growth mindset; (2) using culturally relevant and psychologically nurturing instruction; and (3) attending to a relationship-building focus to education. Long-lasting program participation effects will be examined.

Socorro Orozco, California State University, Los Angeles
Twitter: @dsococo17

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255.1 Curiosity and Exploration—Passing the Legacy to Our Students
10–12 Exhibitor Workshop
LA Convention Center, 514
How do we turn the phrase “Exploring our world through math” on its head? By exploring math through the world, we give students opportunities to engage with the questions they have about the world. Join us for this exciting session where we’ll explore the joy and beauty of math, and consider ways to pass a legacy of curiosity to our students.
Texas Instruments, Sachse, Texas

255.2 Keep it Real, Keep it Relevant: Exciting Opportunities to Keep Students Engaged by Paul Battaglia
Coaches/Leaders/Teacher Educators Exhibitor Workshop
LA Convention Center, 510
Opportunities to enrich student learning are everywhere! Teachers should feel empowered to use real-life, relevant materials and experiences to show students where math truly exists. Big Ideas Learning author, Paul Battaglia, reveals innovative resources that go beyond the walls of a classroom and demonstrates how to apply them on a daily basis.
Big Ideas Learning, Erie, Pennsylvania

255.3 The “R” in CRL (Culturally Responsive Learning)
General Interest Exhibitor Workshop
LA Convention Center, 513
A critical aspect of Culturally Responsive Learning is selecting tasks that invite students to share their own ideas. Let’s experience how 3–Act Math tasks promote student agency and authorship of mathematical ideas where teachers actively respond to different student cultures, backgrounds, and ideas to drive instruction. Presenter: Andrew Byrns.
Savvas Learning Company, Paramus, New Jersey

255.4 Math & Music with TeachRock
Coaches/Leaders/Teacher Educators Exhibitor Workshop
LA Convention Center, 512
In this session, attendees will experience hands-on activities drawing from the free, standards-aligned curricular resource TeachRock. The activities and resources featured in this session will cover a variety of mathematical concepts using musical artists ranging from Beyonce to the Grateful Dead.
TeachRock, New York, New York

255.5 Nearpod Math in the Middle Grades
6–8 Exhibitor Workshop
LA Convention Center, Exhibitor Workshops Theatre 2
Nearpod Math, our new supplemental K–8 math program, provides the content, organization and exclusive tools teachers need to maximize student learning and engagement. In this session, you will learn how to use Nearpod Math to strengthen your mathematics teaching practices while building student confidence and understanding.
Nearpod, Dania Beach, Florida

Looking for lessons, activities, and teacher resources? Check out nctm.org/crcc.
Friday Morning Workshops

256 Connecting Children’s Literature and Math to Build Equitable Access in Math Class

PreK–2 Workshop
JW Marriott, Platinum H13

Everyone is born with a “math brain.” Focusing on equitable math practices invites every student to engage in complex mathematical thinking. This workshop focuses on implementing equitable math instruction through the lens of children’s literature and quality math tasks related to students’ shared experience.

TJ Jemison, All Learners Network, Burlington, Vermont
Twitter: @tedjyt
Ashley Marlow, All Learners Network, Burlington, Vermont

257 Creating a Mathematics Community That Embraces Productive Struggle

PreK–2 Workshop
LA Convention Center, 409

Are you asking, “What can I do in my mathematics classroom so all students engage in struggle and thrive?” Join us to discuss intentional actions you can use to foster productive struggle and help your students see why struggle is important in learning mathematics. You will walk away with practical ideas to implement in your classroom.

Susan Katt, Lincoln Public Schools, Nebraska
Twitter: @susiekatt
John SanGiovanni, Howard County Public Schools, Baltimore, Maryland

258 Social, Emotional, and Mathematical: Routines to Support Social-Emotional Learning in K–Grade 2

PreK–2 Workshop
LA Convention Center, 502 B

All learning is social and emotional. Math routines are a way for teachers to nurture positive relationships and safe environments where SEL can develop and mathematical content can be explored deeply. In this interactive workshop we will explore routines that are ripe with opportunities to develop SEL in K–2 classrooms and beyond!

Katherine Marin, University of Louisville, Kentucky
Twitter: @professormarin

259 Equity and Access through Counting Collections in Grades 3–5

3–5 Workshop
LA Convention Center, 402

Young mathematicians are motivated by the challenge of organizing, counting, and representing collections. This session introduces counting collection trajectories, formative assessment tools that allow elementary teachers to understand and advance student thinking in grades 3–5.

Louisa Hodges, Great Minds, Zachary, Louisiana
Twitter: Louisa Hodges

260 Learn to Tune In to Your True Power . . . Listening!

3–5 Workshop
JW Marriott, Platinum C

Do you ever wonder what your students are thinking and notice that papers don’t talk? Using CGI research, participants will analyze student work, listen to students’ thinking, and plan for the next steps. Through listening and taking next steps, teachers will learn how to help develop students’ math identities as amazing mathematicians.

Melissa Canham, Downey Unified School District, California
Twitter: @Melissa_Canham
Glenda Martinez, Downey Unified School District, California
Julie Yearsley, Downey Unified School District, Long Beach, California

261 The Hidden Power of Multiple Strategies: Connect Properties and Students’ Thinking with Number Talks

3–5 Workshop
LA Convention Center, 408 A

How can you use the various strategies that emerge during number talks as an opportunity to help students see powerful connections? Exploring these connections will help students develop foundational place value and algebraic understandings. In this session, you’ll explore these connections so you can elevate number talks in your classroom.

Nicole Rigelman, Portland State University, Oregon
Twitter: @nrigelman

262 Assess, Activate, and Build on the Prior Knowledge of Your Students

6–8 Workshop
LA Convention Center, 152

Many teachers assume students have no prior knowledge and fail to find out what they already know. Effective teachers understand the importance of connecting concepts to things that are familiar to students. In this session, participants will learn how to use students’ prior knowledge, both personal and cultural, as a resource for learning math.

Pamela Seda, Seda Educational Consulting, LLC, Ellenwood, Georgia
Twitter: Pamela Seda
Kydall Brown, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; University of California, Los Angeles

263 Broaden the Purposes of Learning Mathematics

Create Equitable and Anti-Racist Structures in Schools and Systems

Develop Deep Mathematical Understanding

Implement Equitable Mathematics Instruction

Position Assessment to Promote Equitable Practices and Support Student Learning

Reimagine the Role of Technology in Mathematics Education

Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
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**Friday Morning Workshops**

**9:45 a.m.–11:00 a.m.**

**263** Mistakes: How to Make Them Awesome
6–8 Workshop
LA Convention Center, 403 A

Teachers have the power to transform mistakes from a moment of embarrassment to discovery. As we reel from the effects of remote instruction, embracing mistakes with humor and joy can transform a student’s experience. Through a conscious and pervasive practice of patience and awareness, we can shift students toward constructive mistake-making.

*Esther Selk*, The Girls’ Middle School, Palo Alto, California
*Alyssa Olson*, The Girls’ Middle School, Palo Alto, California

**264** Multiplication for Every Age
6–8 Workshop
LA Convention Center, 403 B

Too often as teachers, we focus on what we are teaching this school year—and that’s about it. How often do we critically look at what students are learning outside of our grade band? In this session, we will follow the progression of multiplication as a concept and a skill from the foundations in kindergarten through algebra 2.

*Shelby Strong*, Stronger Math, LLC, Gretna, Louisiana
*Justin Aion*, Alionized Consulting, Greensburg, Pennsylvania

**265** Advancing and Assessing Learning Gaps through Mathematical Discourse
8–10 Workshop
LA Convention Center, 408 B

Using the Five Practices in your classroom not only engages students in mathematical conversations but can also be a powerful tool in closing the learning gaps. Learn to use advancing and assessing questions more effectively to push learning forward in areas where students need it most.

*Brooke Powers*, Open Up Resources, Lexington, Kentucky
*Morgan Stipe*, Open Up Resources, Carroll, Iowa

**267** Rethinking the Standards for Mathematical Practice for a More Culturally Responsive Classroom
8–10 Workshop
LA Convention Center, 406

In this session, the California Mathematics Council Equity and Social Transformation committee (EST) will provide space for a presentation and discussion about the continued evolution of the Standards for Mathematical Practice ( SMP), an evolution that reflects the present and heightened need for equitable mathematics education for all learners.

*Timothy Weekes*, San Francisco State University, Emeryville, California
*Elizabeth Gamino*, Selma Unified School District, California

**268** Empowering Each and Every Student through Mathematical Modeling in K–12 Classrooms
10–12 Workshop
LA Convention Center, Petree C

Authentic mathematical modeling tasks broaden the purpose of learning and teaching mathematics. Explore components of such tasks that empower students. Engage in activities designed to deepen your knowledge of essential concepts and processes. Examine how modeling can be used in the classroom to teach mathematics for self- and community empowerment.

*Aline Abassian*, Seminole State College of Florida, Casselberry
*Daniel Edelen*, University of Central Florida, Orlando

**269** Experimental Design and Rubric Creation
10–12 Workshop
LA Convention Center, 150 BC

How can we help students understand key concepts in experimental design and help prepare them for the AP Statistics exam? In this highly interactive session, we’ll look at a recent free-response question, analyze typical student responses, and work in groups to create a scoring rubric, focusing on what makes some responses better than others.

*Josh Tabor*, Canyon del Oro High School, Oro Valley, Arizona
*Daren Starnes*, Independent Consultant, Hilton Head, South Carolina

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**Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning**
Friday Morning Workshops

9:45 a.m.–11:00 a.m.

270 If Mathematical Induction Is the Aspirin, How Do You Create the Headache?

10–12 Workshop
LA Convention Center, 502 A
In 2015, Dan Meyer wrote a series of posts with titles of the form, “If [X] Is the Aspirin, How Do You Create the Headache?” about creating intellectual need in students. In this session, we will discuss how to create this need for the proof technique of mathematical induction, using some nonstandard approaches to the topic.
Todd Cadwallader Olsker, California State University, Fullerton, Upland

271 Let’s Talk: Strategies to Use Student Discourse to Increase Mathematical Understanding

10–12 Workshop
LA Convention Center, 308
In this workshop, we will be looking at strategies that can be used to help increase student discourse in the classroom to help deepen student understanding. We will be going through different strategies and technology resources that can be implemented to encourage student talk that teachers can take back to use.
Jill Jacobs, Kent School District 415, Seattle, Washington
Twitter: @jilljacobs

272 President Series: Building Positive Mathematics Identities through Strengths-Based Practices

Coaches/Leaders/Teacher Educators Workshop
LA Convention Center, 515 A
Engaging all learners in the mathematics learning space, this session is designed to help educators push beyond the boundaries of traditional instructional practices toward a more inclusive and engaging space for all learners of mathematics.
Lisa Ashe, NC Department of Public Instruction, Raleigh, North Carolina
Twitter: @lashe920
Joleigh Honey, Utah State Board of Education, Sandy

273 SITEMIC Explorations of Culturally Responsive STEM Pedagogies with Preservice Elementary Teachers

Coaches/Leaders/Teacher Educators Workshop
JW Marriott, Platinum AB
Research has shown that elementary school teachers do not feel adequately prepared to teach mathematics. We have launched an innovative STEM (science, technology, engineering, and mathematics) major to prepare STEM confident elementary teachers with culturally responsive and sustaining pedagogy in diverse classrooms. NSF funded Noyce Scholars will share their experiences.
Andrew Lazowski, Sacred Heart University, Fairfield, Connecticut
Twitter: @AndrewLazowski
Kristin Rainville, Sacred Heart University, Fairfield, Connecticut
Bonnie Maur, Sacred Heart University, Fairfield, Connecticut
Mark Beekey, Sacred Heart University, Fairfield, Connecticut

Download Speaker Handouts!
View sessions in the mobile app or visit nctm.org/planLA to access available presentation handouts.

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NCTM FOCAL AREAS

- Productive Struggle (PK–2, 3–5, 6–8, 9–12)
- Facilitating Discourse (PK–2, 3–5, 6–8, 9–12)
- Algebra Readiness (6–8)
- Making Mathematics Accessible (4–8)
- Building a System of Tens (K–8)
- Making Meaning for Operations (K–8)
- Measuring Space in Dimensions (K–8)
- Orchestrating Productive Discussions in Math Classrooms (6–8)
- Catalyzing Change in Middle School Mathematics (6–8)

NCTM workshops are available for in-school or remote learning to help expand teachers' understanding of mathematics concepts, develop effective instructional strategies, and positively affect student learning outcomes.

NCTM Professional Learning Services offers a wide range of customized, evidence-based professional learning opportunities designed for teachers and school teams.

Visit NCTM Professional Learning Solutions nctm.org/professionalservices for a free consultation, or contact Chonda Long at clong@nctm.org or (800) 235-7566.
Friday Morning Sessions

11:00 a.m.–12:00 p.m.

274 Misconceptions as an Inquiry- and Asset-Based Perspective on Mathematics Assessment
  PreK–2 Session
  JW Marriott, Platinum D
  The word “mistake” often pushes teachers automatically into deficit thinking. Borrowing the idea of misconceptions from the literacy world allows teachers to change lenses, taking an inquiry- and asset-based view of assessment. Considering multiple systems for mathematical thinking, teachers can create opportunities to advance learning through strengths.
  Sara Delano Moore, ORIGO Education, Kent, Ohio
  Twitter: @saradelanomoore
  William Bintz, Kent State University, Ohio

275 Bridging the Gap: Math Literacy and Problem Solving
  3–5 Session
  LA Convention Center, 410
  At a certain level, all readers do the same thing no matter what they are reading and decoding. However, at a certain point, the reading becomes more specialized to math and “math reading.” In this session, participants will explore research-based skills and strategies that support math literacy to enhance problem solving.
  Paul Volkert, Broome-Tioga BOCES, Binghamton, New York
  Twitter: @VolkertMath
  Cody Osterhout, Broome-Tioga BOCES, Binghamton, New York

276 Using Cognitively Guided Math Instruction to Teach Problem Solving to English Language (EL) Students
  3–5 Session
  LA Convention Center, 503
  Participants will learn how to incorporate cognitive strategy instruction for improving the learning and performance of math problem solving and reasoning skills by facilitating information processing through the use of graphic organizers. Also, they will learn how to assist students in monitoring and reflecting on the problem-solving process.
  Jennifer Bond, Ferguson Florissant School District, Saint Louis, Missouri
  Joseph Sencibaugh, Webster University, Saint Louis, Missouri

277 Using Manipulatives to Assess Geometric Understanding
  3–5 Session
  LA Convention Center, 501 A
  Participants will engage in meaningful tasks, which provide opportunities to sort, classify, and organize geometric shapes into a concept matrix. They will defend their reasoning and justify their responses, while using the five practices of productive discussion.
  Juanita Walker, Chapman University, Orange, California
  Barbara Post, California State University, Fullerton

278 Empowering Students through Creative Problem-Solving Opportunities
  6–8 Session
  JW Marriott, Georgia
  When students have the opportunity to explore and share their entire problem-solving process, they begin to develop a sense of ownership in their own mathematical ideas. This session explores how technologies, such as CueThink, leverage student thinking and empower students by making thinking visible and facilitating peer discourse.
  Allison DePiro, CueThink, Barboursville, Virginia
  Sam Rhodes, Georgia Southern University, Statesboro
  Aris Winger, Lawrenceville, Georgia

279 Reasoning When Comparing Fractions: Number Talks Matter
  6–8 Session
  LA Convention Center, 404
  The mathematics explored during middle school is some of the most important mathematics that adults use. However, developing proficiency with rational numbers is also one of the major challenges students encounter during middle school. In this session we will explore ways to support students’ verbal reasoning of rational numbers using number talks.
  George Roy, University of South Carolina, Chapin
  Twitter: George Roy
  Christie Martin, University of South Carolina, Columbia
  Matthew Cunningham, Irmo Middle School, Columbia, South Carolina

280 Exploring Relationships among Variables Using CODAP
  8–10 Session
  LA Convention Center, 511 C
  Explore middle and high school statistics content to compare distributions and model relationships between variables using CODAP (Common Online Data Analysis Platform). Consider how to represent, summarize, and describe univariate, bivariate, and multivariate data to explore relationships. Brainstorm activity adaptations for use with your classes.
  Susan Peters, University of Louisville, Kentucky

281 Digital Assessments: Past, Present, and Future
  10–12 Session
  LA Convention Center, 153 BC
  In 2021 students across the globe responded to almost 19 million individual online AP digital exam questions, including 2,264,400 in AP Calculus and 1,038,034 in AP Statistics. We will describe the qualities of effective and fair digital assessment items and challenges associated with developing, preparing for, and delivering digital assessments.
  Stephanie Ogden, College Board, Knoxville, Tennessee
  Twitter: @SoSogden
  Ben Hedrick, ETS, Princeton, New Jersey

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282 Informed Investing: Using Math to Evaluate Meme Stocks
10–12 Session
JW Marriott, Atrium III
The remarkable rise and fall of Gamestop stock put the stock market at the center of our news cycle and introduced many students to this crucial institution. Learn how using high school math, students can discover how to estimate stock value on the basis of objective criteria, and decide for themselves whether “meme stocks” are a safe or risky investment.
Philip Dituri, FiCycle, New York, New York
Twitter: @philip_dituri
Jack Marley-Payne, FiCycle, New York, New York

283 Triangle Treachery: An Engaging Task for Problem Solving, Perseverance, and Perspectives
10–12 Session
LA Convention Center, 407
Contained within a simple note card is a triangle with varying lengths and constant height. Investigating the area and perimeter of this dynamic triangle leads to some critical mathematical ideas as well as some surprising functions and models. This problem-solving task allows for multiple perspectives as students move from puzzled to productive.
Robert Mann, Western Illinois University, Macomb
Twitter: @rmann967

284 How Will You Leave Your Mark?
Coaches/Leaders/Teacher Educators Session
LA Convention Center, 405
How will your students, co-workers, and administration remember you? Let’s explore how we will leave our mark on mathematics education and what positive change we have influenced. In this session we will explore Social Emotional Learning (SEL) and mathematical protocols we have implemented in our classrooms to promote positive change.
Christine Percy, School District of Palm Beach County, Wellington, Florida
Twitter: @ChristineLPercy
Jennifer Hataway, School District of Palm Beach County, Jupiter, Florida

285 Infusing Multiculturalism and Equity into the Posing of Mathematics Word Problems
Coaches/Leaders/Teacher Educators Session
LA Convention Center, Petree D
The task of creating contextual situations when posing word problems provides an opportunity for teachers at all levels to address multiculturalism, inclusion, and the promotion of social justice. We will examine a task designed to raise awareness and support prospective teachers in learning to pose inclusive and culturally diverse word problems.
Ashley Williams, Texas A&M University, College Station
Rachael Welder, University of Nevada, Reno

286 Beyond X’s and Y’s: Supporting the Development of Algebraic Reasoning
General Interest Session
LA Convention Center, 306
The development of algebraic reasoning begins long before students engage in formal algebra instruction. This session examines how common instructional practices in the elementary grades lay the groundwork for this important topic in middle school and beyond. Direct links to the progression of algebraic reasoning across the grades will be made.
Julie McNamara, California State University East Bay, Hayward

287 ELP + SMP = Student Success in the Math Classroom
General Interest Session
LA Convention Center, 511 AB
Participants will receive an overview of the Standards for Mathematical Practice (SMP) and make connections to the English Language Proficiency Standards (ELP). Connecting SMP to ELP, students will receive the needed support to build their academic language while also engaging in problem solving to maximize student learning and agency.
Eboney McKinney, AZ Dept. of Education, K12 Academic Standards, Phoenix, Arizona
Twitter: EboneyMcKinney
Laurel Cherry, AZ Dept. of Education, K12 Academic Standards, Phoenix, Arizona
Iris M. Carl Equity Address: Making Black Girls Count in Mathematics Education: A Black Feminist Vision of Transformative Teaching

General Interest Session

LA Convention Center, Hall B

Much is lost when we do not politicize Black girls’ math education. Centering Black girls as knowledge producers through a critical analysis of their experiences is necessary. I aim to bridge-build and inspire all to listen, reflect, ask questions, and then act in solidarity with Black girls to realize their limitless possibilities in mathematics.

