



2022 ANNUAL MEETING & EXPOSITION

Sept. 28–Oct. 1, Los Angeles

Los Angeles

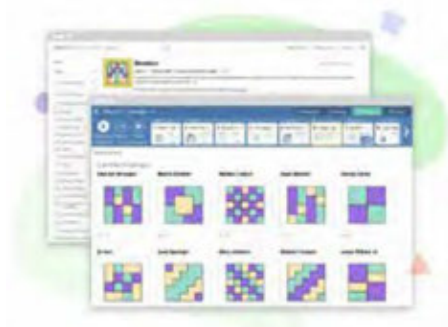
Program Book

#NCTMLA22

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

Amplify.

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.	<i>Express Reg Only</i>
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.



2022 ANNUAL MEETING & EXPOSITION

SEPT. 28–OCT. 1, 2022 ★ LOS ANGELES

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nctm.org/losangeles2022

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National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 20191-1502; Telephone (703) 620-9840; Fax (703) 476-2970; E-mail nctm@nctm.org; Web nctm.org.

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Welcome!



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 sanitization 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
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★★★★★
Average 4.7/5 user rating

 Algebra Tiles	 Base Ten Blocks	 Clock	 Color Tiles	 Cuisenaire® Rods	 Fraction Circles	 Fraction Circles	 Geoboard
 Hundred Board	 Linking Cubes	 Number Lines	 Pattern Blocks	 Place Value Disks	 Rekenrek	 Two-Color Counters	 XY Coordinate Board

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:

	EXHIBIT HALL
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.
Saturday	Closed

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.

REGION	PRESIDERS	ROOM
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 Murawska , 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 is a New York Times, Wall Street Journal, and Amazon bestselling author, who has co-authored along with his brother, Dan, *The Power of Moments: Why Certain Experiences Have Extraordinary Impact*, *Decisive: How to Make Better Decisions in Life and Work*, *Switch: How to Change Things When Change is Hard*, and their first book, *Made to Stick: Why Some Ideas Survive and Others Die*.

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.

- 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 Session

7:15 a.m.–7:45 a.m.

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

7:30 a.m.–9:00 a.m.

4 Seventy-First Annual Delegate Assembly

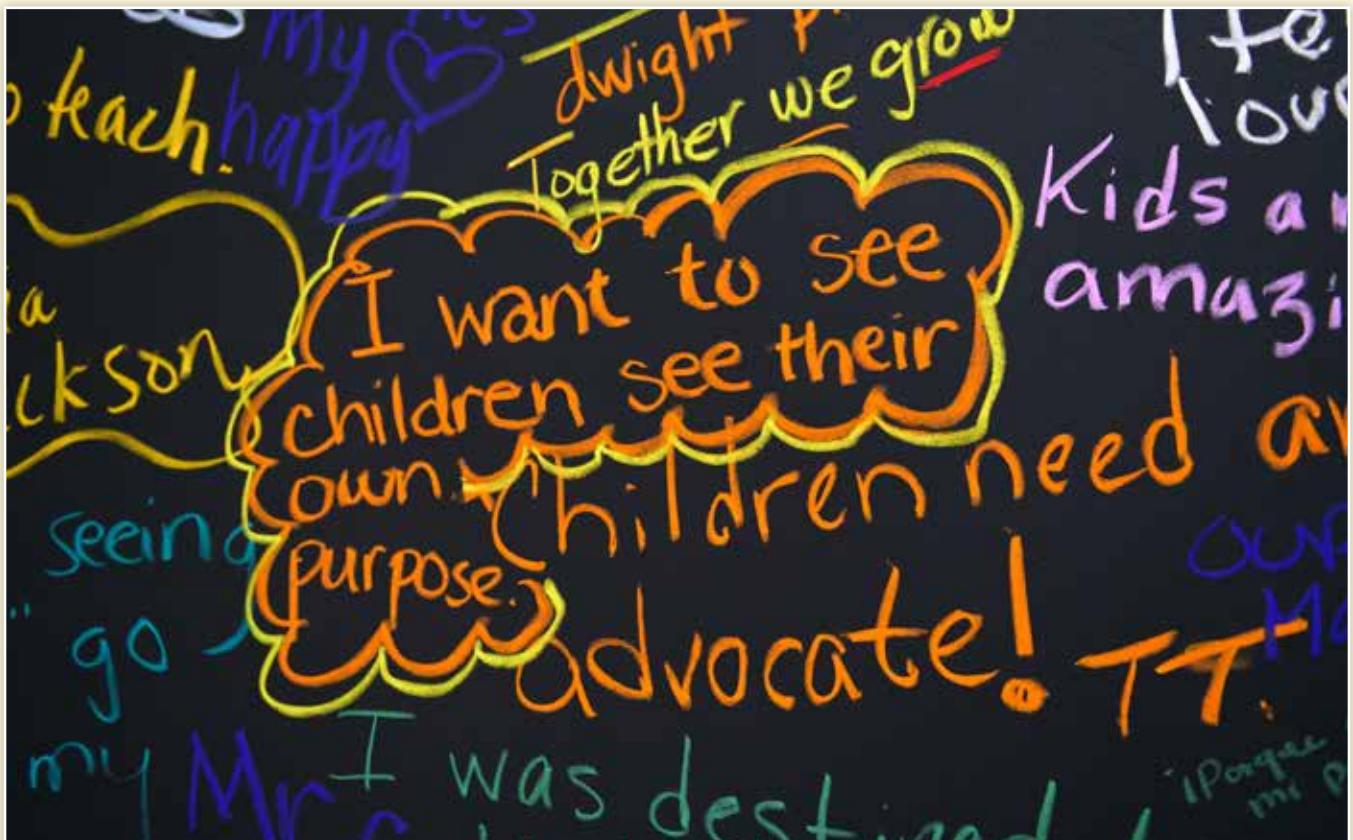
General Interest Session

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.



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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: @teach2abilities

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.

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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

LA Convention Center, 407

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



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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
Twitter: @Jason_To

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 Listen Up! Hearing Your Students' Mathematical Thinking



Research Session
LA Convention Center, 306

Are you looking for ways to increase student dialogue in the classroom? Do you wonder how to better understand your students' thinking? Come explore how to listen to and promote student thinking throughout instruction and assessment using a progression of questioning.

Scott Miller, Self, Naperville, Illinois
Twitter: @smiller229

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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 (unspayed) 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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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 HIJ

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: @bblankephd

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: @debpeart1

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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29 Bring the Standards of Mathematical Practices (SMPs) to Life!



6–8 Workshop

LA Convention Center, 403 A

Representation is paramount to learning, and the SMPs allow students to see themselves as math people. Leave with hands-on activities to highlight the SMPs for all students and create a classroom culture where students feel represented as math people!

Sara Odioso, Nativity Prep Academy, San Diego, California
Twitter: @Ms_Odioso

30 Incorporating Mechanical Engineering into the Math Classroom to Develop Global Citizens



6–8 Workshop

LA Convention Center, 501 BC

Learn the first steps of integrating mechanical engineering and global sustainability into your curriculum as you team up to design a rooftop water catchment system. Trace a teacher's classroom implementation of this challenge, developed in collaboration with The Tech Interactive of Silicon Valley and refined through an NEA Global Fellowship.

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

All students deserve access to grade-level mathematics. Utilizing instructional and language routines is a key component of providing equitable access to all. Engage and discuss these routines while experiencing the major work of grades 6–8.