Nicole M. Joseph is an associate professor with tenure of mathematics education in the department of Teaching and Learning at Vanderbilt University. She is also the Director of the Joseph Mathematics Education Research Lab (JMERL) which trains undergraduate and graduate students in Black Feminist and Intersectionality epistemological orientations producing theoretical and methodological practices that challenge hegemonic notions of objectivity to emphasize humanizing, empowering, and transformative research.

Dr. Joseph’s research explores two lines of inquiry, (a) Black women and girls, their identity development, and their experiences in mathematics and (b) gendered anti-blackness, whiteness, white supremacy and how these systems of oppression shape Black girls’ and women’s underrepresentation and retention in mathematics across the pipeline. Her scholarship has been published in top-tiered journals such as Educational Researcher, Review of Educational Research, Teachers College Record, Harvard Education Review, and the Journal of Negro Education.

Her activist work includes founding the March for Black Women in STEM, an event held every fall that seeks to bring together communities to raise awareness about issues Black women and girls face in STEM learning, education, and industry. Her new grant Measuring Inclusive Constructs of Mathematics Identity (MICMI) starts with Black girls as they identify the intersectional assets needed for more effective math learning that transcend a physical space or curriculum.

About the Iris M. Carl Equity Address:
The Iris M. Carl Equity Address was established in 2008 in honor of Iris Carl, a past president of NCTM who championed mathematics literacy for all.

The Iris M. Carl Equity Address posthumously recognizes Carl’s work in placing NCTM at the forefront of the public debate on the importance of curricular standards. She was also a well-respected public voice in support of mathematics education through testimony before Congress and in the news media. Carl served as NCTM president from 1990 to 1992. In 1997, she received the Mathematics Education Trust Lifetime Achievement Award in recognition of her lifelong commitment to mathematics education. Carl died in 2004.

The address features a selected speaker at the NCTM Annual Meeting and Exposition. Each year a distinguished mathematics educator, noted for making significant contributions to research in education equality, will be invited to give the address.
### Friday Morning Sessions

#### 11:00 a.m.–12:00 p.m.

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<th>Session</th>
<th>Title</th>
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<td>289</td>
<td>Redefining Efficiency to Disrupt Marginalization</td>
<td>11:00 a.m.–12:00 p.m.</td>
<td>LA Convention Center, 411</td>
<td>Berkeley Everett, Jennifer Hagman</td>
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<td>290</td>
<td>Strength in Numbers: Connecting Social Emotional Learning and Math</td>
<td>11:00 a.m.–12:00 p.m.</td>
<td>JW Marriott, Platinum E</td>
<td>Alex Kajitani</td>
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<td>291</td>
<td>Your Wellness Story: Living Your Best Life as a Mathematics Teacher!</td>
<td>11:00 a.m.–12:00 p.m.</td>
<td>LA Convention Center, 151</td>
<td>Timothy Kanold</td>
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<td>Every Step Counts: Getting Visibility into Your Students’ Thinking with Mathspace</td>
<td>11:00 a.m.–12:00 p.m.</td>
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<td>291.2</td>
<td>One Problem, Many Approaches to Designing Your Lesson</td>
<td>11:00 a.m.–12:00 p.m.</td>
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<td>Think! Mathematics</td>
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<td>291.3</td>
<td>Playing with Quadratics in Standard Form &amp; Other Curiosities</td>
<td>11:00 a.m.–12:00 p.m.</td>
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<td>291.4</td>
<td>Teaching Problem Solving to ALL Students</td>
<td>11:00 a.m.–12:00 p.m.</td>
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<td>291.5</td>
<td>Moving Towards Mastery: Why High-Quality Tasks Aren’t Enough</td>
<td>11:00 a.m.–12:00 p.m.</td>
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**Broaden the Purposes of Learning Mathematics**

- Create Equitable and Anti-Racist Structures in Schools and Systems
- Develop Deep Mathematical Understanding
- Implement Equitable Mathematics Instruction
- Position Assessment to Promote Equitable Practices and Support Student Learning
- Reimagine the Role of Technology in Mathematics Education
- Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
**Friday Morning Bursts**

11:30 a.m.–12:00 p.m.

**292** Thinking Relationally about the Equals Sign: Successful Strategies for Diverse Learners

*PreK–2 Burst*

LA Convention Center, 408 B

K–grade 2 teachers explore how a learning progressions approach can be used to develop children’s relational understanding of the equals sign. They examine challenges students have with this critical “Grade 1” concept and how tasks and instruction can be designed and sequenced to develop relational thinking for diverse learners across K–grade 2.

*Ingrid G. Ristroph,* The University of Texas at Austin

Twitter: @IngridRistroph

**292.1** Inquiring Minds—the Base for Base Ten!

*PreK–2 Burst*

JW Marriott, Platinum C

Ensuring that Kindergarten students have a deep understanding of TEN is crucial for future learning. During our time, we will discuss games and activities to engage students in not only concept development but also flexibility of thinking. We will talk about the impact on vertical standards and share ideas for active engagement.

*Rebecca Camera,* Farmingdale Public Schools, New York

Twitter: @Mrs_Camera

*William Marzillier,* Farmingdale Union Free School District, New York

*Janice Puglisi,* Farmingdale Public Schools, New York

**293** Attending to Equity and Instructional Differentiation through Cognitive Interviewing

*3–5 Burst*

JW Marriott, Platinum H13

Through asking well-planned questions that anticipate student misconceptions, cognitive interviews provide teachers with insight to the processes and patterns of student thinking. Such insight allows teachers to attend to students’ specific needs, thereby promoting equity of opportunity for all learners to engage deeply in the mathematics classroom.

*Amber Brown,* University of South Florida (Graduate Teaching Assistant), Brandon

Twitter: @anbrown215

**294** Kolam: Connecting Math, Art, and Culture

*3–5 Burst*

LA Convention Center, 403 A

During this session participants will engage in culturally relevant practices that connect to mathematical ideas. Specifically, Kolam, a traditional Indian art form, will be explored. Participants will learn about ways to build students’ mathematical identities through tasks that center art and culture in grades 3–5.

*Deepa Bharath,* Cambridge Public Schools, Massachusetts

Twitter: @deepanyc

*Siddhi Desai,* University of Central Florida, Oviedo

**295** Measuring Variability: Evolving from Elementary to the Secondary School Level

*6–8 Burst*

LA Convention Center, 308

Grappling with the variability of data in distributions for both quantitative and categorical variables is core to statistical reasoning. This burst will highlight the evolution of how students develop understanding of variability in data for both types of variables, from elementary to the secondary school level.

*Christine Franklin,* American Statistical Association, Alexandria, Virginia

**296** Using Opening Problems to Spark Engagement

*6–8 Burst*

LA Convention Center, 152

Participants will experience three problems with “low floor” entry points, and they will learn how problems may be enhanced and revisited as students deepen their understanding of probability, expressions and equations, and functions.

*Shelley Kriegler,* Center for Mathematics and Teaching, Sherman Oaks, California

Twitter: Shelley Kriegler

*Cynthia Raff,* Center for Mathematics and Teaching, Pasadena, California

**297** Test Recovery: The Power of “Yet” Assessments

*Coaches/Leaders/Teacher Educators Burst*

LA Convention Center, 502 A

Assessing students is necessary but can come at the cost of mathematics anxiety and fears. Going through COVID-19 in a hybrid and face-to-face environment, these costs were even higher, so we reinvented our point-recovery system. Come hear how you might harness the power of “yet” on your summative point-recovery opportunity.

*Amanda Meiners,* Northwest Missouri State University, Maryville

Twitter: @meinersaj314

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Thank you to all of the volunteers who have helped make this conference a success!
Friday Morning Bursts

**298 Understanding How to Implement GAISE Recommendations (Statistical Guidelines) into K–12 Mathematics**

*Coaches/Leaders/Teacher Educators Burst*  
LA Convention Center, 402

The focus is to introduce how to implement the GAISE II (Guidelines for Assessment and Instruction in Statistics Education) report recommendations into PK–12 mathematics classrooms. The majority of the session will be to showcase the same topic/example across the three levels as described by GAISE in order to develop statistical thinkers.

Angela Walmsley, Florida International University, Miami  
Anna Bargaglioti, Loyola Marymount University, Manhattan Beach, California

**301 Unpacking the Reality of Mathematics Anxiety in Our Students**

*General Interest Burst*  
LA Convention Center, 403 B

Mathematics anxiety can develop at any age but often manifests while students are in school. It sets a path of avoidance of math as students mature in their academics and everyday life. This presentation will explore common causes of mathematics anxiety and offer remediation tips for teachers to help diffuse students’ feelings of angst.

Stephanie Quan-Lorey, University of Redlands, California

**302 Building a University-School Partnership: From Early Missteps to Emerging Success**

*Higher Education Burst*  
LA Convention Center, 406

This presentation will highlight the extension of the Professional Development School (PDS) model of teacher preparation into an elementary mathematics pedagogy course in an intensive university-school partnership where preservice teachers are deeply embedded in an elementary mathematics classroom.

Ryan Zonnefeld, Dordt University, Sioux Center, Iowa  
Valorie Zonnefeld, Dordt University, Sioux Center, Iowa

**303 Using Magnitude Bars to Support Students’ Representations of Dynamic Objects**

*Research Burst*  
LA Convention Center, 502 B

I report on the results of providing magnitude bars in a semester-long study with preservice teachers to support their meanings of geometric formulas introduced in K–12 curriculum. The students represented varying quantities in dynamic contexts. I illustrate the ways in which magnitude bars supported their constructions and reasoning.

Irma Stevens, University of Michigan, Ann Arbor

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**Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning**
Friday Afternoon Sessions

1:00 p.m.–2:00 p.m.

304  Closing Gaps and Creating Access to Grade-Level Concepts through Measurement Contexts
PreK–2 Session
JW Marriott, Georgia
Do students have gaps in prior learning? Are you struggling to help fill in their missing experiences while also attending to current grade-level standards? See how measurement tools and contexts can create rich tasks that are accessible for all students and simultaneously address learning gaps.
Marianne Strayton, Clarkstown Central School District, New City, New York
Twitter: @MSEducateEdD

305  Making Sense and Persevering Together: Using SMP 1 to Foster an Equitable Math Learning Community
3–5 Session
JW Marriott, Platinum FG
This session explores connections between Math Practice 1 and the development of an equitable math learning community in which all students see themselves as problem solvers. Using classroom examples, we will examine ways in which this practice can be leveraged to build a collaborative community that fosters positive math identities and agency.
Annie Sussman, TERC, Cambridge, Massachusetts
Arusha Hollister, TERC, Cambridge, Massachusetts

306  Math Cultural Connections through Children’s Literature
3–5 Session
LA Convention Center, 411
Let’s integrate culturally diverse children’s literature in our math classrooms to build on the strong mathematical backgrounds of our students. This session will have participants connect the rich backgrounds and cultures of the families and students they serve by creating cultural contexts for the math they teach.
Amber Trantham, Jacksonville State University, Anniston, Alabama
Twitter: @atranth
Tameka Stephens, Gadsden City Schools, Alabama

307  Strengths-Based Feedback: Leveraging Students’ Strengths to Reveal Their Mathematical Brilliance
3–5 Session
LA Convention Center, 511 AB
Facilitating strengths-based feedback is an essential component of creating and sustaining a strengths-based mathematics classroom. We will explore the three phases of the strengths-based feedback cycle and strategic ways of giving, receiving, supporting, and leveraging feedback at particular points during a lesson.
Beth Kobett, Stevenson University, Eldersburg, Maryland
Twitter: @bkobett
Karen Karp, Johns Hopkins University, Baltimore, Maryland

308  “Sam’s Journey”: Exploring the History of Math and Sense of Identity through Powerful Narrative
6–8 Session
LA Convention Center, 511 C
What does it mean to be a good mathematician? Our Innovamat program introduces some lessons with “Sam’s Journey,” a short animated series that explores the history of math while navigating the narrative of every teenager’s inner storm. We will share the creative process and demonstrate how students can broaden their vision while having fun.
Marc Caelles, Innovamat, Sant Cugat del Vallès, Spain
Albert Vilaïta, Innovamat & Universitat Autònoma de Barcelona, Spain
Verónica Sánchez, Innovamat, Sant Cugat del Vallès, Spain
Blanca Souto, Innovamat & Universitat Autònoma de Barcelona
Laura Morera Ubeda, Innovamat & Universitat Autònoma de Barcelona, Sant Cugat del Valles, Spain

309  Catching up and Moving Forward: Rethinking Tier 1 Intervention
6–8 Session
LA Convention Center, 503
How can we address unfinished learning while still moving students forward in new grade-level learning? This session will explore how real-world context and visual representations help students make connections to the big math ideas that structure math learning, allowing them to build deep understanding of prior concepts while learning new content.
Corrine Mitchell, Zearn, New York, New York
Friday Afternoon Sessions

310 Welcoming All Students into the Middle School Classroom with Culturally Responsive Tasks and Routine
6–8 Session
LA Convention Center, 306
Culturally responsive problem-solving tasks invite great conversations in the middle school mathematics classroom. When students have multiple entry points for ideas about effective and efficient ways of approaching a task, great things happen, especially when everyone is connecting with the lesson on the basis of their own cultural experiences. Lloyd Jones, Curriculum Associates, Hendersonville, North Carolina
Twitter: @lloydones

311 #SlowMath: Looking for and Making Use of Structure
8–10 Session
LA Convention Center, 501 A
We want all students to be able to say, “I can look for and make use of structure.” But how do we support the struggle to learn? What expressions, equations, and diagrams require making what isn’t pictured visible? Let’s engage in tasks for which making use of structure can provide an advantage and invite students to make their thinking visible. Jennifer Wilson, Illustrative Mathematics, Black Mountain, North Carolina
Twitter: @jwilson828
Vanessa Cerrahoglu, Orange County Department of Education, Huntington Beach, California
Elizabeth Ramirez, Illustrative Mathematics, Long Island City, New York

312 President Series: Centering Black Girls’ Lived Experiences to Promote Algebraic Thinking
8–10 Session
LA Convention Center, 151
Black girls’ lived experiences are often invisible in the teaching and learning of mathematics. During this session, participants will engage in high-level algebraic tasks that build on the rich experiences and cultural knowledge of Black girls and their communities. Crystal Morton, Indiana University – Purdue University Indianapolis
Brea Ratliff, Me to the Power of Three, Auburn, Alabama
Evan Taylor, Indianapolis Public Schools

313 Three-Part Classroom Framework to More Equitable Mathematics Instruction
8–10 Session
LA Convention Center, 405
Here are three steps to make your math instruction more equitable. First, learn about intentional community-building activities to nurture students’ positive mathematical identities. Next, experience engagement strategies that foster students’ mathematical belonging and joy. Last, experience a strategy to make grade-level content accessible to all. Juliana Tapper, CollaboratEd Consulting LLC, Westminster, Colorado

314 Breaking Bias in Data and Modeling
10–12 Session
JW Marriott, Platinum D
The themes of our discussion will be (1) the beauty and utility of mathematical modeling, and (2) the consequences. We will share project-based lessons introducing students to data science and machine learning. Through these lessons, we will explore data and bias, as well as the predictive power and predictable failure of applied mathematics. Jedediah Williams, Nantucket High School, Massachusetts
Twitter: @jedediah

315 We Belong! Building Culturally Caring Communities to Support Powerful Collaborations in Schools
10–12 Session
LA Convention Center, 150 A
Engage in this session to discuss how establishing culturally caring classroom communities can help us frame critical collaborations needed for fostering a sense of belonging for every mathematics learner. Together, we will discuss effective ways to establish positive relationships that affect students’ mathematics learning. Paula Santana De Tice, University of Central Florida, Orlando
Twitter: @SantanaMathEd
Lybrya Kebreab, University of Central Florida, Orlando

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**Friday Afternoon Sessions**

1:00 p.m.–2:00 p.m.

### 316 Disrupting Special Education Structures: Supporting De-Streaming in Elementary Mathematics

*Coaches/Leaders/Teacher Educators Session*
LA Convention Center, 407

Although common in high school, streaming is a practice that occurs covertly in elementary schools. This presentation will outline our processes, challenges, and learning from working with elementary teachers to support full inclusion of students with special education needs in math classes that provide equal access to successful outcomes for all.

_Elli Weisdorf_, York Region District School Board, Newmarket, Ontario
Twitter: @ElliWeisdorf

_Jordan Rappaport_, York Region District School Board, Thornhill

### 317 All Students Can Learn Math—But They Aren’t: The Seven Hidden Needs of All Math Learners

*General Interest Session*
LA Convention Center, 404

We claim all students can learn math, but the data is painting a very different, and devastating, picture. Recent discoveries in brain research reveal hidden needs for students to feel included, rather than marginalized, in math class. Join a best-selling author for an engaging session to uncover seven prerequisites for all students to learn math.

_Liesl McConchie_, Math With the Brain in Mind, La Mesa, California
Twitter: @LieslMcConchie

### 318 Democratic Mathematics Education: A Timely Convergence of Math and Civics

*General Interest Session*
LA Convention Center, 410

What would happen if we took math class seriously as space for democratic education? Democratic Math Education is both a philosophy and practice of math education designed to engage students in a rigorous mathematics experience and develop their capacity for democratic participation.

_Catherine Henney_, N/A, Richmond, Virginia

### 319 Math (In)Justice: Rethinking the Relationship among Standards, Assessment, and Identities in K–12

*General Interest Session*
LA Convention Center, Petree D

Using an anti-racist social justice lens, this session critically examines the role of mathematics standards and assessment systems on student identities across K–12. We explore the complex realities and impacts on identity for learners, families, teachers, and leaders. Implications for classroom, district, and state policies will be discussed.

_Julia Aguirre_, University of Washington Tacoma, Renton
Twitter: @JuliaAguirre23

_Karen Mayfield-Ingram_, University of California Berkeley

_Danny Martin_, University of Illinois Chicago

### 320 President Series: What’s New for You at the Mathematical Association of America?

*General Interest Session*
JW Marriott, Platinum E

As a sister organization to NCTM, MAA has many initiatives and opportunities that overlap the interests of NCTM members. Learn about our joint position statement on teaching calculus, the Instructional Practice Guide, AMC for all, and work on the mathematical education of teachers, placement and articulation, and more.

_Jennifer Quinn_, MAA & UW Tacoma, Washington
Twitter: @swirlgirl131415

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**Membership questions? We’ve got answers! Visit Member Services in NCTM Central.**

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**Friday Afternoon Sessions**

**321** President-Elect Address: Honoring the Voices of Our Students

*General Interest Session*
LA Convention Center, Hall B

Too many times and for too long, we have seen that not every student experiences success in mathematics. What can we do to see and hear our students? Let’s examine some teaching practices that help nurture students’ positive mathematical identities and promote deep understanding of concepts.

*Kevin Dykema,* President-Elect, National Council of Teachers of Mathematics, Reston, Virginia; Mattawan Middle School, Michigan

**322** UDL Math Makeover: Meeting the Needs of All Learners through a Universally Designed Math Workshop

*General Interest Session*
LA Convention Center, 153 BC

The question: How can we meet the needs of all learners without going backward, lowering expectations, and losing our sanity? The answer: Give your class a makeover with a Universally Designed math workshop. The surprise: It’s easier than you think! This session will deliver the resources, structures, and inspiration you need to start tomorrow!

*Alison Mello,* Foxborough Public Schools, North Attleboro, Massachusetts
Twitter: Alison Mello

**323** International Perspectives on the Teaching and Learning of Mathematics: Reflections on ICME 14

*Research Session*
JW Marriott, Atrium III

An International Congress on Mathematical Education (ICME) is an opportunity to discuss common challenges and promising practices with mathematics teachers and educators from other countries. This session will feature a panel of ICME Travel Grant awardees reflecting on ICME 14 highlights and the impact on their work as well as ways to get involved.

*Gail Burrill,* Past President, National Council of Teachers of Mathematics, Reston, Virginia; Michigan State University, Hales Corners, Wisconsin

*Jana Dean,* Olympia School District, Washington

*Linda Blanco,* Joliet Junior College, Illinois

*Nikita Patterson,* Georgia State University, Stone Mountain

Lisa Conzemius,* Detroit Lakes Public High School, Minnesota

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1:00 p.m.–2:00 p.m.

323.1 Connecting Many Ideas through Board Writing

*PreK–2 Exhibitor Workshop*
LA Convention Center, Exhibit Hall 1

This session demonstrates how a teacher uses board writing to document diverse student ideas to help connect and relate ideas. Along the way, students learn to articulate mathematical ideas using words, symbols and diagrams through teacher modeling.

*Think! Mathematics*, Neptune Beach, Florida

323.2 I Gotta Do This with My Kids!

*10–12 Exhibitor Workshop*
LA Convention Center, 514

Check out the powerful ways students can be engaged using TI-84 CE graphing technology as an exploration tool. We will explore many ideas for using graphing technology as a tool for exploring concepts that are tough to teach and tough to learn. Come learn some new strategies for incorporating graphing technology into your classroom.

*Texas Instruments*, Sachse, Texas

323.3 ‘Just-In-Time’ Gap-Filling Towards Grade-Level Gains with Get More Math

*General Interest Exhibitor Workshop*
LA Convention Center, 510

Every fall, math teachers face the same old dilemma: how can students learn grade-level content if they don’t have mastery of concepts from prior grades? This session will cover strategies that address initial weaknesses and gaps, with an emphasis on targeting grade-level material while weaving in supporting concepts along the way.

*Get More Math!*, Sonora, California

323.4 Live Podcast Recording of Math Teacher Lounge with Bethany Lockhart Johnson and Dan Meyer

*General Interest Exhibitor Workshop*
LA Convention Center, 512

The hit Math Teacher Lounge podcast has come to NCTM ... and you’re invited to a live taping! Join co-hosts Bethany Lockhart Johnson and Dan Meyer for a live session full of special guests, games, and giveaways, a session where they'll take on some of math education and NCTM’s toughest questions.

*Amplify*, Brooklyn, New York

323.5 NBA Math Hoops: Creating the Next Math Champion!

*Coaches/Leaders/Teacher Educators Exhibitor Workshop*
LA Convention Center, 513

NBA Math Hoops leverages the game of basketball and the NBA/WNBA to engage students with math and social-emotional learning skills through a digital/physical board game, curriculum, mobile app, and community program. The presentation will detail all aspects of the program experience. All resources are completely free of cost for educators.

*Learn Fresh*, Philadelphia, Pennsylvania

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**324** Equity and Access through Counting Collections: K–2

*PreK–2 Workshop*
LA Convention Center, 408 A

Young mathematicians are motivated by the challenge of organizing, counting, and representing collections. This session introduces counting collection trajectories, formative assessment tools that allow elementary teachers to understand and advance student thinking in PK–grade 2.

*Maria Elena Amaya*, Great Minds, Whittier, California

**325** Math in the Making! Developing Informal and Humanistic Math Practices within Play-Making Activities

*PreK–2 Workshop*
LA Convention Center, 408 B

Are you interested in learning how play-making activities engage students’ in mathematical practices that are grounded in informal and humanistic approaches? Through engaging in play-making activities, we will discuss ways to notice and build on students’ intuitive mathematical understanding and mathematical practices in your own classroom.

*Amber Simpson*, Binghamton University, New York
*Signe Kastberg*, Purdue University, West Lafayette, Indiana
*Andrew Tyminski*, Clemson University, South Carolina

**326** A Framework for Creating an Equitable Mathematics Classroom

*3–5 Workshop*
LA Convention Center, 409

What supports the development of students’ mathematical identity and agency in an elementary math classroom? What does equitable teaching and learning look and sound like? This session explores a framework for reflecting on characteristics of a math learning community that foster and support all students in becoming powerful math thinkers.

*Karen Economopoulos*, TERC, Cambridge, Massachusetts
*Marta Garcia*, Consultant, Wilmington, North Carolina
*Lynne Godfrey*, Consultant, Medford, Massachusetts
*Megan Murray*, TERC, Cambridge, Massachusetts

**327** Teaching Fractions with Deep Understanding, Fluency, and Real-Life Problem Solving: Success for All

*3–5 Workshop*
LA Convention Center, 502 A

Are you looking for great ideas to help every student understand fractions? Come learn strategies to develop deep understanding of fractions, focusing on fractions as numbers, equivalent fractions, operations with fractions, and decimal equivalence. Actively engage with real-world problem solving and effective questioning strategies. Handouts.

*Donna Knoell*, Self, Shawnee Mission, Kansas
Twitter: @DonnaKnoell

**328** The Power of Generalization in Elementary Mathematics

*3–5 Workshop*
LA Convention Center, 150 BC

Generalization is the missing component of elementary math instruction. Deep understanding of the four operations through generalizing patterns is key to bridging elementary math to algebra. In this session we will use generalizations to gain a deeper understanding of the four operations and allow students to solidify their fluency and flexibility.

*Dennis Regus*, Riverside County Office of Education, Murrieta, California
Twitter: @MathHiker76

**329** Visual Number Talks: A New Way to See this Routine

*3–5 Workshop*
LA Convention Center, 515 B

Do you find it a struggle to get all students involved in number talks? Come discover how adding a visual component creates entry for all students and supports conceptual, fluency, and number sense development.

*Kim Webb*, Tulare County Office of Education, Visalia, California
Twitter: @NoodleKimw

*Joseph Lamb*, Tulare County Office of Education, Visalia, California

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Friday Afternoon Workshops

1:00 p.m.–2:15 p.m.

What’s the Big Idea?

6–8 Workshop
JW Marriott, Platinum AB
Understanding big ideas and weaving them into lessons is no small task. Focusing on big ideas in middle school, we will experience how rich problems and comprehensive lessons can have multiple big ideas entwined. Participants will gain an understanding of how big ideas develop deep mathematical understanding for their students while linking ideas together.

Cynthia Raff, Center for Mathematics and Teaching, Redondo Beach, California
Mark Goldstein, Center for Mathematics and Teaching, Redondo Beach, California

Where Are the Words? Reducing Barriers without Reducing Rigor

6–8 Workshop
LA Convention Center, 402
Let go of the keywords and make the mathematics more accessible through different modalities. For many students, words are the problem with word problems. In this session, learn how to reduce the barrier that written word problems can present while increasing relevance and engagement with meaningful contexts.

Lauren Trahan, Great Minds, Birmingham, Alabama
Jennifer Tadlock, Great Minds, Lafayette, Louisiana

Writing Robust Mathematics Tasks: Lessons Learned from the SBAC Performance Task Project

6–8 Workshop
LA Convention Center, 308
We share a framework for authoring robust math tasks that engage students in developing autonomous chains of reasoning in the context of solving an engaging mathematical question while attending to issues of accessibility and bias. This framework was developed by The UCLA Curtis Center as part of its contract work to author SBAC Performance Tasks.

Michelle Welford, UCLA Curtis Center, Chestnut Hill, Massachusetts
Twitter: @UCLACurtisCtr

Creating LGBTQ+ Affirming Mathematics Classrooms

6–10 Workshop
LA Convention Center, 515 A
This workshop will provide attendees with a beginner’s level understanding of creating LGBTQ+ affirming mathematics classrooms. We will discuss the interplay of mathematical identity and LGBTQ+ identity and explore strategies for confronting bias, auditing classroom spaces and curricular materials, and responding to pushback from stakeholders.

Brandie Waid, The Queer Mathematics Teacher / Radical Pedagogy Institute, West Orange, New Jersey
Twitter: @MathTeach_BEW

Turner’s Graph of the Week

6–10 Workshop
LA Convention Center, 403 A
This hands-on session focuses on using statistical data to sharpen analytical thinking, improve math literacy, raise current event awareness, and develop civically engaged students. Participants will learn how to maximize the use of Graph of the Week with their students. Materials will be available for immediate use.

Kelly Turner, Saddelback Valley Unified School District, Mission Viejo, California

Using Low-Tech and High-Tech Tools to Support Visualization and Reasoning in Your Geometry Classroom

6–10 Workshop
LA Convention Center, 502 B
We will take a deep dive into geometry concepts using paper manipulatives and dynamic geometry models as we explore, conjecture, and justify. We will make connections among area, parallel lines, rigid transformations, and the Pythagorean theorem. Bring your device and be ready to participate!

Tami Martin, Illinois State University, Normal
Roger Day, Illinois State University, Normal
John Carter, Iolani School, Honolulu, Hawaii
Arsalan Wares, Valdosta State University, Lake Park, Georgia
**Friday Afternoon Workshops**

1:00 p.m.–2:15 p.m.

### 336  
**Explore Alternatives to Dilemmas Encountered in the Class to Rehumanize Learning for All**

**10–12 Workshop**  
LA Convention Center, 406

Investigate dilemmas encountered in the classrooms of two National Board Certified Teachers with diverse backgrounds. Learn alternative solutions that challenge privilege and foster all students’ math agency within the classroom in order to rehumanize mathematics teaching and learning for all students.

Jessica Alvarado, Anaheim Union High School District, California  
Twitter: @mrs_alvarado

Amtul Chaudry, Anaheim High School, California

### 337  
**Becoming a Mathematics-Focused Social Justice Educator**

**Coaches/Leaders/Teacher Educators Workshop**  
LA Convention Center, Petree C

Come learn why one should become a mathematics-focused social justice educator, how to engage students in meaningful mathematics-focused social justice experiences, and the ideal conditions to create an authentic mathematics-focused social justice classroom environment that allows students to thrive academically, socially, and politically.

Kristopher Childs, K Childs Solutions, Winter Garden, Florida  
Twitter: @DrKChilds

### 336.1  
**Reaching Beyond Algebra II: Exploring Non-Traditional Mathematics Topics**

**10–12 Workshop**  
LA Convention Center, 501BC

In this workshop, we will focus on topics that may appear in courses beyond Algebra II; these topics include graph theory and mathematical logic. We will spend the majority of our time working collaboratively on relevant tasks pertaining to these topics, and participants will walk away with resources they can implement in their classrooms.

Tamar Avineri, North Carolina School of Science and Mathematics, Durham  
Ashley Loftis, North Carolina School of Science and Mathematics, Durham

### 338  
**Thinking Like a Data Scientist: Using Data Tools and an Investigation Framework to Support Students**

**Coaches/Leaders/Teacher Educators Workshop**  
JW Marriott, Platinum HJ

Want to engage students with real data to build statistical reasoning and data science skills? Bring your laptop or tablet to investigate multivariate, messy data using a data investigation process and a free data tool (CODAP). A guide for questioning throughout a data investigation to support students’ thinking and data practices will be shared.

Gemma Mojica, North Carolina State University, Raleigh  
Hollylynne Lee, North Carolina State University, Raleigh

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**Hear what’s new from exhibitors—attend an exhibitor workshop.** Find the full schedule by clicking on the “exhibitor workshops” icon on the NCTM mobile app.

- Broaden the Purposes of Learning Mathematics
- Create Equitable and Anti-Racist Structures in Schools and Systems
- Develop Deep Mathematical Understanding
- Implement Equitable Mathematics Instruction
- Position Assessment to Promote Equitable Practices and Support Student Learning
- Reimagine the Role of Technology in Mathematics Education
- Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
14 optimal practices for thinking that create an ideal setting for deep mathematics learning to occur
Grades K–12

Strengths-based approaches to support multilingual students’ development in mathematics
Grades K–8

Detailed plans for helping elementary students experience deep mathematical learning
Grades K–1, 2–3, 4–5

Your game plan for unlocking mathematics by focusing on students’ strengths
Grades K–6

Guidance on building productive relationships with families about math education
Grades K–5

Empowering students to embrace productive struggle to build essential skills for learning and living—both inside and outside the classroom
Grades K–12

A vulnerable and courageous grassroots guide that leads math teachers through a journey to cultivate a more equitable, inclusive, and cohesive culture of professionalism for themselves
Grades K–12

Enter to win a $300 Corwin Math Library at booth #327
corwin.com/math
Friday Afternoon Sessions

339  Creating an Inclusive and Engaging Mathematical Environment through Discourse
PreK–2 Session
LA Convention Center, 511 AB
This presentation centers on ways to engage students in meaningful discussions during mathematics instruction. Students thrive when they are given opportunities to describe and defend their thinking. They need structured support to do this well. Learn specific strategies to foster a sense of belonging and community in your elementary classroom.
Lisa Brooks, University of Central Florida, Saint Cloud
Twitter: Lisa Brooks

340  Getting Your Model On with Math: Using Models to Represent Problem Solving
PreK–2 Session
LA Convention Center, 306
The presentation will provide participants with different research-based strategies that will help students learn how to model their problem-solving thinking. The speaker will model solving word problems using five-frames, ten-frames, number lines, five-trains, ten-trains, and number charts.
Dana Enriquez-Vontoure, Vontoure Learning, LLC, Humble, Texas
Twitter: @Vontoure_Math
Shaneka Thomas, Vontoure Learning, LLC, Humble, Texas
Shana Swain, Vontoure Learning, LLC, Humble, Texas

340.1 Fractions + Geometry = Dynamic Duo!
PreK–2 Session
JW Marriott, Platinum FG-JW
Fractions before third grade-YESS! Fractions are often positioned as fear inducing; however, by focusing on developing early learners conceptual understanding, students can find early success! Join us to discuss teaching fractions using tangible and meaningful contexts through geometry with various models, representations, and precise language.
Stefanie D. Livers, Missouri State University, Springfield
Twitter: @LiversStefanie

341  “One Mathematics” Problem, “Many Voices”
3–5 Session
LA Convention Center, 501 A
How do you get your students to really enjoy and excel at problem solving? Try letting as many of them have a voice in examining challenging yet achievable problems that have multiple solution paths—maybe some paths you never thought of. Generate excitement among your students by modeling how to take risks in mathematical problem solving.
Ron Lancaster, University of Toronto, Hamilton

342  Keep Your Language Clean: Teach Effectively by Wiping Out the Dirty Words
3–5 Session
LA Convention Center, 405
Some words commonly used in math can make learning messy. The words we use either support or interfere with sense making. We will provide a fun, interactive and entertaining session discussing multiple dirty words and phrases, the rationale for wiping them out, and alternative vocabulary for cleaning it up.
Ryan Higgins, Chesterfield County School District, South Carolina
Chris Higgins, South Carolina Connections Academy, Hartsville

343  Deepen Mathematical Understanding through Valuing Community and Thinking Classroom Procedures
6–8 Session
LA Convention Center, 411
Students’ voices are critical to deepen mathematical reasoning, but how do you intentionally promote this? Learn strategies that provide opportunities for all students to participate in class, contribute meaningful discourse, and reflect on the process. Obtain strategies that transform engagement and promote student-centered learning that works.
Angela Reed, AUHSD, Anaheim, California
Lupe Serrano, AUHSD, Anaheim, California
Jennifer Fuentes, AUHSD, Anaheim, California

344  Project-Based Learning: Learning Math with Purpose and Voice
6–8 Session
LA Convention Center, 410
Do you want to teach mathematics with purpose, relevance, and rigor? Explore how you can use PBL (project-based learning) to promote equity, inclusion, and diversity using five C’s (critical thinking, collaboration, communication, creativity, and character) and 21st century skills.
Susie Min, Oxford Academy, Cypress, California
Tor Ormseth, El Rancho USD, Pico Rivera, California

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Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
Friday Afternoon Sessions

2:30 p.m.–3:30 p.m.