Morgan Stipe, Open Up Resources, Carroll, Iowa

Twitter: @mrsstipemath

Brooke Powers, Open Up Resources, Lexington, Kentucky

31 “Dear Math”—Understanding Student Math Identities through Storytelling



8–10 Workshop

JW Marriott, Platinum AB

In this session, we will explore math identity development through the unpacking of student writing in “Dear Math” letters. We will share quotes and themes, and we will unearth the roots of their feelings in service of an equitable (and enjoyable) math experience for all.

Sarah Strong, High Tech High, San Diego, California

Twitter: @sstrong57

32 Designing for Joy and Thinking



8–10 Workshop

LA Convention Center, 502 A

Moments of fun, play, and joy in our mathematical spaces can be cultivated with intentional design and practice. A joyful learning space can also foster rich discourse, collaborative discovery, and rich thinking. Experience components of classroom culture building to inspire these meaningful and joyful learning opportunities for your own context.

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

We all try to authentically engage students while building conceptual understanding; however, it is often easier said than done. Travel with a history-of-math expert on a magical journey to find ways to incorporate the stories and strategies that the Egyptians, Babylonians, Greeks, Indians, and Chinese used to solve algebra and geometry problems.

Matthew Beyranevand, Chelmsford Public Schools, Massachusetts

Twitter: @mathwithmatthew

34 Industry-Inspired Activities That Connect Industry to Mathematics Instruction



10–12 Workshop

LA Convention Center, 406

Industry-inspired lessons will be demonstrated and explored by participants. STEM lessons include an industry launch video with a Desmos activity, a student sheet posing industry tasks, and analysis questions that require student discussion. Presented materials are a result of a three-year NSF collaboration between high schools and a community college.

Jay Martin, Wake Technical Community College, Willow Springs, North Carolina

Julia Smith, Wake Technical Community College, Raleigh, North Carolina



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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
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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


40 Rich Mathematical and Computational Tasks for Grades 4–6 Geometry: Using a Language, Scratch

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: Eunhye Cho Flavin


41 The Power of CGI and Multiplication Fluency.

3–5 Session
 LA Convention Center, 404

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: @sarahbbush

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: @fawnpnguyen


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

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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 High School District 219, 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: @austingreene5

Stephanie Burdette, Greenville County Schools, South Carolina

Kristen Griffin, Greenville County Schools, South Carolina

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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, ONorthwest 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!**

-  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

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

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



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58 Building Addition and Subtraction Procedural Fluency through Strategy-Focused Games



PreK–2 Workshop

LA Convention Center, 402

Fluency is the student's ability to apply procedures accurately, efficiently, and flexibly. Learners need opportunities to develop this understanding through engaging games selected to meet their needs. This session will get you playing and reflecting on games that can be used in your classroom to support students on their path to fluency.

Cynthia Cliche, Murfreesboro City Schools, Tennessee
Twitter: @cindycliche1

Jeremy Winters, Middle Tennessee State University, Murfreesboro

59 Checkmate: Anticipating Your Students' Next Moves!



PreK–2 Workshop

LA Convention Center, 502 A

Would you love to better understand student thinking? Let's create anticipatory frameworks for story problems to guide instruction and support all learners! Come prepared to think like your students and get those rich mathematical discussions in "check."

Matt Sheelen, High Tech Elementary Chula Vista, California
Twitter: mjsheelen

Ruth Smith, High Tech High- Graduate School of Education, Chula Vista, California

60 Leveraging the Brilliance in Student Work to Extend Learning for Each and Every Student



PreK–2 Workshop

LA Convention Center, 515 B

Assessment requires more than looking for right answers. To engage in equitable assessment, we must look for the brilliance in student work and identify and build on the funds of knowledge they bring to our classrooms. We'll explore ways to leverage each student's work to engage them in grade-level mathematics and cultivate their math identities.

Marni Greenstein, Amplify Education, Brooklyn, New York
Twitter: math_marni

Kristin Gray, Amplify, New York, New York

61 Accessing Fluency through Routine and Opportunity



3–5 Workshop

LA Convention Center, 403 A

Student agency is connected to their fluency, which includes but goes well beyond basic fact recall. Teaching strategies conceptually is a necessary first step. But what do you do next? This session features practical fluency routines for engaging students in reasoning and discourse. K–5 classroom-ready resources will be shared.

John SanGiovanni, Howard County Public Schools, Westminster, Maryland

Twitter: @JohnSanGiovanni

Jennifer Bay-Williams, University of Louisville, Pewee Valley, Kentucky

62 Incorporating Best Practices for Teaching Math through Technology



3–5 Workshop

JW Marriott, Platinum HIJ

Are you new to teaching math with technology? This workshop will provide you with a variety of virtual technology that can improve your instructional practices. Templates and examples will be shared focusing on early-career teachers. Bring a device for accessing the internet for this interactive learning workshop.

Heather Bleecker, Salish Kootenai College, Polson, Montana

Jason Ries, Dixon School District #9, Montana

63 What We're Learning to Ask about Weaving Mathematics and Equity during Classroom Talk: Grades 3–5



3–5 Workshop

LA Convention Center, Petree C

During mathematics discussions, teachers weave students' ideas into a mathematical story line while supporting each student's opportunity to learn. Participants will do math together and view video from upper elementary classrooms to consider the challenges of managing these two commitments—to rigorous mathematics and to equitable participation.

Susan Jo Russell, TERC, Somerville, Massachusetts

Deborah Schifter, EDC, Northampton, Massachusetts



Broaden the Purposes of Learning Mathematics



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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

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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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: @growingminds12

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. Brainiaccamp'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, Brainiaccamp, Austin, Texas
Mark Schmit, Brainiaccamp, 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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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!

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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 students feel a strong sense of belonging, allowing for true learning partnerships.

Toni Harrison-Kelly, School Leadership for Social Justice, Desoto, Texas

Twitter: @SLSJus

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 Donovan, Woodbridge High School, Irvine, California

Twitter: @kristiedonovan

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



Broaden the Purposes of Learning Mathematics



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Reimagine the Role of Technology in Mathematics Education





Teach Equity-Centered Mathematics by Attending to Social-Emotional Learning


- 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 Ltd., 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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93.1 An All Access Pass to Meaningful Math

3–5 Exhibitor Workshop



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

93.2 Assess Yourself: An Interactive Discussion on Mastery and Innovative Approaches to Assessment



8–10 Exhibitor Workshop

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

93.3 Exploring Computational Thinking and Coding in Math Class



10–12 Exhibitor Workshop

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

93.4 Leveraging Rich Prompts to Drive Mathematical Discourse for Multilingual Learners (MLLs)



Coaches/Leaders/Teacher Educators Exhibitor Workshop

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

93.5 Success is in the Numbers: Building Fact Fluency on a Foundation of Number Sense



Coaches/Leaders/Teacher Educators Exhibitor Workshop

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

93.6 The Concrete-Pictorial-Abstract Approach to Learning Mathematics



3–5 Exhibitor Workshop

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



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

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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

Lesia 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: @gotttmitch12

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.

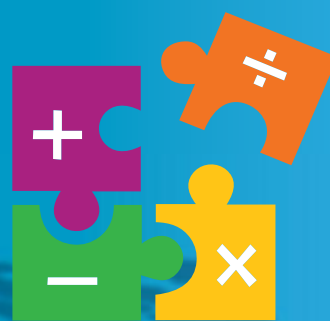
Monica Tienda, Oak Park School District, Royal Oak, Michigan
Twitter: @matienda

Mario Valdez, Alpaugh Unified School District, Porterville, California

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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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

106 “What Are You Thinking?” Using Math Journals as a Vehicle for Assessment and Learning.



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

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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: drtedco

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: Ashley Loftis








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 Pantozzi, 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 GAISE 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, Brainingcamp, 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: @LXJSmonk

Andrea Diaz, TNTP, New York, New York

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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
LA Convention Center, 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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122 Accelerating Learners with Number Lines: Visual Models to Support Equity and Access for Students



PreK–2 Workshop

LA Convention Center, 408 B

Research indicates a relationship between students' experiences with number lines and their mathematical achievement. In this session for K–2 educators, participants will explore the progression from number tracks to number lines and engage in games and activities to support all students will deep understanding of mathematical concepts.

Andrea Kotowski, ORIGO Education, Placitas, New Mexico
Twitter: @dreamathchick

123 Beyond Literature Connections: Storytelling in Math



PreK–2 Workshop

LA Convention Center, 403 B

In the last few years, math in literature has exploded! Children's books address all areas of the curriculum with engaging stories and whimsical illustrations, along with accompanying lesson plans. How about math as literature? What if our students approached math as readers and authors?

Teresita Cuesta, Sidwell Friends School, Gaithersburg, Maryland

124 See It, Move It, Grasp It: Math with Virtual Manipulatives



PreK–2 Workshop

JW Marriott, Platinum C

Manipulatives are important tools that help young mathematicians reason about and make sense of complex mathematical ideas. What changes or stays the same when students engage with virtual manipulatives alongside or in place of physical ones? What are the opportunities and limitations? Explore these questions using free virtual manipulatives. Bring your own device!

Chrissy Newell, Desmos Classroom at Amplify, Turlock, California
Twitter: @MrsNewell22

125 Catalyzing Change: Developing Identity, Agency, and Deep Understanding through Equitable Instruction



3–5 Workshop

JW Marriott, Platinum AB

Examine cases exemplifying effective and equitable teaching, positioning children as mathematical knowers, doers, and sense makers (recommendations 3 and 4). Discuss the teacher's role in providing experiences to nurture a positive identity and strong sense of agency. Leave equipped with ideas to initiate critical conversations and catalyze change.

Nicole Rigelman, Portland State University, Oregon
Twitter: @nrigelman
DeAnn Huinker, University of Wisconsin–Milwaukee

126 Connecting Children's Literature and Math to Build Equitable Access in Math Class



3–5 Workshop

LA Convention Center, 502 B

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.

Ashley Marlow, All Learners Network, Burlington, Vermont
Twitter: @MarlowMathVT

TJ Jemison, All Learners Network, Burlington, Vermont

127 Developing Students to Become Analytical Problem Solvers



3–5 Workshop

LA Convention Center, Petree C

This workshop will lead participants through problem-solving situations and discuss the multiple ways to solve these problems. Leaders will engage participants in ways to encourage their students to use their analytical problem-solving skills and unique voices to solve similar problems in their classrooms.

Katherine Horak Smith, Tarleton State University, Stephenville, Texas

Twitter: @horaksmith

Michael Warren, Tarleton State University, Stephenville, Texas

Eileen Faulkenberry, Tarleton State University, Stephenville, Texas

Beth Riggs, Tarleton State University, Stephenville, Texas

128 Statistics and Data Science in the Elementary Grades



3–5 Workshop

LA Convention Center, 501 BC

As states push to adjust their standards to include more statistics and data science, it is challenging for teachers to find resources to teach these topics; particularly for the elementary grades. In this workshop, we will present the GAISE II framework and several examples of activities and lessons for teachers to directly take to the classroom.

Anna Bargagliotti, Loyola Marymount University, Manhattan Beach, California

Jeffrey Shih, University of Nevada, Las Vegas

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129 Using Discourse Actions to Promote Access and Student Voice in Mathematics Classrooms



3–5 Workshop

LA Convention Center, 152

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.

Amber Candela, University of Missouri – St. Louis
Twitter: @AmCan36

Melissa Boston, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; Duquesne University, Ellwood City, Pennsylvania

130 Engaging Students to Positively Change How They Relate to Math



6–8 Workshop

LA Convention Center, 402

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.

Claudisha Harriel, Abundant Fruit Educational Services, Memphis, Tennessee

131 Mathematical Language Routines: Cultivating Conversation in Middle School Classrooms



6–8 Workshop

LA Convention Center, 150 BC

Come learn how math language routines simultaneously support sense making and language development. We'll experience these routines to see how mathematical ideas take shape through language, and look at student work to see how discourse can support understanding, and develop community, giving all students access to high-quality math instruction.

Elizabeth Ramirez, Illustrative Mathematics, Long Island City, New York

Vanessa Cerrahoglu, Orange County Department of Education, Huntington Beach, California

Jennifer Wilson, Illustrative Mathematics, Black Mountain, North Carolina

132 Ethnomodeling: Connecting Art, History, Culture, and Mathematical Modeling



8–10 Workshop

LA Convention Center, 403 A

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.

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

133 Nurturing Mathematical Identity and Agency: Empower and Engage Students



8–10 Workshop

LA Convention Center, 502 A

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.

Dewey Gottlieb, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; Hawaii Dept. of Education, Honolulu
Twitter: @dewgott

Yannabab Weiss, Waiakea High School, Desmos Studio, Hilo, Hawaii

Nikki H S Chiba, Chiefess Kamakaha Middle School, Lihue, Hawaii

134 Creating Discipline-Rich, Standards-Aligned End Products in Project-Based Learning



10–12 Workshop

LA Convention Center, 515 A

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.

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



Broaden the Purposes of Learning Mathematics



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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 get students to develop an understanding that goes beyond $y=mx+b$ and to 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

Twitter: @mathmedic

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



Coaches/Leaders/Teacher Educators Workshop
JW Marriott, Platinum HIJ

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!)



Coaches/Leaders/Teacher Educators 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: @kristenlmangus

140 Vamos A Jugar! Games for Your Elementary ELL Families



Coaches/Leaders/Teacher Educators 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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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: @Mathgarden

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: srrhod

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



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

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



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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



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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

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

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

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

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’Erasmus

Savvas Learning Company, Paramus, New Jersey

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

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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Position Assessment to Promote Equitable Practices and Support Student Learning



Reimagine the Role of Technology in Mathematics Education



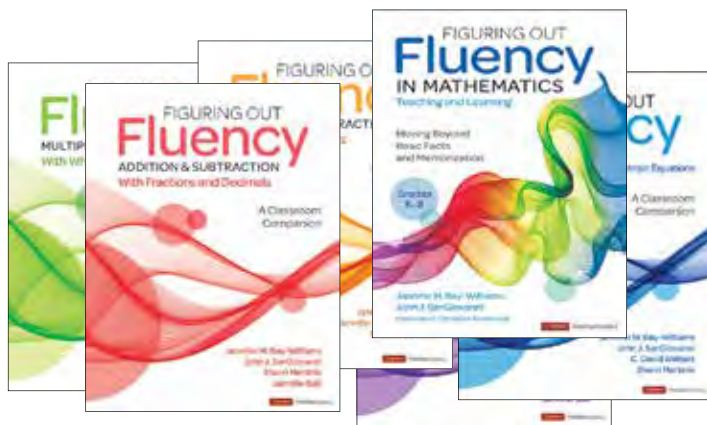
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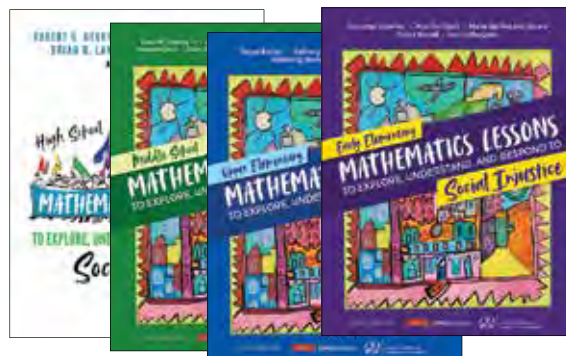
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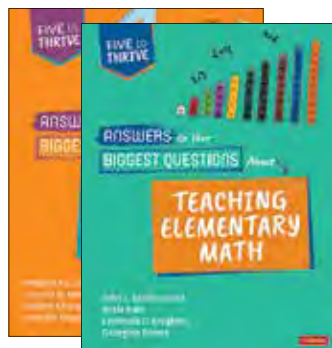
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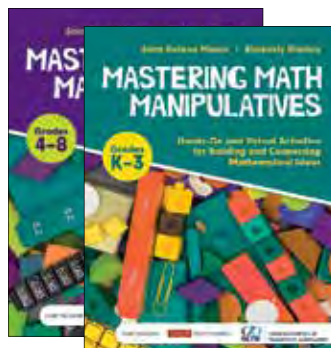
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ROSALBA SERRANO, SHERRI MARTINIE,
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Because fluency is so much more than
basic facts and algorithms
Grades K–8