345  Algebraic Structure as the Focus in the Teaching and Learning of Algebra

8–10 Session  JW Marriott, Georgia
This session will describe an NSF funded project, Thinking with Algebra (TWA), and how a focus on algebraic structure can be used to enhance the teaching and learning of algebra. Rich problem sets that engage students in learning algebra in a deeper and meaningful way will be shared, and the classroom climate will be modeled.

David Feikes, Purdue University Northwest, Westville, Indiana
Bill Walker, Purdue University, West Lafayette, Indiana
Natalie McGathey, Prairie State College, Chicago Heights, Illinois
Bir Kafle, Purdue University Northwest, Hammond, Indiana

346  Math versus Mathematics: Using Desmos to Honor Student Thinking and Value Student Input

8–10 Session  LA Convention Center, 511 C
Desmos, as a tool for instruction, has the power to honor student thinking through a variety of animations, digital manipulatives, and connected ideas. In this session we’ll explore how Desmos can make visual patterns come to life, connect mathematical representations, and deliver meaningful learning experiences that value student input.

Kurt Salisbury, Desmos Inc., Woodway, Texas
Twitter: @kurt_salisbury

347  Global Mathematics: A High School Elective Course for All Students

10–12 Session  LA Convention Center, Petree D
Come learn how one high school created an elective course, Global Mathematics, that helps students understand and critique the world while also experiencing wonder, joy, and beauty. This course engages students at every ability level through the study of the history of math and the usefulness of math to address global and local issues.

David Ebert, Oregon High School, Wisconsin
Twitter: @MrDaveEbert

348  Promoting Equity and Access with Mathematical Modeling

10–12 Session  JW Marriott, Atrium III
Math modeling invites students to join discussions about math concepts and real-world problems, allowing for approaches that level the playing field for students. Come away with rich modeling problems that can be applied to courses from algebra to calculus, as well as instructional tips from experienced teachers and modeling contest judges.

Greta Mills, Oxbridge Academy, West Palm Beach, Florida
Twitter: @mathteacher671
Cheryl Gann, NC School of Science and Mathematics, Durham, North Carolina
Kayla Blyman, Saint Martin’s University, Lacey, Washington

349  President Series: Taking an Equity Stance

Coaches/Leaders/Teacher Educators Session  LA Convention Center, 151
The familiar and comfortable educational system that we negotiate does not work for our children. Because the oppressive culture of the system is deeply ingrained, it falls upon educators to be proactive in our self-education, acknowledge the inherent systemic racism that leads to inequities, and be courageous in our words and actions.

Diana Ceja, Riverside County Office of Education, Fontana, California
Twitter: @imathination
Shirley Roath, Riverside County Office of Education, California

350  Assessing and Addressing Unfinished Learning with the Readiness Assessment for Math Project (RAMP)

General Interest Session  LA Convention Center, 503
The Readiness Assessments for Math Project is a set of short, formative, standards-based assessments with accompanying instructional resources that focus on assessing and addressing unfinished learning to support students in getting access to grade-level mathematics learning.

Jamie Garner, Stanislaus County Office of Education, Modesto, California
Twitter: Jamie Garner

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**Friday Afternoon Sessions**

2:30 p.m.–3:30 p.m.

351  California Dreaming? A New Future for Math Learners in California and Beyond  
*General Interest Session*  
LA Convention Center, Hall B  
New proposals for math teaching in the state of CA include a focus on big ideas and connections and new pathways in data science and number sense. They also include dismantling inequitable tracking structures and encouraging more students to higher levels of mathematics. Come and hear about the ways this can happen in your own classroom!  
Jo Boaler, Stanford University, California  
Twitter: @joboaler

352  Conferring with Mathematicians  
*General Interest Session*  
LA Convention Center, 153 BC  
Let’s talk about conferring with mathematicians in K–grade 5. Join us as we explore two conferring structures (Within the Task and Beyond the Task), methods for manageable data collection, and suggestions for analyzing the data to inform instructional decisions. This session will feature classroom examples and helpful tools to support this work.  
Gina Picha, None, Austin, Texas  
Twitter: @gipicha

352.1 Fostering a Growth Mindset: The Importance of Kindness and the Need for Empathy  
*General Interest Session*  
LA Convention Center, 407  
Wouldn’t it be nice to infuse math classrooms with kindness—the warmth and openness in one’s heart for the well-being, happiness, and success of others? Participants will learn about kindness-happiness connections, the importance of kindness in fostering a growth mindset, and the need for empathy in connecting with students.  
Kien Lim, University of Texas at El Paso  
kienlim@utep.edu

353  Mathematics and Statistics Are Awesome: Let’s Talk about Why  
*General Interest Session*  
3W Marriott, Platinum E  
The Catalyzing Change series suggests there is more to mathematics than college and career readiness—the joy and wonder. What are some things in mathematics you find fascinating? We’ll explore some of these from your perspectives as well as mine. In the process, we’ll also think about a new normal for what should be considered important to teach.  
Gail Burrill, Past President, National Council of Teachers of Mathematics, Reston, Virginia; Michigan State University, Hales Corners, Wisconsin

354  Building Relationships and Community with Preservice Mathematics Teachers  
*Higher Education Session*  
LA Convention Center, 404  
How do we create strong math teachers who see the importance of building relationships with their students and creating opportunities for students to build relationships with one another? We will describe how we model this for our preservice teachers throughout their program. Experience activities that we use to develop relationships and learn math.  
Christine Larson, South Dakota State University, Brookings  
Twitter: @CL2718  
Sharon Vestal, South Dakota State University, Brookings

354.1 Are We Wasting Children’s Time Teaching What They Cannot Yet Understand?  
*PreK–2 Exhibitor Workshop*  
LA Convention Center, Exhibit Hall 2  
Learning Loss is greater and it takes longer to catch up when we teach what is expected without determining what children need. Kathy Richardson and Sue Dolphin share how the Assessing Math Concepts for All (AMCg) assessments can identify where children are in understanding number, allowing teachers to provide the most effective instruction.  
Didax Inc, Rowley, Massachusetts

354.2 Helping PreK–8 Students Become Problem Solvers, NOT Problem Performers, presented by Brittany Goering  
*PreK–2 Exhibitor Workshop*  
LA Convention Center, 513  
Come explore ways to help your PreK–8 students become problem solvers. Students who are thinkers and focus on the problem and mathematics to achieve a solution instead of just picking out numbers and trying to do something with them without understanding. In this session we will explore problems that will help students focus on understanding.  
hand2mind, Inc., Vernon Hills, Illinois

*10–12 Exhibitor Workshop*  
LA Convention Center, 514  
Hear co-author Rich Sgroi speak about the course Advanced Algebra with Financial Applications using the text Financial Algebra. The course draws upon topics from Algebra 2, Trig, Stats, Probability, and Precalc in the contexts of spending, banking, credit, taxes, investing, home/auto ownership, and budgeting.  
National Geographic Learning, Boston, Massachusetts

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Twitter: @gipicha

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Kien Lim, University of Texas at El Paso  
kienlim@utep.edu

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National Geographic Learning, Boston, Massachusetts
Friday Afternoon Workshops

2:45 p.m.–4:00 p.m.

355 New Teacher Celebration
Coaches/Leaders/Teacher Educators Workshop
LA Convention Center, 408 A
Come and celebrate the progress and possibilities as new and early-career teachers, or as a teacher still in training. Meet and network with the NCTM Board and leadership and other new and early-career teachers. We’ll have refreshments and prizes, too!
David Barnes, National Council of Teachers of Mathematics, Reston, Virginia
New Teacher Strand sponsor Knowles Teacher Initiative

356 Asian American, Canadian, and Pacific Islander Education Project: Curricular Resources for K–12 Math Classrooms
PreK–2 Workshop
LA Convention Center, 515 B
This workshop guides ways to integrate Asian American, Canadian, and Pacific Islander identities, stories, and histories into the mathematics classroom. Participants will engage in mathematics lessons and explore additional curricular resources as starting points to broaden the cultural identities and the type of stories shared. Join us as a community to build a repository of curricular resources.
Cathery Yeh, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; University of Texas at Austin
Twitter: @YehCathery
Jennifer Suh, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; George Mason University, Stone Ridge, Virginia
Holly Tate, George Mason University, Fairfax, Virginia
Nahee Kwon, University of California, Irvine-California Institute of Technology

357 Growing Basic Fact Strategies into General Reasoning Strategies
PreK–2 Workshop
LA Convention Center, Petree C
Addition and subtraction fact strategies (e.g., Making 10 and Take from 10) are not just better ways for students to learn their facts; they also prepare students for reasoning strategies for multidigit addition and subtraction. Come explore ways to explicitly teach basic facts strategies and connect to teaching strategies beyond basic facts.
Jennifer Bay-Williams, University of Louisville, Pewee Valley, Kentucky
Twitter: @JBayWilliams

358 Our Children Are Not Numbers: Rethinking K–5 Mathematics Assessment and Grading Practices
PreK–2 Workshop
LA Convention Center, 150 BC
My child looked in my eyes and asked, “Mom, am I still a Level 2?” When tests are used to assign numbers to children, they chip away at their identity and erode their humanity. In this workshop, we will engage in humanizing practices that draw on students assets as we share one district’s journey to shift their assessment and grading practices.
Shelbi Cole, Bold Math Moves Educational Consulting, LLC, Trinity, Florida
Twitter: @ShelbiCole1
Jody Guarino, Orange County Department of Education, San Clemente, California
John Drake, Newport Mesa Unified School District, Costa Mesa, California
Michelle Sperling, Newport Mesa Unified School District, Costa Mesa, California

359 The Games We Play: Creating Rich, Differentiated Play-Based Opportunities for All Learners in K–2
PreK–2 Workshop
LA Convention Center, 502 B
Math games are powerful teaching tools sometimes inaccessible or reserved only for those who finish all their work. Games can be leveraged to optimize core instruction and differentiated to meet students at their level; providing rich opportunities for a variety of learners all while maintaining equitable and inclusive mathematics instruction.
Shayna Kalnitsky, Windsor Central Supervisory Union, Andover, Vermont
Twitter: ShaynaKalnitsky

360 Rethinking Pre-Assessments: Gathering Data with Equity in Mind
3–5 Workshop
LA Convention Center, 408 B
All students are capable of mathematical thinking—yet traditional pre-assessments usually focus on what students don’t know. Let’s rethink these practices. Together, we will explore formative assessment strategies that honor student thinking, foster student identity, and support equity-based instructional decision-making.
Jenna Laib, Brookline Public Schools, Massachusetts
Twitter: @jennalaib

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2:45 p.m.–4:00 p.m.

361 Ten Things I Wish I Knew about Teaching K–5 Mathematics

3–5 Workshop
LA Convention Center, 152

Whether you are brand new or a veteran teacher, if you find teaching math challenging, this is the session for you. This practical session gives actionable answers to some of the most pressing questions, such as, How do I teach problem solving, How do I facilitate discussion, How do I make use of representations, or How do I help students see themselves?

John SanGiovanni, Howard County Public Schools, Westminster, Maryland
Twitter: @JohnSanGiovanni

362 Beyond Rote Procedures: Useful Reasoning Strategies for Algebraic Expressions and Equations

6–8 Workshop
LA Convention Center, 403 A

When building procedural fluency with rational numbers, strategies such as “compensation” promote number sense and improve students’ skills. What happens when letters enter the equation? Join us to explore reasoning strategies that help students become flexible and efficient with algebraic expressions and equations.

C David Walters, Weber State University, Ogden, Utah
Kiersten Campbell, West Point Elementary School, Utah

363 Making Meaning of Systems of Equations with Contexts and Representations

6–8 Workshop
LA Convention Center, 501 BC

Realistic Mathematics Education (RME) has guided the Netherlands to high international rankings and influenced curriculum around the world, including the United States. In this session, we will dive into a sequence of context-rich tasks and representations that support student understanding of algebra using the RME principle of progressive formalization.

Raymond Johnson, Colorado Department of Education, Broomfield
Twitter: @MathEdnet
Frederick Peck, University of Montana, Missoula
David Webb, University of Colorado Boulder

364 Compound Interest and Your Financial Life Cycle

8–10 Workshop
LA Convention Center, 406

Explore an exciting way to teach exponents and compound interest using the concept of the financial life cycle! Guide your students through an authentic application of mathematics, rather than having them mindlessly plugging numbers into the compounding formula. Participants will receive classroom-ready materials to use with their students.

Twitter: @philidituri
Jack Marley-Payne, FiCycle, New York, New York

365 Elevating Student Status with Rough-Draft Talk

8–10 Workshop
LA Convention Center, 502 A

Teachers experience rough-draft talk to see how it encourages students to share mathematics authority. They explore how sharing strategies with others elevates status by explicitly expanding on what counts as valuable contributions. They will leave with one more tool that promotes a culture that honors mistakes as a valuable part of learning.

Brianna Ruiz, CPM Educational Program, Elk Grove, California
Twitter: Brianna Ruiz

366 Forget Learning Loss: Let’s Focus on Learning Gained with Portfolio Assessment Tools and Routines

8–10 Workshop
JW Marriott, Platinum C

Participants will explore student math portfolios as a routine for more authentic and student-centered assessment in mathematics. Participants will also explore tools to develop student-generated rubrics, help students assess their own learning, and provide meaningful feedback to their peers.

Cate Challen, High Tech High Graduate School of Education, San Diego, California
Sarah Strong, High Tech High, San Diego, California

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2:45 p.m.–4:00 p.m.

367 Growing Trees: Using Nonlinear Regression Trees to Model Real-World Data
   10–12 Workshop
   LA Convention Center, 403 B
   Classification and regression trees (CART) are models that classify data and predict outcomes. The workshop involves hands-on activities using real data to predict whether a patient reporting chest pain is having a heart attack. Participants will learn how the activities develop a synthesis of statistical, mathematical, and computational thinking.
   Monica Casillas, UCLA, Los Angeles, California
   Suyen Machado, UCLA, Los Angeles, California
   Marc Buchanan, Chaffey Joint Union HS District, Rancho Cucamonga, California
   Robert Gould, UCLA, Los Angeles, California

368 Who Am I for Kids? Embracing Asset-Based Instruction to Build Positive Math Identities
   Coaches/Leaders/Teacher Educators Workshop
   LA Convention Center, 515 A
   Reflect on current practices, structures, and beliefs to answer, “Who am I for kids?” Discover your own mathematical identity. Decide if who you are is who you want to be for kids. Dream big! Create a vision board to communicate your math identity. In your “now,” how will you harness students’ superpowers to build positive math identities?
   Julienne DuBenion, DoDEA, Alexandria, Virginia
trouse_2001@yahoo.com

369 Why Should This Convince Me? Making the Hidden Moves of Analyzing Arguments Explicit
   Coaches/Leaders/Teacher Educators Workshop
   LA Convention Center, 409
   Mathematics is about the collective construction and analysis of justifications. Focusing on truth hides this collective activity, makes it seem innate, and blocks people from participation and power. We will discuss bringing a research lens, Toulmin analysis, into classrooms to help students name and take up the power of these collective moves.
   Brian Katz, California State University Long Beach, California
   Twitter: @thetwordninja_bk
   Elizabeth Thoren, Pepperdine University, Malibu, California
   Vanessa Hernandez, California State University Long Beach, California

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NCTM

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Friday Afternoon Sessions

4:00 p.m.–5:00 p.m.

370  Building a Coherent Instructional System around Open Educational Resources

**PreK–2 Session**
JW Marriott, Platinum E

At Illustrative Mathematics we are developing a vision of what we call the IM Classroom, where quality instructional materials, problem-based instruction, and administrative support work together. I will describe our work to ensure that all students, particularly students from marginalized groups, have access to an IM Classroom.