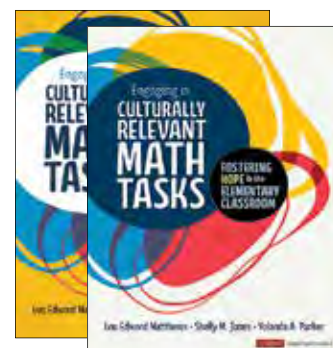
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Connect content to students' daily lives, fortify their mathematical
understanding, and expose them to issues that will support
them in becoming active citizens and leaders
Early Elementary, Upper Elementary, Middle School, High School



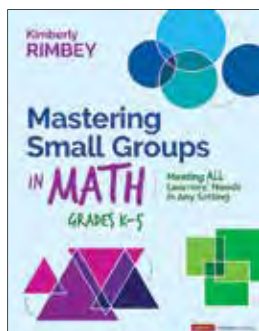
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ANDREA CHENG, JENNIFER OUTZS**
Actionable answers to your most pressing questions
about teaching elementary and secondary math
Elementary, Secondary



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



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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

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158 Counting Money: Making 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

159 The Importance of Productive Struggle for All Learners

 *PreK–2 Workshop*
LA Convention Center, 501 BC


Productive struggle is key to fostering a positive math identity which supports students to see math as useful and valuable. In this workshop, we explore the importance of productive struggle for *all* learners. Participants will examine their own beliefs about struggle and create rich tasks that promote productive struggle in their math classroom.

Katie Jacobsen, All Learners Network, Burlington, Vermont

Twitter: @katieajacobsen

DeVeau Sleeper, All Learners Network, Woodstock Elementary School, Vermont

160 What We're Learning to Ask about Weaving Mathematics and Equity during Classroom Talk: K–Grade 2


 *PreK–2 Workshop*
LA Convention Center, Petree C

During mathematics discussions, teachers weave student ideas into a mathematical story line while considering how to support each student's opportunity to learn. Participants will do math together and view video from primary grades to consider the challenges of managing these two commitments—to rigorous mathematics and to equitable participation.

Deborah Schifter, Education Development Center, Northampton, Massachusetts

Susan Jo Russell, TERC, Somerville, Massachusetts


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, Edmonton, 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 HIJ




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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- 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 be 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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170 Man-Made and Natural Disasters: Experimental Simulations for Algebra Classes



10–12 Workshop

LA Convention Center, 502 B

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.

Amy Herman, Math Solutions, Louisville, Kentucky

Connie Horgan, Self, Sun City West, Arizona

171 Mathematical Language Routines: Cultivating Conversation in High School Classrooms



10–12 Workshop

LA Convention Center, 402

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.

Vanessa Cerrahoglu, Orange County Department of Education, Huntington Beach, California

Twitter: @mymathsoul

Jennifer Wilson, Illustrative Mathematics, Black Mountain, North Carolina

Elizabeth Ramirez, Illustrative Mathematics, Long Island City, New York

172 Probability without Formulas



10–12 Workshop

LA Convention Center, 403 B

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.

Luke Wilcox, Kentwood Public Schools, Grand Rapids, Michigan

Twitter: @thstatsmedic

Lindsey Gallas, Math Medic, Caledonia, Michigan

173 A Systemic Approach to Access and Equity in Mathematics



Coaches/Leaders/Teacher Educators Workshop

LA Convention Center, 403 A

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.

Tonya Clarke, Clayton County Schools, Jonesboro, Georgia

Twitter: @clarkesgotclass

Charlene Matthew, Clayton County Schools, Jonesboro, Georgia

173.1 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

LA Convention Center, 153 BC

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.

Basil Conway, Columbus State University, Georgia

Katherine Hammonds, Columbus State University, Georgia

174 Step Up or Step Aside: Got Technology, Now What?



Coaches/Leaders/Teacher Educators Workshop

JW Marriott, Platinum C

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.

Tjuana Hinton, Baltimore County Public Schools, Maryland

Kisha Maynard, West Georgia Technical College, Newnan

Courtney Greene, Douglas County School System, Douglasville, Georgia



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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 Contreras 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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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: @mdsteele47

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: @mathapprentice_
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 at 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 is 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**
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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: @AAE_Math
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: jillkbroderick

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

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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

198 PLCs to Practice from Data to Action



Coaches/Leaders/Teacher Educators Burst

LA Convention Center, 308

Explore a variety of PLC protocols that will help you facilitate collaborative, equity-focused PLCs to make data-driven decisions. Participants will engage in high-quality instruction, scholar performance, scholar work and formative assessment protocols while developing actionable look-fors that affect instruction.

Marlena Sinclair, Pinellas County Schools, St Petersburg, Florida

Alfredo Blanco, Pinellas County Schools, St. Petersburg, Florida

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



Broaden the Purposes of Learning Mathematics



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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

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 Dyrdek'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.

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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Upcoming NCTM Events

ANNUAL MEETING



Washington, DC | Oct. 25–28

2023

Chicago, IL | Sept. 25–28

2024



REGIONAL CONFERENCES & EXPOSITIONS

Baltimore, MD | Nov. 30–Dec. 2

2022

2024

Seattle, WA | Feb. 7–9

VIRTUAL CONFERENCE

Virtual | Mar. 29–Apr. 1

2023



NATIONAL COUNCIL OF
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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: @gfletcher

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, Brainingcamp, 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, UCSB, Goleta, California

Tomy Nguyen, UCSB, Santa Barbara, California

Rachel Lambert, University of California Santa Barbara, Culver City

Avery McNiff, UCSB, Santa Barbara, California

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209 Lab Classrooms: Creating a Space for Immersive Learning in, from, and for Practice



3–5 Session

LA Convention Center, 151

Teaching and learning often happen in isolation. Teachers develop and refine their practices independently, and preservice teachers have limited day-to-day classroom experiences. To learn in, from, and for practice, we need to create laboratory spaces that provide opportunities for collaborative planning, teaching, and real-time coaching.

Kristin Gray, Amplify, New York, New York

Twitter: @MathMinds

Faith Muirhead, University of Delaware Professional Development Center for Educators, Newark

210 Look-Think-Talk: A Visual Mathematics Routine for Eliciting a Multiplicity of Student Thinking



3–5 Session

LA Convention Center, 407

Which is more? What patterns do you see? How many? Images of mathematics + juicy questions = Look-Think-Talk: a brief, inclusive everyday routine. Join the Multiplicity Lab team as we try this routine together, pose seven big questions to kick-start mathematical discussion in any grade, and share hundreds of activities you can use with your students.