**William McCallum**, Illustrative Mathematics, Tucson, Arizona
Twitter: @wmcallum

370.1  Breaking Down Readability Barriers in Mathematics

**PreK–2 Session**
LA Convention Center, 410

A student’s relationship to math should not be dictated by their relationship to reading. All students should see themselves as mathematicians and be able to access math text. This session analyzes the barriers present in math texts and explores techniques to make text more readable and accessible for all students while maintaining content rigor.

**Christine K. Hopkinson**, Great Minds, LLC, Washington, District of Columbia

372  Using Multiple Representations to Unlock Joy and Creativity in Problem Solving

**3–5 Session**
LA Convention Center, 153 BC

How can we lean into the idea that there’s more than one “right way” to help all students do mathematics in their own authentic ways? This session will explore how the study of fractions can unlock the joy of problem solving when we use multiple representations and focus on the variety of solutions.

**Corrine Mitchell**, Zearn, New York, New York

373  Rehumanizing Mathematics: A South Los Angeles Applied Mathematics Mentorship Program

**6–8 Session**
LA Convention Center, 404

The Applied Mathematics Mentorship Program (AMMP) is a community effort to engage South LA students in semester-long investigations of mathematics relevant to their community under the guidance of STEM mentors of color. In this session, AMMP Leadership shares first-year successes and challenges. AMMP is a Gates Grand Challenge for algebra 1 awardee.

**Julian Rojas**, UCLA Curtis Center, Los Angeles, California
Twitter: UCLA Curtis Ctr
**Michelle Welford**, UCLA, Los Angeles, California
**Marcus Roper**, UCLA Department of Mathematics, Los Angeles, California
**Travis Holden**, Los Angeles Unified School District, California

374  Problems to Ponder—Pondering Powerful Problems

**8–10 Session**
LA Convention Center, 407

Let’s rock mathematics through powerful problems to ponder! What makes a problem powerful? How can we find joy, wonder, and beauty in mathematics through pondering powerful problems in mathematics? Let’s explore ways to support our students as thinkers and doers of mathematics through powerful problem pondering.

**Trena L. Wilkerson**, President, National Council of Teachers of Mathematics, Reston, Virginia; Baylor University, Waco, Texas
Twitter: @TrenaWilkerson
**Lianne Jones**, Baylor University, Hewitt, Texas
**Melissa Donham**, Baylor University, Waco, Texas

375  An Algebra 2 Alternative for Struggling Students: Advanced Algebra with Financial Applications

**10–12 Session**
LA Convention Center, 503

Advanced Algebra with Financial Applications helps motivate students with the algebra they will need as adults. Banking, credit, employment, income taxes, auto insurance, mortgages, and investing are covered using selected topics from algebra 2, precalculus, geometry, probability and statistics, and more. All topics are taught assuming an algebra 1 prerequisite only.

**Robert Gerver**, North Shore Schools, retired, Kings Park, New York
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**Friday Afternoon Sessions**

4:00 p.m.–5:00 p.m.

- Broaden the Purposes of Learning Mathematics
- Create Equitable and Anti-Racist Structures in Schools and Systems
- Develop Deep Mathematical Understanding
- Implement Equitable Mathematics Instruction
- Position Assessment to Promote Equitable Practices and Support Student Learning
- Reimagine the Role of Technology in Mathematics Education
- Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
Friday Afternoon Sessions

382  Spiraling Up Together: Empowering Mathematics Teacher Leaders

General Interest Session
LA Convention Center, 150 A

Join us to discuss a model for empowering teachers as leaders with ongoing professional development sessions centered on equity in teaching, pedagogy, and leadership via dynamic collaborative groups spanning multiple grade levels. We will share the focus and format of our teacher leader academy and samples of teacher growth data.

Dianna (Dee) Crescitelli, Kentucky Center for Mathematics, Georgetown
Twitter: @dncrescitelli
Funda Gonulates, Northern Kentucky University, Highland Heights

383  Teacher Discourse to Support Students’ Mathematical Thinking during Classroom Embedded PD

General Interest Session
LA Convention Center, 411

We will describe how collaborative teacher dialogue in learning labs plays a role in the development of equitable mathematics instruction. We will share a range of dialogic moves teachers use to support their colleagues’ development of ways to elicit students’ mathematical thinking.

Joy Zimmerman, UCLA, Los Angeles, California
Twitter: University of California, Los Angeles
Theodore Sagun, UCLA, Los Angeles, California

383.1  Teaching Mathematics Through Social Justice: Developing Mathematical Literacy with Real World Data

General Interest Session
LA Convention Center, 511 AB

Participants will be encouraged to reflect on their identities to compare to the diverse populations they will serve in the classroom. The audience will also be invited to observe, analyze, and discuss current data that impacts marginalized populations. This data can be used in their classrooms to engage learners and foster student agency.

Taajah Witherspoon, University of Alabama at Birmingham, Hoover
Twitter: @tspoon1000

383.2  Creating the Strong Mathematical COMMUNITY Your School Deserves

General Interest Session
LA Convention Center, 501A

Do you feel like your math department and math classroom lacks a sense of community? A sense of belonging? In this session we will discuss how you can make a positive change through team building, technology use, and parental involvement. I will help you discover what it takes to be the classroom in your school that all others want to emulate.

Daniel Wilkie, Christ Church Episcopal School, Pelzer, South Carolina
Twitter: @starwarsmthprof

384  Applying Learnings from an International Congress on Mathematics Education in Your Classroom

Research Session
JW Marriott, Atrium III

Participants will investigate the Sierpinski Triangle used by Tommy Dreyfus, the ICME Felix Klein Awardee, in research on constructing knowledge in classrooms, discuss how this played out in a middle school classroom in the United States and in his research, and consider a mathematician’s perspective on why such an activity is important. Participants will also share what they learned that was useful in their own practice.

Jennifer Outzs, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; Seminole Middle School (retired), Indian Shores, Florida
Barbara Lynch, Lakewood Middle School, Ohio
Chris Rasmussen, San Diego State University, California
Mary Flagg, University of St. Thomas, Houston, Texas

Join us at the 2023 NCTM Annual Meeting & Exposition:
Washington, DC
October 25–28, 2023
Speaker proposals accepted through October 7!

- Broaden the Purposes of Learning Mathematics
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Friday Afternoon Bursts

4:30 p.m.–5:00 p.m.

385  Creating, Describing, and Defining Patterns to Support Visuospatial Reasoning

**PreK–2 Burst**
LA Convention Center, 308
Patterns in experience and in mathematics play a key role in the development of geometric and algebraic thinking. In this burst, we engage in an example of pattern making, describing, and defining to consider how to integrate opportunities for children to develop visuospatial reasoning.

Signe Kastberg, Purdue University, West Lafayette, Indiana
Andrew Tyminski, Clemson University, South Carolina
Amber Simpson, Binghamton University, New York

386  Noticing Mathematical Opportunities in Children’s Literature

**PreK–2 Burst**
JW Marriott, Platinum H1J
Literature can provide opportunities to explore mathematics, yet few studies describe what teachers notice as they select literature for teaching mathematics and how their noticing relays insights into teachers’ pedagogical content knowledge (PCK). In this presentation, we reveal what preschool teachers notice and identify connections to PCK.

Donger Liu, University of Nebraska-Lincoln
Kelley Buchheister, University of Nebraska-Lincoln

387  Math Inquiry Lab: A Vehicle of Differentiation and Optimal Student Engagement Grades 3–5

**3–5 Burst**
LA Convention Center, 403 B
This detailed Burst provides the structured tools for fellow teachers/coaches to operate a differentiated Math Inquiry Lab in their respective schools through a multitude of tangible learning opportunities geared to help students construct meaning, discover patterns at their optimal level of understanding, while engaging in meaningful math discourse.

Dina Carlucci, Farmingdale Public Schools, New York
Jennifer Olsen, Farmingdale Public Schools, New York
Janice Puglisi, Farmingdale Public Schools, New York

388  Stop, Collaborate, and Listen

**3–5 Burst**
LA Convention Center, 515 B
Are you looking for opportunities for students to think deeply, make connections, and build number sense with short, engaging routines? This session will focus on routines that use Dr. John Hattie’s high-impact strategies of discussion, feedback, and spaced vs. mass practice. This hands-on, interactive session will leave you energized and excited!

Andrea Wood, Mid-Del Schools, Midwest City, Oklahoma
Twitter: @AWoodLovesMath

389  Why Do I Need to Know This?

**6–8 Burst**
LA Convention Center, 150 BC
If students are asking this question, maybe you have already lost them. Instead, how can you hook them? A mathematics classroom doesn’t have to always be “real world,” but it does have to be interesting and engaging. Let’s look at some strategies and activities that you can implement so that question doesn’t get asked.

Mark Goldstein, Center for Mathematics and Teaching, Redondo Beach, California
Cynthia Raff, Center for Mathematics and Teaching, Redondo Beach, California

390  Formative Assessment, Feedback and More—Everyday Connections to Planning and Instruction

**General Interest Burst**
LA Convention Center, Petree C
Participants will discuss everyday use of classroom-based formative assessment, including observations, interviews, show me, hinge questions, and exit tasks, and links between formative assessment and feedback. The session will emphasize the importance of connecting planning, teaching, and assessment and will consider the role of summative assessments.

Francis (Skip) Fennell, Past President, National Council of Teachers of Mathematics, Reston, Virginia; McDaniel College, Westminster, Maryland
Twitter: @SkipFennell

391  Technically Thinking: Thoughtfully Transforming a Technology Infused Classroom

**General Interest Burst**
LA Convention Center, 409
Students experience technology in math classes daily; this has been especially true throughout the COVID-19 pandemic. This session will equip teachers to improve purposeful use of technology. We will use the SAMR framework to better understand appropriate uses of technology, its role in instruction, and its implications for student investigation.

Andrew Glaze, Salt Lake City School District, Utah
Twitter: @dr_glaze
Alison Espinosa, Salt Lake City School District, Murray, Utah

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Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
Friday Afternoon Session 4:30 p.m.–5:30 p.m.

**391.1 IGNITE! Teacher Gratitude Reception**

*General Interest Session*
JW Marriott, Platinum E Hall

We are so thankful to the dedicated teachers igniting students’ passion for mathematics. All attendees are welcome to join the fun at this complimentary reception in advance of the IGNITE! session to relax with a complimentary beverage, tasty snacks and huge THANKS for all you are doing to advance student learning all year long!

*Hosted by the Bill & Melinda Gates Foundation*

Friday Evening Session 5:30 p.m.–6:30 p.m.

**392 IGNITE! We’ll Enlighten You and We’ll Make it Quick**

*General Interest Session*
JW Marriott, Platinum E

Hear from eight mathematics educators as they are challenged to give a five-minute talk, using twenty slides that auto advance every fifteen seconds whether they are ready or not! Dr. Kristopher Childs will emcee this exciting event!

*Kristopher Childs,* K Childs Solutions, Winter Garden, Florida
Twitter: @DrKChilds

*Adrienne Baytops-Paul,* UnboundEd.org, Upper Marlboro, Maryland
Twitter: @ABPaul3

*Theresa Wills,* George Mason University, Springfield, Virginia
Twitter: @theresawills

*Nat Banting,* Saskatchewan Public Schools, Saskatchewan, Canada
Twitter: @NatBanting

*Chris Nho,* Desmos, San Diego, California
Twitter: @nhoskee

*Kevin Dykema,* President-Elect, National Council of Teachers of Mathematics, Reston, Virginia; Mattawan Middle School, Michigan
Twitter: @kdykema

*Diana Ceja,* Riverside County Office of Education, Fontana, California
Twitter: @imathination

*Crystal M. Watson,* Cincinnati Public Schools, Ohio
Twitter: @_CrystalMWatson

*Ana Vaca,* Union City Board of Education/ImmSchools, Union City, New Jersey
Twitter: @avacamathedu

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Join the National Council of Teachers of Mathematics in Washington, DC, October 25-28, 2023 for the NCTM 2023 Annual Meeting & Exposition.

Preview the conference strands:

- Uplifting and Inspiring the Mathematics Educator
- Creating Inclusive, Engaging, and Rigorous Mathematics for All
- Challenging and Advancing Policy and Structures in Mathematics Education
- Expanding the Narrative of Who Belongs
- Improving Core Instruction through Deeper Mathematical Content and Pedagogical Knowledge

Interested in becoming a speaker?

Visit nctm.org/speak/dc2023 to submit a proposal.
Saturday Morning Sessions

8:00 a.m.–9:00 a.m.

393 Math Anywhere! Meeting Families in the Places They Go

PreK–2 Session
LA Convention Center, 410
What if family math night isn’t just a school event? Math Anywhere! partners with local organizations to spread joyful math throughout our community. Learn our core strategies and how we adapted our approach to reach families at home as public events were canceled. Leave this session with free resources and bring family math to your own community.

Molly Daley, Education Service District 112, Vancouver, Washington
Twitter: @mdaley15

394 Creating Equitable Class Discussions with Remote Learning

3–5 Session
LA Convention Center, 411
Facilitating discussions is a complex process that benefits and supports all students but doing so virtually requires additional planning and tools. This session explores the tools, challenges, and recommendations when using “silent discussions” for real-time and off-line remote learning to create inclusive whole-class discussions.

Cory Bennett, Idaho State University, Pocatello
Mick Morgan, Pocatello/Chubbuck School District 25, Idaho

395 Math with Purpose: Teaching Math through Project-Based Learning

3–5 Session
LA Convention Center, 150 A
Tired of students saying they hate math? Help them see math not as an academic subject, but as a means for making sense of interesting information and solving meaningful problems. Integrate math into PBL units that engage students in making the world a better place. Be more than a math teacher. Be that teacher students never forget!

Terra Tarango, Van Andel Education Institute, Grand Rapids, Michigan
Twitter: Terra Tarango

396 Mathematical On-Ramps: A Strategy for Providing All Students Access to Grade-Level Mathematics

3–5 Session
LA Convention Center, 503
Student engagement with grade-level content is paramount. How can we build a strong foundation of skills for new concepts? Participants will learn what is meant by and engage with mathematical on-ramps to understand how this strategy supports all students accessing grade-level mathematics content.

Anne Lucas, Amplify, New York, New York
Kristin Gray, Amplify Education, Brooklyn, New York

397 Strategies to Enhance Long-Term Learning

3–5 Session
LA Convention Center, 407
Do your students forget what they have learned? Are you interested in strategies that will boost student learning and can be implemented in your limited class time? In this session, explore factors that affect what we remember and powerful strategies to improve learning retention in mathematics classrooms.

Paula Sokolik, Great Minds, Bolivar, Missouri
Emily Koesters, Great Minds – Eureka Math, Washington, District of Columbia

398 Teachers Talk Less . . . Students Talk More

3–5 Session
LA Convention Center, 511 AB
Learn how digital and video tools make math accessible and allow students to shine in ways they may not be able to through traditional means. The mathematics classroom is the ideal place for sharing ideas, discourse, and collaboration. Let students take center stage by engaging them with digital activities and demonstrations.

Dreama Carroll, Great Minds, Grandview Heights, Ohio
Twitter: DreamaCarroll28

399 Surrounded by Math: We’ve Been “Cursed” with the Math Sight!

6–8 Session
LA Convention Center, 153 BC
The children’s book The Math Curse will be used as a lever into deepening mathematical understanding by bringing in genuine math happenings. Become the “cursed” role model by sharing pictures, objects, and stories encountered daily. We share our many happenings to help you get creative, have fun, and leave “cursed” with the math sight!

Chris Higgins, South Carolina Connections Academy, Hartsville
Ryan Higgins, Chesterfield County Public School District, McBee, South Carolina

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Saturday Morning Sessions

8:00 a.m.–9:00 a.m.

400 Showing Up Authentically on Assessments: What Does That Even Mean?

**10–12 Session**
LA Convention Center, 151
What is an authentic assessment? Who decides what is authentic? How do they reflect understanding? How do they honor creativity, individuality, and the collaborative experience that is mathematics? Pull up to this session as your authentic self, and prepare to analyze and create something that is meaningful for you and your young people!

Gary Chu, Niles Township High School District 219, Skokie, Illinois
Twitter: @mrgarychu

401 Using SEL to Support Elementary Preservice Teachers’ Development of Mathematical Content Knowledge

**Coaches/Leaders/Teacher Educators Session**
LA Convention Center, 404
Elementary preservice teachers often enter teacher education programs with negative experiences in mathematics and low confidence in their mathematical content knowledge. This session focuses on how we prioritize social-emotional learning through explicit pedagogical actions in a mathematical content course for elementary preservice teachers.

Gurpreet Sahmbi, Ontario Institute for Studies in Education of the University of Toronto, ONorthwest Territories
Twitter: @gurpreetsahmbi

402 Building Agency and Cultures of Care in the Math Classroom

**General Interest Session**
LA Convention Center, 405
Honoring social-emotional needs and building students’ agency are catalysts for making learning stick. This session is based on current research and will empower teachers with student-centered strategies focused on building confidence, metacognition, and mindfulness, ensuring learning is accessible for all.

Bonnie Bolado, North Carolina Center for the Advancement of Teaching, Cullowhee
Twitter: @bonniebolado

403 Math without Mistakes

**General Interest Session**
LA Convention Center, Hall B
The math education community has worked to destigmatize mistakes in recent years, yet it continues to diagnose as mistaken what is instead very purposeful student thinking. We’ll learn about curriculum, technology, and strategies that celebrate and develop that thinking instead, helping learners grow in their math identity and knowledge.

Dan Meyer, Desmos, Oakland, California
Twitter: ddmeyer

404 Pillars and Practices (Part 1): Ungrading to Catalyze Change at the Margins

**General Interest Session**
LA Convention Center, 306
As educators, we seek innovative ways to engage students, close gaps between student groups, and motivate all students to demonstrate their brilliance. Come learn how a major overhaul of my grading practices led students to stop chasing points and embrace authentic learning with a focus on building mathematical identity and agency.