Jen Munson, Northwestern University, Evanston, Illinois

Sarah Larison, Northwestern University, Chicago, Illinois

Mari Altshuler, University of Illinois at Urbana-Champaign, Chicago, Illinois

211 Is Percent A Problem? Let's Talk Decimals, Fractions, and Percentages



6–8 Session

LA Convention Center, 306

Join us to explore engaging and effective intervention strategies to help students from all backgrounds progress from decimals, fractions benchmarks, to percentages. Learn how to develop students' percentage fluency through numeracy routines and strategies that capitalize on their previous math experiences to promote depth and conceptual understanding.

Shaneka Thomas, Vontoure Learning, LLC, Humble, Texas
Twitter: @ShanekaRichard7

Dana Enriquez-Vontoure, Vontoure Learning, LLC, Humble, Texas

Shana Swain, Vontoure Learning, LLC, Humble, Texas

212 Math Games: No, Seriously . . . These are Games: Winners and Learners



6–8 Session

LA Convention Center, 501 A

Connecting the Eight Math Practices to learning through playing games is the objective of this session. These teacher-created games are made to be used in a large classroom setting or online to provide all students with a fun and creative way to review and reinforce math concepts previously taught. Each game focuses on one of the Math Practices.

Susan Chadaz, Box Elder School District, Tremonton, Utah

213 The Tortoise and the Hare: How Math Class Missed the Moral and What We Can Do about It



6–8 Session

JW Marriott, Platinum E

How does this story of the tortoise and hare affect the story of our students and their identity in math class? We'll explore the two systems for thinking in the brain and practical classroom lessons that not only help you find the right balance in your program but also help your students rewrite their own unique story.

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

Twitter: @mathletepearce

Jon Orr, Lambton Kent District School Board, Chatham, Ontario, Canada

214 Using Representations as a Tool for Sense Making and Justification in High School Algebra



10–12 Session

JW Marriott, Platinum D

All students, especially ELLs, benefit from the use of personal representations as tools for sense making during their initial engagement in cognitively demanding tasks. They also use representations as tools for explanation, justification, and proof along a continuum of deepening mathematical understanding and more precise use of language.

Scott Hendrickson, Mathematics Vision Project, St. George, Utah

Twitter: @scottmvpmath



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215 Access and Equity for Struggling Students: What All Teachers Should Know about Math LD/Dyscalculia



Coaches/Leaders/Teacher Educators Session
LA Convention Center, 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



Coaches/Leaders/Teacher Educators Session
LA Convention Center, 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: @TMus_Ed

Naomi Church, Growing Minds Consulting, LLC, Deerfield Beach, Florida

217 President Series: STEM-ifying the Beauty of Mathematics



Coaches/Leaders/Teacher Educators Session
LA Convention Center, 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



General Interest Session
LA Convention Center, 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: drtedcoe

Shelbi Cole, Bold Math Moves Educational Consulting, LLC, Trinity, Florida

219 Supporting Students' Meaningful Active Learning of Mathematics



General Interest Session
LA Convention Center, 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



General Interest Session
LA Convention Center, 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

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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



Make the most of your membership by downloading the NCTM app! Learn more at nctm.org/confapp.

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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



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


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 Milvidsaia, 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 Sgroi, 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 Murawska, Skokie/Morton Grove School District 69, Illinois
 Twitter: @murawskamath

Sean Nank, California State University San Marcos, Carlsbad



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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



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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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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: @drsoco17

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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.

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



PreK–2 Workshop

JW Marriott, Platinum HIJ

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: @teedjvt

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

Kyndall Brown, Board of Directors, National Council of Teachers of Mathematics, Reston, Virginia; University of California, Los Angeles



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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

Twitter: @strongermath

Justin Aion, Aionized 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

Twitter: @lbrookepowers

Morgan Stipe, Open Up Resources, Carroll, Iowa

266 Jumping through the Math and Science Practices in an Interdisciplinary Investigation of Crickets



8–10 Workshop

LA Convention Center, 501 BC

Engage in an inquiry, enhanced by interdisciplinary connections, that focuses on discovering and modeling the relationship between the rate at which crickets chirp and ambient temperature. Using recordings of crickets in different conditions, participants play an authentic role as a scientist analyzing data and representing it mathematically.

Kim Krusen McComas, University of Arkansas, Fayetteville

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

Twitter: AlineAbassian

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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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 CadwalladerOlsker, 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: Jill Jacobs

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 SISTEMIC 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: Andrew Lazowski

Kristin Rainville, Sacred Heart University, Fairfield, Connecticut

Bonnie Maur, Sacred Heart University, Fairfield, Connecticut

Mark Beekey, Sacred Heart University, Fairfield, Connecticut



Download Speaker Handouts!

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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 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)

VIRTUAL

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Focused Workshop
Delivered Virtually

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1/2-5 DAYS

Focused Workshop

STANDARD

2-3 DAYS

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Article/Book
Admin Consultation

PREMIUM

4-5 DAYS

Focused Workshop
Article/Book
Admin Consultation
Follow-Up

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



Professional Development

| PROFESSIONAL SERVICES



274 Miscues 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 miscues 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: @saradelanomooore

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: @rrmann967

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: Eboney McKinney

Laurel Cherry, AZ Dept. of Education, K12 Academic Standards, Phoenix, Arizona



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Reimagine the Role of Technology in Mathematics Education



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288 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 (JREL) 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.



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289 Redefining Efficiency to Disrupt Marginalization

General Interest Session



LA Convention Center, 411

How do we position students as powerful mathematical thinkers despite pressures to categorize students and their ideas as either “efficient” or “inefficient”? Join us for a scintillating conversation around empowering students.

Berkeley Everett, Berkeley Everett, Glendale, California
Twitter: @berkeleyeverett

Jennifer Hagman, UCLA Mathematics Project, Redlands, California

290 Strength in Numbers: Connecting Social Emotional Learning and Math



General Interest Session

JW Marriott, Platinum E

Without strong social and emotional skills, students really struggle in math class. Building strong SEL skills helps students develop their self-awareness and make sense of mathematics. You will learn strategies that can be immediately implemented to lower math anxiety and approach problem solving and mistakes with confidence and a growth mindset.

Alex Kajitani, California Teacher of the Year, Carlsbad
Twitter: @AlexKajitani

291 Your Wellness Story: Living Your Best Life as a Mathematics Teacher!



General Interest Session

LA Convention Center, 151

Based on Dr. Kanold’s 2022 book, *Educator Wellness*, this session recognizes that we work and live within a profession of emotional labor. New or veteran teachers of mathematics are not immune from the emotional exhaustion and prolonged stress of a school year. How do we take care of ourselves and maximize our impact every day? Let’s find out!

Timothy Kanold, Solution Tree, Lodi, California
Twitter: Timothy Kanold

291.1 Every Step Counts: Getting Visibility into Your Students’ Thinking with Mathspace



6–8 Exhibitor Workshop



LA Convention Center, 510

Math is so much more than right and wrong. Get a peak into your students’ process with Mathspace, whose StepSmart technology provides unparalleled visibility into student thinking, and provides unique insights to allow you, the teacher, to be the right help at the right time, for every student.

Mathspace, New York, New York

291.2 One Problem, Many Approaches to Designing Your Lesson



3–5 Exhibitor Workshop



LA Convention Center, 513

Learn how to create and modify an opening task to reach a broad range of learners. This session focuses on striking the right balance between structure and struggle. We help teachers prioritize critical thinking, communication, curiosity and creativity to achieve high impact results.

Think! Mathematics, Neptune Beach, Florida

291.3 Playing with Quadratics in Standard Form & Other Curiosities



10–12 Exhibitor Workshop



LA Convention Center, 514

How can we engage our students in the beauty and wonder of mathematics? Often, we explore math in unusual places. But what about the puzzles that lie within mathematics itself? Come dive into interesting relationships within the world of Quadratics.

Texas Instruments, Sachse, Texas

291.4 Teaching Problem Solving to ALL Students



3–5 Exhibitor Workshop



LA Convention Center, Exhibit Hall 1

Teaching students to reason and problem solve is the cornerstone of quality math instruction. This session will highlight several engaging strategies such as Three Reads, Numberless Word Problems, and more that will provide multiple entry points for all students to engage in the math and ignite a passion for problem solving in your classroom!

STEMscopes, Houston, Texas

291.5 Moving Towards Mastery: Why High-Quality Tasks Aren’t Enough



3–5 Exhibitor Workshop



LA Convention Center, 512

High quality tasks lay the foundation for success through productive struggle. Are the tasks themselves enough to move students towards mastery? Join author Jessica Kaminski (Primary Math 2022) to learn to build on this solid foundation using carefully sequenced problems that provide mathematical and perceptual variation to extend each standard.

Marshall Cavendish Education, Rye Brook, New York



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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 HIJ

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










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

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- 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 Bargagliotti, Loyola Marymount University, Manhattan Beach, California
- 299** First-Year Teachers-Researcher Partnership to Humanize Math Instruction through Restorative Justice
 *General Interest Burst*
 LA Convention Center, 515 A
 This session shares the experiences and successful strategies developed by five first-year teachers partnered with a researcher to implement a developing framework that bridges Restorative Justice and Cognitively Guided Instruction in Mathematics in the effort to craft a math teaching practice that centers anti-racism, healing, relationships, and joy.
Shanté Stuart McQueen, Portland State University, Beaverton, Oregon
 Twitter: SStuartMcQueen
- 300** NCTM's Resources for the High School Classroom
General Interest Burst
 LA Convention Center, 408 A
 As busy teachers, it can be hard to find the best resources for your classroom. 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 high school classroom.
Jayne Lorenz, National Council of Teachers of Mathematics, Reston, Virginia

- 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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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: @atrantham
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 Vilalta, 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



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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: Lloyd Jones

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.

Jededyiah Williams, Nantucket High School, Massachusetts
Twitter: @jededyiah

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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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: @swirlgirl31415



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

- 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

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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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



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

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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330 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


331 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


332 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


333 Creating LGBTQ+ Affirming Mathematics Classrooms

 *8–10 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


334 Turner's Graph of the Week

 *8–10 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, Saddleback Valley Unified School District, Mission Viejo, California

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

 *8–10 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

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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

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

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

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



Coaches/Leaders/Teacher Educators Workshop

JW Marriott, Platinum HIJ

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



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.

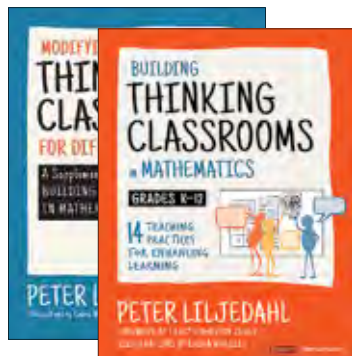
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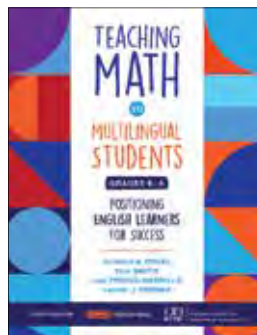
Visit booth
#327



PETER LJLJEDAH

14 optimal practices for thinking that create an ideal setting for deep mathematics learning to occur

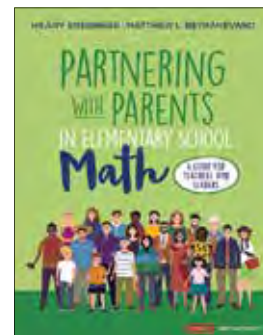
Grades K-12



**KATHRYN B. CHVAL, ERIN SMITH,
LINA TRIGOSO-CARRILLO, RACHEL J. PINNOW**

Strengths-based approaches to support multilingual students' development in mathematics

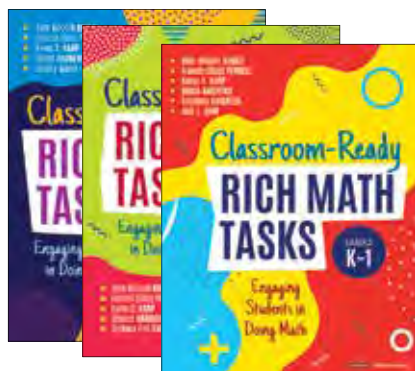
Grades K-5



**HILARY KREISBERG,
MATTHEW L. BEYRANEVAND**

Guidance on building productive relationships with families about math education

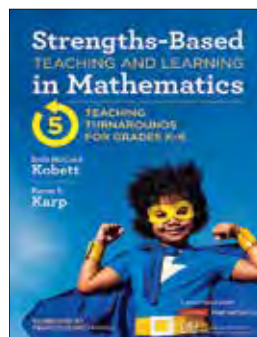
Grades K-5



**BETH MCCORD KOBETT, FRANCIS (SKIP) FENNELL,
KAREN S. KARP, DELISE ANDREWS,
LATRENDIA KNIGHTEN, JEFF SHIH, DESIREE HARRISON,
BARBARA ANN SWARTZ, SORSHA-MARIA T. MULROE**

Detailed plans for helping elementary students experience deep mathematical learning

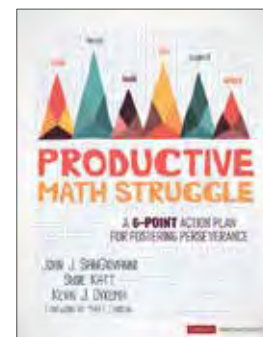
Grades K-1, 2-3, 4-5



**BETH MCCORD KOBETT,
KAREN S. KARP**

Your game plan for unlocking mathematics by focusing on students' strengths

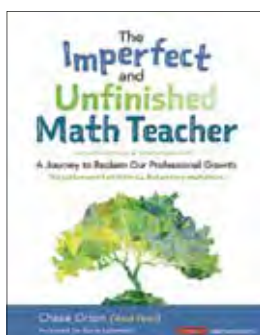
Grades K-6



**JOHN J. SANGIOVANNI,
SUSIE KATT, KEVIN J. DYKEMA**

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

Grades K-12



CHASE ORTON

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

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\$300 Corwin Math
Library at booth #327**

corwin.com/math

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—YES! 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



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


- 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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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: @gpicha

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

JW 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: @CLL2718

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 (AMC) 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 Goerig



PreK-2 Exhibitor Workshop



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

354.3 Financial Algebra: Building Confidence, Competence, & Interest in Math Through Financial Application



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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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

Naehee Kwun, 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 1?” 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: Shayna Kalnitsky








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

-  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

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.

Philip Dituri, Financial Life Cycle Education / Dituri Consulting, Brooklyn, New York
Twitter: @phildituri

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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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 harnesses 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: @thewordninja_bk

Elizabeth Thoren, Pepperdine University, Malibu, California

Vanessa Hernandez, California State University Long Beach, California



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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: @wgmcallum

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. Hopkins, 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: UCLACurtisCtr

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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376 Connecting Mathematics to the World: Opening Doors for Students*10–12 Session*

JW Marriott, Georgia

Mathematics is a fascinating discipline but often does not resonate with students. Activities that involve real data and real contexts from analyzing climate change to herd immunity can engage more students in doing more mathematics. Let's shift to a new normal, helping students understand that mathematics is a tool for understanding the world.