Nolan Fossum, Trabuco Hills High School, Vista, California
Twitter: @NolanFossum

405 President Series: Designing Equitable Structures for Teacher and Student Success

**General Interest Session**
LA Convention Center, Petree D
One of the guiding principles in the NCSM Framework for Leadership in Mathematics Education is to design and implement equitable structures supporting student learning. Let’s look at these big ideas through an anti-racist lens and learn more about how you can disrupt barriers that intentionally or unintentionally disadvantage groups of students.

Paul Gray, NCSM: Leadership in Mathematics Education, Provincetown, Massachusetts
Twitter: @Dr_PaulGray

405.1 Worthwhile Tasks to Engage, Inspire and Deepen Math Understanding for Elementary Level Learners

**General Interest Session**
LA Convention Center, 501A
Worthwhile tasks are tasks that promote problem solving in the math classroom. This session will focus on what makes a task “worthwhile”. We’ll explore the three key traits of a worthwhile task including high cognitive demand, multiple entry/exit points, and relevance through ready-to-use examples along with great online resources to find more.

Norma Boakes, Stockton University, Mays Landing, New Jersey
Twitter: @mathed_dr

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**Core Themes**

- Broaden the Purposes of Learning Mathematics
- Create Equitable and Anti-Racist Structures in Schools and Systems
- Develop Deep Mathematical Understanding
- Implement Equitable Mathematics Instruction
- Position Assessment to Promote Equitable Practices and Support Student Learning
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- Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
8:00 a.m.–9:15 a.m.

Saturday Morning Workshops

**406** “Behind ‘Their’ Eyes”: Knowing Our Students Mathematically through Data-Informed Instruction

*PreK–2 Workshop*
LA Convention Center, 150 BC

Come explore how to formatively assess and collect evidence of what students know and can do daily. Examine the difference between reviewing, revising, revisiting, and reengaging math concepts with students. Reflect and share on how to pivot instruction and determine “just in time supports” by using the evidence collected during daily tasks.

Karen Riley Jeffers, Prince George's County Public Schools, Oxon Hill, Maryland
Twitter: @Karen_RJeffers

**407** Equal, Not Equal, and Other Fundamental Concepts for First-Grade Math

*PreK–2 Workshop*
LA Convention Center, 408 B

What does deep mathematical understanding mean in first grade? Big ideas in mathematics take root in the early grades. Children’s everyday observations about relationships between quantities can serve as a starting point for learning math. Join us in exploring alternative ways to introduce students to fundamental concepts!

Linda Venenciano, University of Hawaii, Manoa, Honolulu
Seanvelle Yagi, University of Hawaii, Honolulu

**408** Assessment for All: How to Make Assessments Culturally Responsive

*3–5 Workshop*
LA Convention Center, 402

Culturally responsive teaching is a crucial component to providing all students with an equitable education. This session will explore this important but underrepresented aspect of culturally responsive pedagogy by sharing the results of panel discussions consisting of leaders who are defining and creating culturally responsive assessment.

Sarah Whitney, NWEA, Culver City, California

**409** Hands-On Geometry for Deeper Understanding of Polygon Properties: A Rope, a Paper Plate, and More

*3–5 Workshop*
LA Convention Center, 308

We will investigate polygons and their properties through hands-on activities that lead to deeper student understanding. Attention will be given to differentiating the lessons for special education through gifted students. Van Hiele levels will be addressed as well. We will also examine how these activities could be accomplished online.

Margie Mason, College of William and Mary, Williamsburg, Virginia

**410** Using Coding and Social-Emotional Learning to Teach Mathematics in the Elementary Classroom

*3–5 Workshop*
LA Convention Center, Petree C

STEAM is for all students! This session examines how educators can use coding and strategies that support social-emotional learning to teach measurement and geometry concepts in the elementary classroom. Participants will learn basic coding techniques that will enhance students’ exploration of mathematics while fostering an inclusive atmosphere.

Lindsay Gold, University of Dayton, Ohio
Twitter: @lindsayayngold
John Ashurst, Harlan Independent Schools (Retired), Harlan, Kentucky
Michael Houston, Riverside High School, Ellwood City, Pennsylvania

**411** How Students Engage with Math Ideas That Grow from Elementary to Secondary School

*6–8 Workshop*
LA Convention Center, 403 B

We will analyze the math that can be explored in two math tasks. To see how ideas present in early years can be capitalized on in middle and secondary school, we will examine student work from different grade levels. This kind of vertical analysis is too often missing. We encourage teachers of all grade levels to come to offer ideas to colleagues.

Virginia Bastable, Mount Holyoke College, South Hadley, Massachusetts

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8:00 a.m.–9:15 a.m.

412 NASA’s Solar System Scale of Discovery: Life Applications for Ratios, Fractions, and Scale
   6–8 Workshop
   LA Convention Center, 403 A
   Come create a solar system pocket scroll based on the ratios of our solar system. Explore applications of fractions, conversions, and scale with hands-on, standards-aligned NASA STEM activities. Engage our universe as you apply scale to distance, time, size, and models. Apply fractions related to our solar system within the classroom and beyond.
   J Jutila, Antelope Valley Union High School District, Palmdale, California
   Twitter: @J_MJutila
   Barbara Buckner, NASA Goddard Space Flight Center, Laurel, Maryland

413 Promoting Authentic Engagement and Rigor with the Five Practices
   6–8 Workshop
   LA Convention Center, 501 BC
   Come explore five manageable practices that promote equitable and productive classroom discussions. Experience how to shift math authority to students as they build deeper understanding of rich tasks and make connections between multiple approaches.
   Candice Tyloch, CPM, Elk Grove, California
   Susan Hoffmier, CPM, Elk Grove, California

414 Five Equity-Based Practices: Focusing on Intentional Teacher Actions and Valuing Student Identity
   8–10 Workshop
   LA Convention Center, 152
   Participants will share in teacher actions focusing on intentional approaches in equitable teaching practices prior to, during, and following classroom instruction. Through deliberate student-centered instruction, we will facilitate discussions related to content, methods, technology, equity, and assessment in a connected and coherent fashion.
   Farshid Safi, University of Central Florida, Oviedo
   Twitter: @FarshidSafi
   George Roy, University of South Carolina, Columbia
   Jennifer Wolfe, The University of Arizona, Tucson

415 Using Historical Graphs to Increase Student Engagement and Cross-Curricular Connections
   8–10 Workshop
   LA Convention Center, 406
   Help students strengthen their analysis skills using graphs from historical documents, and practice hands-on activities to connect math ideas to students’ interests across the curriculum. We’ll practice strategies to promote data literacy and deepen opportunities for every student to notice and wonder. All sources presented are free and online!
   Peter DeCraene, Evanston Township High School, Berwyn, Illinois
   Twitter: @ShowTheWork

416 A Full Statistical Inquiry: From a Statistical Question to an Inferential Conclusion
   10–12 Workshop
   LA Convention Center, 408 A
   Complete the statistical inquiry process from beginning to end using the big ideas from high school level statistics. We will formulate a statistical question, conduct an experiment, collect data, and analyze our data to make an inferential conclusion about our question. Learn how you can motivate and engage students with statistics using their data and open-source resources.
   Amy Hogan, Brooklyn Technical High School, New York
   Twitter: @alittlestats

Shop and save at the NCTM Bookstore in NCTM Central!
But the Data Doesn’t Show That! How to Encourage Data Literacy in Young Learners

PreK–2 Session
LA Convention Center, 511 C
We will explore the role of data-literacy lessons in preparing students in PK–grade 2 to navigate an information-heavy world. Using real-world data and example student tasks, we will engage in discussion about how to create rich lessons that deepen student understanding of data while guiding them to be critical consumers of information.

Kristin Crosby, Amplify Education, Inc., Brooklyn, New York
Twitter: @kristinjcrosby
Gina Picha, None, Austin, Texas

Using Professional Noticing to Move from Counting to 5 to Understanding Number to 10

PreK–2 Session
LA Convention Center, 411
This session explores mathematical tools that develop early number concepts and effective use of professional noticing. We will examine videos of children’s use of tools and connect this to research-based trajectories and diagnostic assessment. We will discuss next instructional steps to advance student thinking about number along the trajectory.

Denise Trakas, Washoe County School District, Reno, Nevada
Twitter: @denisetraas
Stephanie Vega, Washoe County School District, Reno, Nevada

Fact Strategy Instruction + Meaningful Discourse = Student Understanding

3–5 Session
LA Convention Center, Petree D
Join this session to hear about the power of encouraging discussions as students make sense of fact strategies to significantly improve their use and retention of those strategies. Students’ work will be shared to facilitate peer discussions. You will also walk away with resources to implement fact strategies with discourse in your classroom.

Deborah Thompson, DreamBox Learning, Derby, Kansas
Twitter: @DThompsonMath

Metacognition in the Mathematics Classroom

3–5 Session
LA Convention Center, 407
Ever start off a math class by saying, “What did we do in math yesterday?” only to be met with blank stares? Ever wonder how to support students in thinking about their own thinking in mathematics? In this session, we will explore instructional routines and strategies to engage students in metacognitive thinking skills.

LaTonya Snell-Lockhart, Great Minds PBC, Washington, District of Columbia

Using Storytelling to Empower Our Students to Discover and Author Their Mathematical Identity

3–5 Session
LA Convention Center, 153 BC
Every student comes into our classroom with a variety of life experiences. How do we purposefully tap into our students’ funds of knowledge to make mathematics more relevant, enjoyable, and rigorous? Let’s learn how to intentionally incorporate student stories to create equitable and rich math tasks in which all students can thrive as mathematicians.

Lachanda Garrison, DoDEA, FPO, AE
Twitter: @educationoflife

Differentiation through Inclusivity: Equitably and Abundantly Optimizing Heterogeneous Learning

6–8 Session
LA Convention Center, 405
Differentiation through inclusivity leverages strengths of diverse learners in collaborative learning. Each student serves as a part of the curriculum with individual needs met, not by separated homogeneous instructional avenues, but through inclusive heterogeneous environments that empower student voice and prioritize empathetic understanding.

Joseph Manfre, Punahou School, Honolulu, Hawaii
Twitter: @mathmanfre
Math Solver Apps: A Teacher’s Friend or Foe?
6–8 Session
LA Convention Center, 150 A
The digital age has brought artificial intelligence powered math solvers to our students. Is this a way of cheating on homework and tests or an important support tool for remote schooling? In this session we will explore how these math apps can help teachers examine how they assess and attend to teaching the full breadth of the standards.
William Nolan, NWEA, Portland, Oregon
Sarka Mraz, NWEA, Portland, Oregon

You Can’t Escape Math
Coaches/Leaders/Teacher Educators Session
LA Convention Center, 511 AB
Increasing motivation to learn math can be a daunting task! In this session, you will learn how to incorporate active learning in the secondary math classroom. Participants will learn how active learning can create a sense of belonging in a community and will learn how to create and take part in an escape room using mathematics topics and concepts.
Sandra Leiterman, UA Little Rock, Arkansas

Imperfect and Unfinished: How We Can Reclaim Our Professional Growth (And Why We Must!)
General Interest Session
LA Convention Center, 404
For too long, our culture of PD has been an obstacle to improving our expertise of achieving more productive and equitable outcomes for more of our students. Learn how we, K–12 teachers, can create a culture of professionalism that enhances our identity, fosters our agency, and positions us as capable partners in one another’s professional growth.
Chase Orton, chaseorton.com, Venice, California
Twitter: @mathgeek76

Is It Possible? Is It Plausible? Be a Probability Detective!
General Interest Session
LA Convention Center, 306
How did so many people win big Powerball prizes? What one-in-a-trillion event occurred at a Cleveland baseball game? Does ballot position matter in elections? How did a Price is Right contestant own Plinko? We’ll dissect these “ripped from the headlines” scenarios, separate the possible from the plausible, and make sense of underlying mathematics.
Robert Lochel, Hatboro-Horsham High School, Pennsylvania
Twitter: @bobloch

Points of View: Making Space for Wonder, Joy, and Deeper Understanding in Mathematics

Data Science in Middle and High Schools: A Real Modern Approach

Broaden the Purposes of Learning Mathematics
Create Equitable and Anti-Racist Structures in Schools and Systems
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Implement Equitable Mathematics Instruction
Position Assessment to Promote Equitable Practices and Support Student Learning
Reimagine the Role of Technology in Mathematics Education
Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning
Saturday Morning Workshops

9:45 a.m.–11:00 a.m.

428 Activities for Developing Place Value and Base-10 Understanding in PK–2
PreK–2 Workshop
LA Convention Center, 409
An understanding of number involves integrating several key concepts, such as unit, place value, and one-to-one correspondence. This workshop will engage participants in a variety of ideas, hands-on activities, and games designed to support the development of these key concepts in PK–2 students.
Andrew Tyminski, Clemson University, South Carolina
Twitter: @DrAndyT
Signe Kastberg, Purdue University, West Lafayette, Indiana
Amber Simpson, Binghamton University, New York

429 Parts and Whole: Representing Addition and Subtraction Problems in a Measurement Context
PreK–2 Workshop
LA Convention Center, 308
Focusing on part-whole relationships supports students in seeing the structure of addition and subtraction problems. In this session, we focus on modeling part-whole relationships with measurable attributes and multiple representations that leads to a deep understanding of additive structures and the relationship between addition and subtraction.
Seanelle Yagi, University of Hawaii, Honolulu
Linda Venenciano, University of Hawaii, Manoa, Honolulu

430 Digital Makerspace: Fostering Students’ Mathematical Agency and Creativity
3–5 Workshop
LA Convention Center, 515 B
A makerspace environment can provide opportunities for all students to engage in play and experimentation to support mathematical learning and problem solving. Participants will engage with makerspace activities that have been developed as part of a digital supplemental mathematics curriculum to provide robust learning experiences for students.
Anne Lucas, Amplify Education, Brooklyn, New York

431 Leveraging Phenomena to Initiate Aha Moments in Math
3–5 Workshop
LA Convention Center, 150 BC
In this interactive session, teachers explore science as a catalyst for deepening mathematical reasoning and understanding. Using scientific phenomena, teachers investigate geometry through hands-on bridge building, master measurement by tracking plant growth, and more, solidifying the cross-curricular nature of math and science.
Tess Burns, Twig Education, Scottsdale, Arizona
Denise McDowell, Twig Education, Santa Cruz, California

432 Literature in Math? How about Authentic Stories of Women Who Made a Difference?
3–5 Workshop
LA Convention Center, 408 A
We all know the impact of Katherine Johnson, one of the “Hidden Figures” of NASA, but do you know Raye Montague, Margaret Hamilton, Zaha Hadid, or Sophie Germain? Come learn more about women who have made a difference through authentic children’s literature books and engage in math learning opportunities that stem from these stories.
Melissa Donham, Baylor University, Waco, Texas
Twitter: @melissa_donham
Sandi Cooper, Baylor University, Waco, Texas
Kenley Bailey Ritter, Baylor University, Waco, Texas

433 Using Virtual Manipulatives to Engage Students in Deep Mathematical Exploration and Discovery
6–8 Workshop
LA Convention Center, 502 A
Manipulatives can transform how students make meaning of important ideas by making abstract relationships visible, by teaching creativity and problem solving, and by allowing students to explore and discover. Learn how virtual manipulatives can mirror these effects and support more complex interactions that are impossible in the physical world.
David Poras, Weston Public Schools, Massachusetts
Twitter: @davidporas

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434 Argument-Driven Inquiry in Math: Fostering the Development of Mathematical Thinking in Geometry
8–10 Workshop
LA Convention Center, 515 A
The Argument-Driven Inquiry approach allows teachers to provide students with rigorous and equitable learning experiences that give students an opportunity to “figure things out” instead of just “learning about things” in mathematics. Participants will experience an example of an ADI mathematics investigation about the geometry of gerrymandering.
Victor Sampson, University of Texas, Austin
Twitter: @drvictorsampson

436 Let Continuous Assessment Inform the Flow of Your Lesson
8–10 Workshop
LA Convention Center, 403 A
Assessment is not a one-and-done deal. Using data from an algebra class, discuss how information from openers, closers, monitored practice sessions, and lectures can inform and affect instruction. Various configurations of collaborative grouping with a focus on equitable access, social status, and differentiation will be discussed. Tools that quickly collect assessment data will be shown.
Allan Bellman, University of Mississippi, Oxford
Twitter: @abellman17
Melissa McCann, Biloxi School District, Mississippi
Natalie Headrick, University of Mississippi

Four Strategies Every High School Intervention Teacher Needs to Incorporate
8–10 Workshop
LA Convention Center, 501 BC
Gain skills to promote success with students in intervention courses by intentionally affecting the class culture. Specific, research-based steps and real experiences will be shared that can be immediately implemented in your high school classroom.
Lauren Johnson, FJUHSD, Fullerton, California
Twitter: @MrsJohnsonCA

337 Using Manipulatives and Investigations to Teach Geometry
8–10 Workshop
LA Convention Center, 402
Participants will use hinged mirrors, rubber bands, coffee filters, and other manipulatives, as well as interesting problems to develop and apply geometry concepts in an active, engaging way that encourages all student voices.
Michael Marsh, CPD Educational Program, Los Angeles, California
Saturday Morning Sessions

11:00 a.m.–12:00 p.m.

439  **Assessment: Focusing on What Students Think and Understand**

PreK–2 Session  
LA Convention Center, 503  
Assessments can offer more than simply a checklist of skills. They can reveal students’ thinking and help inform our instruction. Come visit a primary classroom as we share how assessments elicited and captured students’ thinking, informed next steps in planning, and deepened our own understanding of learning progressions.  
Rebecca Holden, Trinity School, Atlanta, Georgia  
Twitter: @bholden86

440  **Strategies to Empower All Students to Engage in Mathematics Thinking, Discourse, and Connections**

PreK–2 Session  
LA Convention Center, 501 A  
How do we empower every student to engage in mathematical thinking and discourse that is relatable to them? We’ll discuss teaching practices that create inclusive classrooms, build student agency, and promote access for each and every student to participate in mathematical thinking, discourse, and making meaningful connections.  
Resources provided.  
Danielle Curran, Curriculum Associates, Reading, Massachusetts  
Twitter: @danigirl16

441  **BrainSTEM: Engaging Neuroscience in Math Teaching and Learning**

3–5 Session  
LA Convention Center, 151  
Based on new research in the educational neurosciences, this interactive session engages participants in activities that demonstrate how emotions, belief systems, student choice, and brain-informed teaching and assessment strategies can positively affect student learning in mathematics.  
Bobbi Hansen, University of San Diego, San Marcos, California

442  **Make Math Magical Again: Restoring the Joy and Wonder in the Math Classroom**

6–8 Session  
LA Convention Center, 306  
What if students loved coming to math class? What if the math classroom was once again a place of discovery and wonder? This session offers tactics for educators to create a classroom culture of joy, implement intentional systems to help students overcome math phobia, and strengthen retention retention and recall by making real-world connections.  
Sharla Horton-Williams, School Leadership for Social Justice, Texas  
Twitter: @SJSJus  
Toni Harrison-Kelly, School Leadership for Social Justice, Texas

443  **Want to Develop Fluency with Functions? Algebra? Patterns!**

6–8 Session  
LA Convention Center, 407  
Participants will be provided with classroom-ready hands-on lessons that enable students to connect patterns and recursive rules to functions. Emphasis will be placed on connecting concrete, pictorial, and abstract representations to help students develop conceptual understanding, refine procedural fluency, and analyze change in various contexts.  
Thomas Beatini, Union City Board of Education, New Jersey  
Twitter: @BeatiniTom

444  **Master Mentors as a Lever for Fostering Culturally Responsive and Sustaining Math Educators**

Coaches/Leaders/Teacher Educators Session  
LA Convention Center, 511 C  
This session will explore strategies and tips in building a robust mentoring program for preservice mathematics teachers, funded by the NSF Noyce Scholarship program.  
Kristin Rainville, Sacred Heart University, Fairfield, Connecticut  
Andrew Lazowski, Sacred Heart University, Trumbull, Connecticut  
Bonnie Maur, Sacred Heart University, Fairfield, Connecticut

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Saturday Morning Sessions

445 The Power of Networks: Building Cultures of Improvement for Anti-Racist Teaching and Learning

Coaches/Leaders/Teacher Educators Session
LA Convention Center, 153 BC

Anti-racist work is better together! Networks are a critical structure to support educators in building anti-racist school systems. Learn how the High Tech High Graduate School of Education designs math-focused networks for school improvement to support schools in building more equitable systems in service of student learning.

Daisy Sharrock, High Tech High Graduate School of Education, San Diego, California
Cate Challen, High Tech High Graduate School of Education, San Diego, California

446 “CONNECT”ing within Mathematics and Students’ Lived Experiences to Drive Learning

General Interest Session
LA Convention Center, 511 AB

Trusting student thinking to drive learning is key for positioning students as powerful mathematicians. This session will use the theme of connection (to prior learning, to student work, to lived experiences) to give educators tools to capitalize on student thinking to simultaneously build positive identities and learn mathematics.

Sara Van Der Werf, VanDerWerf Educational Consulting, Minneapolis, Minnesota
Twitter: @saravdwerf

447 Changing Our View of Disability

General Interest Session
LA Convention Center, 411

The way we view disability can affect the way we think about, plan for, and interact with disabled students. Continual analysis of our own beliefs about disability and what accessible education looks like can help us provide meaningful math instruction and a safe school environment to all students.

Lara Metcalf, Atlanta Area School for the Deaf, Clarkston, Georgia
Twitter: @laramathcalf

448 Fostering Equitable Interactions and Math Agency with the Five Practices: The Solution to Any Challenge

General Interest Session
LA Convention Center, 405

Using the Five Practices can be hard. Timing, sequencing, connecting, and fostering student agency are all challenges. Come discuss how to inspire interactions among students, teachers, and the math to disrupt systems of oppression, make the Five Practices easier for you, and ensure all students have a seat at the table. Leave with actionable solutions!

Kathleen Sheehy, Amplify, Alexandria, Virginia
Sean Nank, California State University San Marcos

449 Mentoring, Challenging, and Empowering: AMTE’s Standards for Preparing Teachers of Mathematics

General Interest Session
LA Convention Center, 410

This session explores the role classroom teachers, school leaders, and teacher educators play in mathematics teacher education. We examine how the AMTE Standards set a vision for preparing, educating, and mentoring teacher candidates through collaborative work with stakeholders. See ways that AMTE can support you in working with teachers.

Megan Burton, Auburn University, Alabama
Twitter: @burton114

450 President Series: Indigenous Perspectives on Rehumanizing Mathematics Teaching and Learning

General Interest Session
LA Convention Center, 404

There is a concept of “We are all related” within many Indigenous nations’ worldviews. This session will explore this concept alongside teaching and learning mathematics. You will be invited to re-story mathematics education through this concept as a way to enact “Rehumanizing Mathematics” in respectful, reciprocal, relevant, and responsible ways.

Florence Glanfield, University of Alberta, Edmonton
Twitter: @FGlanfield

450.1 Adventures in Mathematics

10–12 Session
LA Convention Center, 150A

An “Adventure” is a type of formative assessment that includes elements of student choice and inquiry and is designed in such a way that when complete, it should be apparent to the student if they completed it correctly. In this presentation, the speaker will share examples of such assessments as well as general guidelines on creating your own.

Tatiana Yudovina, Hawken School, Gates Mills, Ohio

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### 11:30 a.m.–12:00 p.m.

#### Saturday Morning Bursts

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| 452            | Developing Ideas of Length in PK–Grade 2: Ideas and Activities               | PreK–2 Burst | Petree C                        | Andrew Tyminski (Clemson University, South Carolina)  
|                |                                                                              |            |                                 | Signe Kastberg (Purdue University, West Lafayette, Indiana)  
|                |                                                                              |            |                                 | Amber Simpson (Binghamton University, New York)                                                   |
| 453            | Developing Student Agency through Social Justice Tasks                       | 3–5 Burst  | 403 A                           | Ashley Schmidt (University of Central Florida, Orlando)  
|                |                                                                              |            |                                 | Tandrea Fulton (University of Central Florida, Sanford) |
| 454            | Relationships Matter: Using the Buddy-Up Routine to Foster Safe Mathematics Learning Environments | 6–8 Burst | 501 BC                          | Kiersten Campbell (West Point Elementary School, Utah)  
|                |                                                                              |            |                                 | C. David Walters (Weber State University, Ogden, Utah)                                     |
| 455            | Key Processes and Dispositions in Data Science That Belong in K–12 Math      | 8–10 Burst | 515A                            | Hollylynne Lee (NC State University, Raleigh, North Carolina)  
|                |                                                                              |            |                                 | Gemma Mojica (NC State University, Raleigh, North Carolina)                         |
| 456            | Creating and Sustaining a Free Mathematics Conference to Empower Educators   | General Interest Burst | 502 A                        | Cody Osterhout (Broome-Tioga BOCES, Binghamton, New York)  
|                |                                                                              |            |                                 | Paul Volkert (Broome-Tioga BOCES, Binghamton, New York)                        |
| 457            | Is a Tuna Melt Actually a Pizza? Fostering Debates and Justifications in the Math Classroom | General Interest Burst | 502 B                        | Justin Aion (Environmental Charter School, Greensburg, Pennsylvania)  
|                |                                                                              |            |                                 | Shelby Strong (Stronger Math, LLC, Gretna, Louisiana)                         |

**Broaden the Purposes of Learning Mathematics**

**Create Equitable and Anti-Racist Structures in Schools and Systems**

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**Implement Equitable Mathematics Instruction**

**Position Assessment to Promote Equitable Practices and Support Student Learning**

**Reimagine the Role of Technology in Mathematics Education**

**Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning**
Saturday Afternoon Session

12:30 p.m.–1:30 p.m.

458 Closing Session: The Art of Logic in an Illogical World
General Interest Session
LA Convention Center, Hall B

For thousands of years, mathematicians have used the timeless art of logic to see the world more clearly. I will show how mathematics can help us address the divisive arguments all around us today. Taking a careful scalpel to politics, privilege, sexism, and other real-world situations, I will show how math can help us find clarity without losing nuance.

Dr. Eugenia Cheng is a mathematician, educator, de-mystifier, author, public speaker, columnist, concert pianist and artist. She was an early pioneer of math on YouTube and her videos have been viewed over 20 million times to date. In addition to teaching undergraduates she has assisted with mathematics in elementary, middle and high schools for over 25 years. She is the author of popular math books including “How to Bake Pi”, and “The Art of Logic”, as well as two children’s books. She is the founder of the Liederstube, an intimate oasis for art song based in Chicago.

Dr. Cheng is Scientist in Residence at the School of the Art Institute of Chicago, won tenure in Pure Mathematics at the University in Sheffield, and holds a PhD in pure mathematics from the University of Cambridge.

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Women and Mathematics Education
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About Host Organization
The California Mathematics Council (CMC) believes that all students have the capacity to become mathematically competent and confident when provided a rigorous and challenging mathematical program supported by high expectations.

Mission
The California Mathematics Council is committed to:
- promoting professional activities that will ensure continual improvement towards excellence in the teaching of mathematics;
- communicating with educators, parents, the public, and legislative bodies concerning issues related to teaching rigorous, challenging mathematics; and;
- increasing the diversity of membership of the California Mathematics Council and the diversity of leadership in mathematics education at the local, state, and national levels.

The National Council of Teachers of Mathematics has served as the public voice of mathematics education for more than 100 years, supporting teachers to ensure equitable mathematics learning of the highest quality for each and every student through vision, leadership, professional development and research. NCTM is the world’s largest organization dedicated to improving mathematics education in prekindergarten through grade 12. NCTM is committed to ongoing dialogue and constructive discussion with all stakeholders about what is best for students. The organization envisions a world where everyone sees the value, beauty and joy of mathematics, and is empowered by the opportunities mathematics affords.

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BeAnActuary.org
“When am I ever going to use this in the real world?” “I don’t want to be an accountant, teacher or engineer. What other careers can I do with math?” “What kind of career offers high salaries, job security and endless opportunities?” Sound familiar? Visit the Be An Actuary booth to pick up information that will make it easy to talk to your students and their parents about a career as an actuary. You can even request for an actuary to come talk to your students or take part in your career day.

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The Benjamin Banneker Association is a national non-profit organization dedicated to mathematics education advocacy, establishing a presence for leadership, and professional development to support teachers in leveling the playing field for mathematics learning of the highest quality for African-American students.

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carnegielearning.com
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Center for Education in Mathematics and Computing (CEMC) 200
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Redmond, OR
cognitive-surplus.com
At Cognitive Surplus, we build products that bring the power of human intelligence to the masses. We believe that the world’s most valuable resource is human thinking, and we’re passionate about unlocking its potential. Our mission is to create a world where technology enables human intelligence to be used for good.

Corwin
Booth 327
Thousand Oaks, CA
corwin.com
At Corwin, we have one objective and one objective only: to help educators do their important work better. We offer a host of independent and integrated professional learning options that conform with your budget, your timeline, and your objectives: books and resources, institutes, author consulting, Visible Learning plus, eLibraries, and eCourses. To learn more about our resources and services on language development, literacy, equity, leadership, math, science, and STEM, visit www.corwin.com.

CPM Educational Program
Booth 211
Elk Grove, CA
cpm.org
CPM offers grades 6-12 mathematics textbooks that use problem based learning in student centered classrooms and supports it with funded professional development. The Core Connections series (c) 2013-2015 is 100% aligned with CCSS content and practices. High school books offer both traditional and integrated pathways. Visit our booth and receive free access to the curriculum.

Curriculum Associates
Booth 911
North Billerica, MA
CurriculumAssociates.com
Curriculum Associates serves millions of students with a laser focus on educators’ needs and the belief that thoughtful, continuous innovation leads to positive impact on classrooms and measurable growth for students.
Didax Inc
Booth 716
Rowley, MA
didax.com

For years Didax has been producing innovative resources for math education professionals. We provide a many manipulatives including our hallmark product, Unifix® Cubes. In addition, we develop other hands-on resources, games, and activity books. We’re proud to partner with Great Minds as the exclusive provider of Eureka Math kits. We’re excited to publish resources from Kathy Richardson and the authors at TERC. We are now offering Didax PD featuring online courses for math instructors.

EAI Education
Booth 610
Oakland, NJ
eaieducation.com

EAI Education is a leading manufacturer of hands-on resources for PreK-12 Math and STEM. Our innovative products include Bar Models, Visual Area Modelers, SmartPals, and Exploragons®. We offer student manipulative kits, along with custom classroom manipulative kits for your curriculum needs. Stop by booth to view our newest products!

EdGems Math
Booth 310
Spring Lake, NJ
edgems.com

EdGems Math is dedicated to empowering a rich community of middle school math teachers – and the diverse learners they support – in class, online, all the time. Our program fosters skill-building and deeper conceptual understanding in all levels of learners through differentiated resources in an engaging visual environment -- helping students discover mathematical concepts, apply or practice standards in a variety of methods, and engage in and develop the eight mathematical practices.

Ellevation
Booth 910
Boston, MA
ellevationeducation.com

Ellevation is a software company focused exclusively on English Language Learners and the educators who serve them. Ellevation provides tools to over 1,100 school districts that streamline program management, improve teacher practice, increase student achievement and foster a district-wide culture of accountability for the success of English Language Learners. Ellevation is the leader in helping all stakeholders in K-12 school districts provide the best academic support to their EL students.

Exemplars
Booth 605
Underhill, VT
exemplars.com

Exemplars offers rich performance tasks that transform instruction and assessment in Math. Our problem-solving resources are evidence-based and designed to engage students and develop their critical thinking, reasoning, and communication skills – leading to improved learning outcomes. Differentiated tasks at 3 levels, lesson planning sheets, rubrics based on the NCTM Process Standards, anchor papers, and assessment rationales are provided. Aligned to Common Core and state standards.

ExploreLearning
Booth 724
Charlottesville, VA
explorelearning.com

ExploreLearning® creates seriously fun ed tech solutions for the most critical challenges in K-12 STEM learning. Effective and fun, our programs help students not only succeed at math and science, but also love it as much as we do. Learn more about Gizmos®, Reflex®, Frax® and Science4Us® at www.explorelearning.com.

Get More Math!
Booth 806
Quarryville, PA
getmoremath.com/

Will a student retain new concepts next week — or next year? Get More Math is designed by a math teacher to ensure that the answer is: yes! Take practice to the next level with on-demand spiraled review that BUILDS proficiency on newer content and MAINTAINS previous content gains. Real-time data for just-in-time intervention. The Exams feature makes every assessment actionable. Accelerate learning as never before with a complimentary site-license lasting through July 31 for qualifying schools.

Geyer Instructional Products
Booth 511
Cincinnati, OH
geyerinstructional.com/

Geyer Instructional has been innovating classroom tools for over 60 years! Offering a complete line of math supplies for K-12, Geyer’s mission is to enrich the classroom and make products to help you, and your students, achieve success. We offer a wide range of products. From graph paper, stickers, and post-its, to measurement tools, dry erase products, classroom posters, magnets, books, and games. Find products that can only be bought with us at booth #511 or online: www.geyerinstructional.com

GM Educator Appreciation Program
Booth 905
Sterling Heights, MI

gmeducatorappreciation.com

Maybe you bought extra classroom supplies instead of concert tickets this school year, or you missed a big evening out because you were helping students study. Whatever role you play at your school, you deserve the GM Educator offer. Visit booth #905 or https://www.gmeducatorappreciation.com to learn more about our special offer on the purchase or lease of eligible, new Chevrolet vehicles.
Exhibitor Directory

Gotzee!
Booth 733
St Michaels, MD
gotzmath.com

Gotzee™ Math Center Kits are the best resource available for math centers in the elementary classroom. Adapted from the IM™ K-5 curriculum, Gotzee!™ Center Kits allow you to deliver your curriculum with integrity while enhancing access to ALL students and with minimal teacher prep.

- SEL mindset messages
- Open Dyslexic Font
- Multiple representations for emerging readers: Colorful Icons, Word Banks, Sight Words & more.
- Streamlined materials
- Enhanced Graphic Organizers
- Cut & Collated Card Decks

Great Minds
Booth 725
Washington, DC
greatminds.org

Eureka Math2™ is a revolutionary math program designed to advance equity in the math classroom by helping students build enduring math knowledge. You’ll still find the consistent math models, rigor to support the productive struggle, and coherence across grades that premiered in Eureka Math®, but exponentially greater. You’ll also find digital interactives, increased opportunities for student discourse, and a new level of flexibility to make math instruction more teachable and engaging.

hand2mind, Inc.
Booth 625
Vernon Hills, IL
hand2mind.com

Children learn best by doing! Visit our booth to learn more about hand2mind’s most-loved programs and manipulatives. Discover simple, standards-based solutions to integrate hands-on learning into your classroom for Daily Math Fluency, Differentiated Math Instruction, Guided Math Lessons, and more. Learn about fun, new ways to use the hand2mind manipulatives you already have in your classroom and get a sneak peek at exciting new products, too.

Heinemann Publishing
Booth 311
Portsmouth, NH
heinemann.com/math

Heinemann math resources are written by educators, for educators, to support student-centered teaching and learning. Our authors start with curiosity about students’ thinking and numerical reasoning. By learning about student understanding, teachers can be responsive to individual needs. The goal of our resources is to elevate teacher expertise, increase their comfort and confidence with math, and provide support for helping students make sense of the math they’re learning. www.Heinemann.com

Houghton Mifflin Harcourt
Booth 719
Austin, TX
hmhco.com

Houghton Mifflin Harcourt is a global learning company dedicated to changing people’s lives by fostering passionate, curious learners. As a leading provider of pre-K-12 education content, services and cutting-edge technology solutions across a variety of media, HMH enables learning in a changing landscape.