Thomas Dick, Oregon State University, Corvallis

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

377 From Trauma to Triumph: My Journey Toward an Unknown Destination*Coaches/Leaders/Teacher Educators Session*

LA Convention Center, Petree D

Difficulties in your life come to reveal your purpose and to help you realize your hidden potential and power. Join Jordan as he takes you on a journey from his early beginnings as a sports statistics aficionado to being pushed out of math in high school and all stops along the way to his current work supporting mathematics learning for educators.

Jordan Rappaport, York Region District School Board, Thornhill

Twitter: @JRappaport27

378 We Need More Math Teachers! Changing the Narrative about Mathematics Teaching as a Career*Coaches/Leaders/Teacher Educators Session*

LA Convention Center, 405

The United States faces a serious shortage of mathematics teachers, due in part to an inaccurate narrative about the profession. This session addresses common misperceptions using data about salary, benefits, diversity, and career satisfaction developed by Get the Facts Out, a national project encompassing multiple STEM organizations.

W Gary Martin, Auburn University, Alabama**Tim Hendrix**, Meredith College, Raleigh, North Carolina**Jean Lee**, University of Indianapolis**Amy McDuffie**, Washington State University, Pullman**Glenn Waddell**, University of Nevada, Reno**379** Culturally and Linguistically Sustaining Mathematics Instruction through My Name, My Identity*General Interest Session*

JW Marriott, Platinum FG

My Name, My Identity centers on cultivating beliefs and mindsets that promote asset-based approaches to equitable math teaching and learning. Tasks co-created by teachers in K–12 will be shared to build student agency as doers of math and support the importance of name, self-identity, and the positive impact they can make on the community.

Ma Bernadette Salgarino, Santa Clara County Office of Education, San Jose, California

Twitter: @salg274

Sandhya Raman, Berryessa Union School District, San Jose, California

Danielle Letts, Alum Rock Union School District, San Jose, California

380 Five Struggles Your Foster Students Wished You Knew*General Interest Session*

LA Convention Center, 306

Foster youth are among the lowest-performing subgroups, yet educators know very little about their experiences or how to support them. We'll try to fill in the gaps by sharing stories from our years spent in foster care to give you actionable tips you can use to support the students who need you the most.

Robert Kaplinsky, robertkaplinsky.com, Long Beach, California

Twitter: @robertkaplinsky

381 Sharing The Mathematical Journey: A Travel Opportunity . . . to Greece!*General Interest Session*








JW Marriott, Platinum D

We share the story of a memorable 2018 trip to Greece with students—to Athens, Samos, and the Peloponnese (Mycenae, Epidaurus, Olympia, Katakolo, and Corinth). We'll trace the mathematical history of one theorem linking Greece, France, Japan, and the United States. Attendees learn how to create a math trail and also how to create a trip for themselves and students.

Brent Ferguson, Princeton Day School, New Jersey

Twitter: @BAFerg

Ron Lancaster, University of Toronto, Hamilton**Doug Piper**, The Lawrenceville School, New Jersey

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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: @dcrescitelli
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!

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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 HIJ

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 insight 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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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, Saskatoon 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

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Visit nctm.org/speak/dc2023 to submit a proposal.

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2023
**ANNUAL MEETING
& EXPOSITION**

Oct. 25-28, Washington, DC

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

Twitter: @AlohaCory

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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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

-  Broaden the Purposes of Learning Mathematics
-  Create Equitable and Anti-Racist Structures in Schools and Systems
-  Develop Deep Mathematical Understanding
-  Implement Equitable Mathematics Instruction
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-  Reimagine the Role of Technology in Mathematics Education
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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
Seanyelle 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: @lindsayanngold

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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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 M Jutila

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 Hoffmeyer, 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!**

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417 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: @kristincrosby

Gina Picha, None, Austin, Texas

418 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: @denisetrakas

Stephanie Vega, Washoe County School District, Reno, Nevada

419 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

420 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

421 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

422 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



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


423 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


424 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


425 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

426 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

427 Points of View: Making Space for Wonder, Joy, and Deeper Understanding in Mathematics

General Interest Session
 LA Convention Center, Hall B
 Beyond teaching math skills, we have a role as teachers of mathematics to open students up to joy and wonder to be found in thinking well. One of the best ways that happens in mathematics is the mental connections made when grasping an idea from multiple perspectives. These aha moments provide opportunities for delight.
Francis Su, Harvey Mudd College, Claremont, California
 Twitter: @mathyawp

427.1 Data Science in Middle and High Schools: A Real Modern Approach

General Interest Session
 LA Convention Center, 151
 The data revolution is here. This panel of speakers will consider and discuss what is needed to revolutionize students' access to learning with and from data about their world. This session will include ideas and examples from ongoing efforts as well as provide an opportunity for audience engagement around this critical issue.
Hollylynn S. Lee, North Carolina State University, Durham
 Twitter: @hollylynnester
Christine Franklin, American Statistical Association, Alexandria, Virginia
Anna Emilia Bargagliotti, Loyola Marymount University, Los Angeles, California
Susan Peters, University of Louisville, Kentucky
Mahmoud Harding, North Carolina School of Science and Mathematics, Cary
Marc Buchanan, Montclair High School, Chaffey Joint Union High School District, California

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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.

Seanyelle 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

- 435**  **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

- 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

- 437**  **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.
Micheal Marsh, CPM Educational Program, Los Angeles, California

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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 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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- 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 interrogating and 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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452 Developing Ideas of Length in PK–Grade 2: Ideas and Activities



PreK–2 Burst

LA Convention Center, Petree C

This session will share a variety of hands-on measurement activities that can be used to support the development of linear measurement in the early primary grades. These activities will be accompanied by a proposed sequence of measurement experiences that can be applied to linear measurement as well as to other measurement attributes.

Andrew Tyminski, Clemson University, South Carolina
Twitter: @DrAndyT

Signe Kastberg, Purdue University, West Lafayette, Indiana
Amber Simpson, Binghamton University, New York

453 Developing Student Agency through Social Justice Tasks



3–5 Burst

LA Convention Center, 403 A

Are your students uninterested in math? Social justice tasks develop students' sense of advocacy and ability to use mathematics to make informed decisions and make the world a better place. In this session, we will investigate the qualities of a meaningful social justice task, how to elicit student thinking, and ways to connect context and content.

Ashley Schmidt, University of Central Florida, Orlando
Twitter: @aschmidt0089

Tandrea Fulton, University of Central Florida, Sanford

454 Relationships Matter: Using the Buddy-Up Routine to Foster Safe Mathematics Learning Environments



6–8 Burst

LA Convention Center, 501 BC

Establishing positive interpersonal relationships among students in math class can be an effective way to lower stress and increase agency. The Buddy-Up routine facilitates the building of such relationships by creating long-term partnerships in math class that feel familiar and safe when students grapple with and discuss mathematical ideas.

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

LA Convention Center, 515A

What do data scientists do and what processes and dispositions can be developed in K–12 math? Whether your state is considering high school pathways in data science, looking to modernize math content across K–12, or integrate data literacy across the curriculum, this session will provide ways to support student learning through and with data.

Hollylynne Lee, NC State University, Raleigh, North Carolina
Twitter: @hollylynvester

Gemma Mojica, NC State University, Raleigh, North Carolina

456 Creating and Sustaining a Free Mathematics Conference to Empower Educators



General Interest Burst

LA Convention Center, 502 A

Interested in running a sustainable in-person or virtual conference for educators in your district or region at no cost? In this session, you will hear about our six-year journey in creating the NYS Southern Tier Math Conference and how we collaborated with outside organizations to provide an equitable learning experience for more than 200 people!