Illustrative Mathematics
Booth 826
Tucson, AZ
illustrativemathematics.org

Illustrative Mathematics is a discerning community of educators dedicated to the coherent learning of mathematics. We collaborate at illustrativemathematics.org, sharing carefully vetted resources for teachers and teacher leaders to give our children an understanding of mathematics and skill in using it. We provide expert guidance to states, districts, curriculum writers, and assessment writers working to improve mathematics education.

IM K-12 Math by Imagine Learning
Booth 617
Scottsdale, AZ
imaginelearning.com/en/us

Imagine Learning is a PreK–12 digital learning solutions company that ignites learning breakthroughs by designing forward-thinking solutions at the intersection of people, curricula, and technology to drive student growth.

Innovemat
Booth 732
Barcelona,

IXL Learning
Booth 110
San Mateo, CA
IXL.com

IXL provides a standards-aligned immersive learning experience for all subjects, K-12. Come learn how IXL’s carefully crafted content and direct instruction supports students as they build the foundational skills needed for success. With IXL Analytics, teachers have insights to help them drive gains in student performance and on high-stakes assessments.

Kendall Hunt Publishing Company
Booth 611
Dubuque, IA
k12.kendallhunt.com

Kendall Hunt is the provider of educational products for math, science and talented and gifted for grades K-12. Full core curriculum math offerings include Illustrative Mathematics for K-12, the Discovering Mathematics Series (Discovering Algebra, Discovering Geometry and Discovering Advanced Algebra) as well as advanced mathematics offerings PreCalculus, Calculus and Statistics. A wealth of supplemental math offerings are also available for all grade levels.

Knowles Teacher Initiative
Booth 429
Morristown, NJ
knowlesteachers.org

The Knowles Teacher Initiative, a 501(c)(3) nonprofit, was established by Janet H. & C. Harry Knowles in 1999 to increase the number of high quality high school science & math teachers in the U.S. Through the Teaching Fellows Program, Senior Fellows Program & the Knowles Academy, Knowles seeks to support a national network of math & science teachers who are collaborative, innovative leaders improving education for all students in the U.S. Visit www.knowlesteachers.org to learn more.
### Learn Fresh
**Booth 704**  
Philadelphia, PA  
[learnfresh.org](http://learnfresh.org)

NBA Math Hoops, our flagship program runs in partnership with NBA Cares, features a comprehensive community program, digital and physical board game, mobile app, and curriculum that allows students to learn fundamental math and social-emotional skills through the game of basketball. All program content is developed in alignment with Common Core State Standards and 21st Century Learning Skills, and has been shown to improve students’ foundational math and social-emotional skills.

### Math Communities
**Booth 535**  
San Jose, CA  
[mathcircles.org](http://mathcircles.org)

Math Circle Network is comprised of communities focused on the enjoyment of mathematical problem solving. Math Circles can take many forms, including after-school programs for students, professional learning communities for teachers and mathematicians, or groups of parents or families who want to become more involved with mathematics education. There are nearly 300 Math Circles around the U.S., including approximately 150 Math Teacher Circles and another 150 Math Student Circles.

### Mathspace
**Booth 529**  
New York, NY  
[mathspace.co](http://mathspace.co)

Mathspace is a space to... LEARN FEARLESSLY Personalized learning and adaptive support encourages students to see mistakes as opportunities to grow. TEACH COMPREHENSIVELY Engage learners with interactive lessons. Differentiate instruction with adaptive tasks. Track student performance with built-in reporting. ASSESS EFFORTLESSLY Use the latest diagnostics to get the information you need on student growth, without taking time out of class. Learn more at: mathspace.co/us

### Legends of Learning
**Booth 426**  
Washington, DC  
[legendsoflearning.com](http://legendsoflearning.com)

Legends of Learning creates standards-aligned digital games to foster deeper engagement, increase content retention and increase test scores; all backed by research from Vanderbilt University. We have over 2,000 standards-aligned games supporting K-8 math and science instruction, so teachers can personalize learning to meet all students where they are. Use Legends to integrate an exciting game-based learning platform into your curriculum to give your students the superpower of knowledge!

### Marshall Cavendish Education
**Booth 927**  
Tarrytown, NY  
[marshallcavendish.us](http://marshallcavendish.us)

Marshall Cavendish Education is a global provider of holistic education curricula that help teachers become facilitators and students to be critical thinkers. The company’s products are published in 11 languages, in more than 50 countries, and are used by grades K-8 educators and students. Marshall Cavendish Education is revolutionizing learning and teaching with the Singapore Math® Approach, which uses the concrete, pictorial and abstract (CPA) learning progression.

### Math Wiz Flashcards
**Booth 221**  
Green Valley, AZ  
[mathwizflashcards.com](http://mathwizflashcards.com)

High School content, AP and IB excellent quality Math Flashcards. You could make all these 3500 cards with 3000 hours of labor as I did. All that work has been done for you! Your school Admin will support your purchase of a collection of these decks. They will last for years. They cover all the key concepts you teach, and they’re fun for your students to use.

### Math Works
**Booth 924**  
San Jose, CA  
[m3challenge.siam.org](http://m3challenge.siam.org)

SIAM builds cooperation between mathematics and the worlds of science and technology through publications, research, and community. Part of our outreach is organizing M3 Challenge, an award-winning Internet-based competition inspiring students to pursue STEM majors and careers since 2006. Working in teams, students solve an open-ended problem in 1A hours. Free. Awards $100,000+ in scholarships annually. Extra credit awards for outstanding (optional) code. More than $1.6 million awarded to date.

### McGraw-Hill
**Booth 805**  
Columbus, OH  
[mheducation.com/prek-12](http://mheducation.com/prek-12)

At McGraw Hill, we appreciate that everyone brings something different to the table and that no two students, classrooms, or schools are the same. That’s why we’ve engineered personalized learning solutions that cater to a wide range of learning styles, interests, and abilities. Every day, our expert authors work to develop flexible resources that embrace your students’ differences, helping them flourish into the people they aspire to be.
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Exhibitor Directory

Michigan State University
Booth 901
East Lansing, MI
prime.natsci.msu.edu/

The doctoral program in mathematics education at Michigan State University is designed for those who show promise of becoming leaders in local, state, national and international mathematics education communities. We prepare researchers and leaders to address critical mathematics education issues by developing analytical perspectives for research, engaging in reflective teaching, and deepening mathematical knowledge. Assistantships and fellowships are available!

MidSchoolMath
Booth 106
Taos, NM
midschoolmath.com

Rated #1 on EdReports' new criteria for middle grades mathematics, Core Curriculum by MidSchoolMath is a multi-dimensional growth mindset curriculum that blends film, software and print-based materials to bring math to life. “I love that students are pulled in with an imaginative problem. Math is solved through group and class discussion. There is a lot of joy learning math this way. The best thing is that students are engaged each and every day.” - Daniel Rose, Salt Lake Arts Academy

Millikin University
Booth 707
Decatur, IL

National Assessment of Educational Progress
Booth 334
Washington, DC

The National Assessment of Educational Progress (NAEP), first administered in 1969, is the largest continuing and nationally representative assessment of what our nation’s students know and can do in subjects such as mathematics, reading, science, and writing. Standard administration practices are implemented to provide a common measure of student achievement.

National Geographic Learning
Booth 104
Boston, MA
ngl.cengage.com

National Geographic Learning provides quality PreK-12, Academic, and Adult Education instructional solutions for reading, writing, science, social studies, ESL/ELD, Spanish/Dual language, Advanced & Electives, Career & Technical Education, and Professional Development.

National Museum of Mathematics
Booth 534
New York, NY
momath.org

Come visit the National Museum of Mathematics to learn how you can win $25,000! The Museum runs an annual contest for innovative math lessons, and we want YOU to participate: rosethalprize.momath.org. We’ll also have some unique math manipulatives to share that help math come alive.

NCSM
Booth 1002
Aurora, CO
mathedleadership.org

NCSM is a mathematics education leadership organization that equips and empowers a diverse education community to engage in leadership that supports, sustains, and inspires high quality mathematics teaching and learning every day for each and every learner. Our bold leadership in the mathematics education community develops vision, ensures support, and guarantees that all students engage in equitable, high-quality mathematical experiences that lead to powerful uses of mathematical understanding.

Nearpod
Booth 217
Dania Beach, FL
nearpod.com

Nearpod is an interactive instructional platform that merges real-time formative assessment and dynamic media for live and self-paced learning experiences inside and outside of the classroom. We are excited to preview a new supplemental K-8 math program that provides a targeted math instruction powered by the signature Nearpod platform coming soon.

Notre Dame STEM Teaching Fellows
Booth 320
Notre Dame, IN
stemeducation.nd.edu

The University of Notre Dame Center for STEM Education is seeking passionate STEM teachers to apply for a unique professional development opportunity. The Trustey Family STEM Teaching Fellows is a competitive program that seeks school-based teams of three to five STEM teachers from the middle grades (grades 5-8) who desire to change STEM education in their schools and communities. Stop by our booth to learn more about becoming a Trustey Fellow!

NumWorks
Booth 705
Raleigh, NC
numworks.com/

NumWorks is on a mission to simplify math learning with the graphing calculator, reinvented. NumWorks is the first calculator created with 21st-century students in mind with a modern aesthetic, thin design and an intuitive app-based interface, allowing users to just focus on the math. With belief in the power of education and a strong community of teachers, students, and developers, NumWorks' goal is to make everyone a math person.

Origio Education
Booth 321
Earth City, MO
origoeducation.com/

ORIGO Education delivers Curriculum, Supplemental Resources, and Professional Learning that addresses the needs of learners from Pre-K through elementary school. Your partner in making math-learning meaningful, enjoyable, and accessible to all.

Savvas Learning Company
Booth 601
Paramus, NJ
savvas.com

At Savvas, we believe learning should inspire. Our next-generation learning solutions, developed by top authors and educators, leverage the power of data and advanced technology to deliver immersive, personalized, and flexible content that connects teachers and students with real-world learning experiences, helping all learners discover their greatness. Visit us at savvas.com.
Exhibitor Directory

Six Red Marbles
Booth 139
Charlestown, MA
sixredmarbles.com

Creating students for life starts with a strong foundation. For over 25 years, Six Red Marbles has been driving a diverse range of learner-centric projects toward excellence for our clients. Expectations for students have evolved, as has the way all of us consume information. At the intersection of these truths is where you’ll find Six Red Marbles, designing and developing engaging, tech-forward learning experiences.

ST Math, Created by MIND Research Institute
Booth 701
Irvine, CA
stmath.com

ST Math is a PreK-8 visual instructional program that leverages the brain’s innate spatial-temporal reasoning ability to solve mathematical problems. The program’s unique, patented approach provides students with equitable access to learning through challenging puzzles, non-routine problem solving, and informative feedback. Time spent on ST Math is time spent learning. Learn more at stmath.com.

STEMscopes Math
Booth 711
Houston, TX
stemscopes.com/math

Discover the wonder of mathematics in our everyday world with STEMscopes Math, our all-new approach to math instruction. Built from the ground up by practicing educators using the flexible 5E lesson model, STEMscopes Math provides you with everything you need to create a meaningful learning experience that empowers your students with 21st-century skills to succeed in future STEM careers.

Stenhouse Publishers
Booth 825
Portsmouth, ME
stenhouse.com

Stenhouse provides quality classroom resources and professional development materials by teachers, for teachers. Visit booth 825 to learn about Building Fact Fluency: A Toolkit for Addition & Subtraction and Building Fact Fluency: A Toolkit for Multiplication & Division—two research-driven, engaging, ready-to-use resources—in your school to create cohesion in your math instruction by using common routines and formative assessment strategies that students will recognize across the grades.

Teaching Channel
Booth 238
Eagan, MN
teachingchannel.com

Our award-winning platform is designed to engage teachers through seeing others teach and investigating their own practice. The Teaching Channel Video Library has over 1,400 classroom videos and nearly 400 are math specific! Video recording, upload, and annotation tools for self-reflection, coaching, and collaboration are all available through our Teaching Channel Plus subscription. Work synchronously or asynchronously on over 75 Learning Plans. Enhance your effectiveness with Teaching Channel!

TeachRock
Booth 933
New York, NY
teachrock.org

TeachRock is a standards-aligned arts integration curriculum that uses popular music and culture history to help teachers engage students. Innovative lesson plans developed by experienced educators and top experts in the field foster genuine learning in a variety of subject areas. TeachRock has crafted engaging and meaningful material for every classroom and developed exciting professional development workshops to share it with teachers. All for free. No cost, period.

TERC
Booth 439
Cambridge, MA
terc.edu

TERC is a nonprofit made up of teams of math and science education and research experts dedicated to innovation and creative problem solving. At the frontier of theory and practice, TERC’s work encompasses research, content and curriculum development, technology innovation, professional development, and program evaluation. TERC has a passion for social justice and strives to create level playing fields for all learners, reaching more than three million students every year.

Texas Instruments
Booth 411
Dallas, TX
education.ti.com

Designed by teachers for teachers, Texas Instruments calculators are dedicated tools built specifically for teaching and learning math, durable enough to withstand the demands of the classroom and distraction-free so that students stay focused on learning. Teachers trust TI calculators to help students succeed in class and on important exams.

The College Board
Booth 134
New York, NY
collegeboard.org/

Pre-AP® courses, including Algebra 1, Geometry with Statistics, and Algebra 2, deliver grade-level instruction through focused course frameworks, instructional resources, classroom assessments for learning, and high-quality professional learning. Program components provide educators and their students the space and time for deep engagement with the most essential and relevant concepts and skills, and courses are backmapped from AP course expectations.
The Markerboard People
Booth 616
Lansing, MI
dryerase.com

The Math Learning Center
Booth 111
Salem, OR
mathelearningcenter.org
The Math Learning Center (MLC) offers innovative and standards-based materials for elementary classrooms. Bridges® in Mathematics, Number Corner®, and Bridges® Intervention are designed to develop mathematical confidence and ability not only in students but also in teachers. In support of our nonprofit mission we also offer a range of free resources, from math apps to free lessons and books for educators.

think! Mathematics
Booth 316
Neptune Beach, FL
mathodology.com
We are educators. Our mission is to inspire and nurture creative forces within each of us— one student, one teacher, and one school at a time. We are innovators. We are believers. Our methods and strategies are backed by empirical evidence. We deliver and create a collaborative environment where students and teachers reason, problem solve, communicate and think mathematically together with passion.

Tile Farm LLC
Booth 833
Albuquerque, NM
Tile Farm is a team of educators, mathematicians, scientists, and artists aiming to highlight the beauty and joy of math for people of all ages. High level mathematicians understand how intuitive, creative, joyful, and rewarding doing math can be. We are aiming to bring that spirit to the masses via a novel curriculum and a suite of accompanying apps.

TO Dos: Mathematics for ALL
Booth 903
Venice, CA
todos-math.org/
MISSION The mission of TODOs: Mathematics for ALL is to advocate for equity and high quality mathematics education for all students—in particular, Latina/o students. TODOs’ goals include advancing educators’ knowledge and ability that leads to implementing an equitable, rigorous, and coherent mathematics program that incorporates the role language and culture play in teaching and learning mathematics and to develop and support educational leaders who continue to carry out the mission of TODOs.

TouchMath
Booth 800
Colorado Springs, CO
touchmath.com
See It, Say It, Hear It and Touch It! TouchMath helps students of all abilities and learning styles master the foundations of math—from number sense to algebra—empowering them to achieve their full potential. Educators around the world rely on TouchMath for its proven strategies to maximize student potential, prepare for state tests, and achieve AYP benchmarks. Celebrate our 47th Anniversary and learn more about our expanded family of Special Education products at book #800.

TPS Publishing Inc.
Booth 135
Valencia, CA
tpspublishing.com
Creative Core Curriculum for Mathematics with STEM, Literacy and Arts K-8 is adopted in CA ad FL. Programs are project based, Smarter Balance and PARCC aligned, written by educators. Professional development is provided by CeMast, at Illinois State University. Differentiated exciting content. Texas adopted K-8 Math, Science and CTE programs; TPS is an adopted HS Forensic science, Law Enforcement, Public Safety and Criminal Investigations supplier. Focus on ELL/Special education.

US Math Recovery Council
Booth 433
Eagan, MN
mathrecovery.org
We empower educators to advance students’ mathematical thinking and success. Math Recovery® transforms numeracy education through customized and unique professional learning with meaningful assessment and instruction.

Wolfram Research
Booth 528
Champaign, IL
wolfram.com/education/high-schools/
Best known for Mathematica and Wolfram|Alpha, Wolfram Research has been innovating in STEM education worldwide and is expanding education and computational learning tools. The new Wolfram|Alpha Notebook Edition makes basic computer programming easy with conversational language input to give advanced computation and dynamic visualization into a single, unified tool perfect for teaching and learning.

Zaner-Bloser
Booth 829
Grandview Heights, OH
zaner-bloser.com/
At Zaner-Bloser, we create tools for teachers that help students become more joyful and creative learners, thinkers, and communicators.

Zearn
Booth 124
New York, NY
about.zearn.org
Check out Zearn in action, create your own classroom display, and learn how Zearn can help you multiply the ‘aha’ moments in your classroom at booth #124! Zearn is the top-rated math learning platform used by 1 in 4 elementary students nationwide. Zearn’s adaptive digital lessons and flexible teaching materials give students more opportunity to explore math concepts with built-in differentiated support right when they need it. It’s free for teachers—always. Stop by booth #124 to learn more!
Meet & Connect at the MTLT Studio

- Get advice on your work-in-progress
- Talk directly to the Editorial Board
- Give back to the community
- Apply to be a Fellow
- Become a reviewer
- Expand your reach
- Get published

Visit the MTLT Studio at NCTM Central in the Exhibit Hall to talk to the Editorial Board, become a reviewer, or turn your session into a published article in MTLT. Expand your reach and support the community.
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