Cody Osterhout, Broome-Tioga BOCES, Binghamton, New York

Twitter: @CodeRedMath

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

LA Convention Center, 502 B

Is a tuna melt actually a pizza? Is a loaf of bread a sandwich? Is a book just a paper taco? This session will introduce participants to the “sandwich chat,” a model for debate in the math classroom that teachers can use throughout the year while exploring mathematical concepts.

Justin Aion, Environmental Charter School, Greensburg, Pennsylvania

Twitter: @justinaion

Shelby Strong, Stronger Math, LLC, Gretna, Louisiana

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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.



-  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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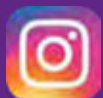
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Affiliate Information

Join an NCTM Affiliate Today

Once you have joined NCTM, membership in an NCTM Affiliate is a terrific way to round out your professional involvement. Affiliates offer an opportunity to link with teachers in your state, region, or city for support, professional development opportunities, community outreach, political advocacy, and information sharing.

The Host Affiliates for this conference and the Affiliates-at-Large appear below. To join one of these organizations, email the Affiliate contact for membership information. NCTM has more than 135 Affiliates throughout the United States and Canada. For a list of all organizations affiliated with NCTM and information on how to join, visit the Affiliate Directory at nctm.org/Affiliates/Directory.

Affiliates-at-Large

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Cynthia Bell, cynthiab@lacnyc.org

Association of Mathematics Teacher Educators

Lisa Poling, polingll@appstate.edu

Association of State Supervisors of Mathematics

Paula Moeller, paulam@camtonline.org

Benjamin Banneker Association, Inc.

Kyndall Brown, kbrown@gseis.ucla.edu

Council of Presidential Awardees in Mathematics

Lisa Conzemius, zemilarson@gmail.com

NCSM

Kristine Cunningham, kcunningham@phoenixunion.org

North American Study Group on Ethnomathematics

Chadd McGlone, cwmcglone@yahoo.com

Society of Elementary Presidential Awardees

Conni Crittenden, crittec@gmail.com

TODOS: Mathematics for ALL

Linda Fulmore, lmfulmore@yahoo.com

Women and Mathematics Education

Patricia Frey, frey@aol.com

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.

To learn more about NCTM products or services, including membership benefits and opportunities, visit www.nctm.org, e-mail nctm@nctm.org, or call (800) 235-7566.

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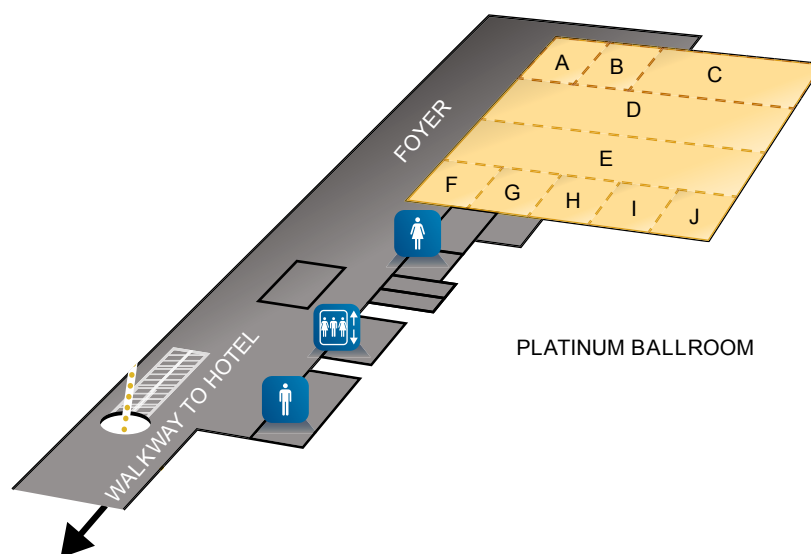
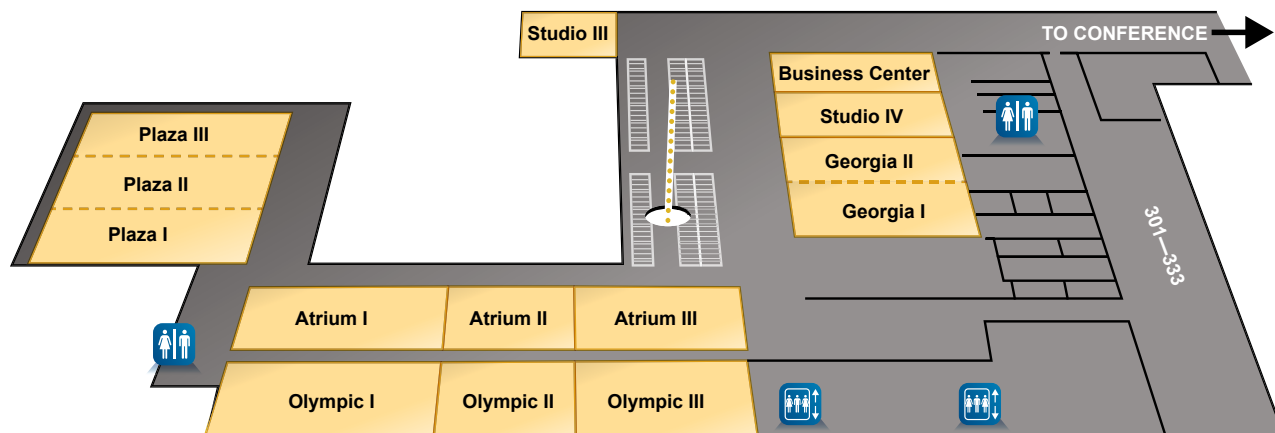
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Floor Plans

JW MARRIOTT LOS ANGELES L.A. LIVE



Floor Plans



Floor Plans



LEVEL ONE

- Exhibit Space
- Pre-function/Registration
- Show Offices
- Restaurant/Concessions
- Business Service Center
- FD** Freight Door
- FE** Freight Elevator
- PE** Passenger Elevator

- M** Men's Restroom
- W** Women's Restroom
- AG** All Gender Restroom
- E** Escalator
- G** Groundwork
- A** ATM
- Column
- +** First Aid/Lactation Room



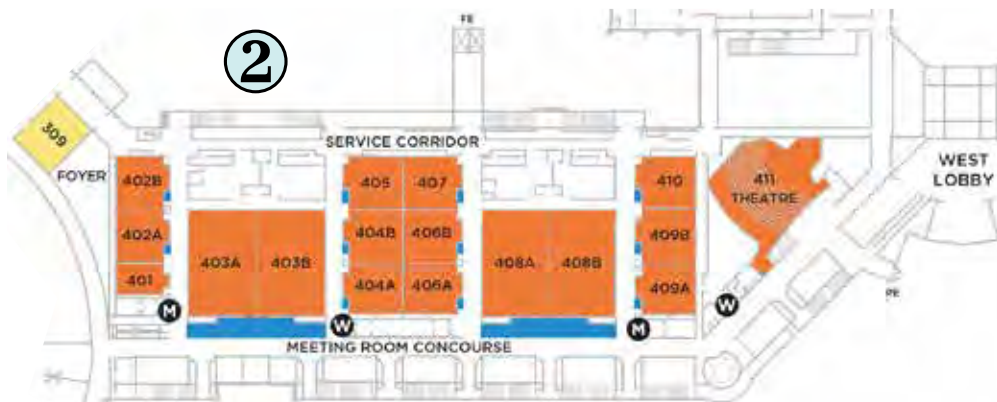
Floor Plans



Los Angeles
CONVENTION CENTER

Managed By AEG

LEVEL TWO

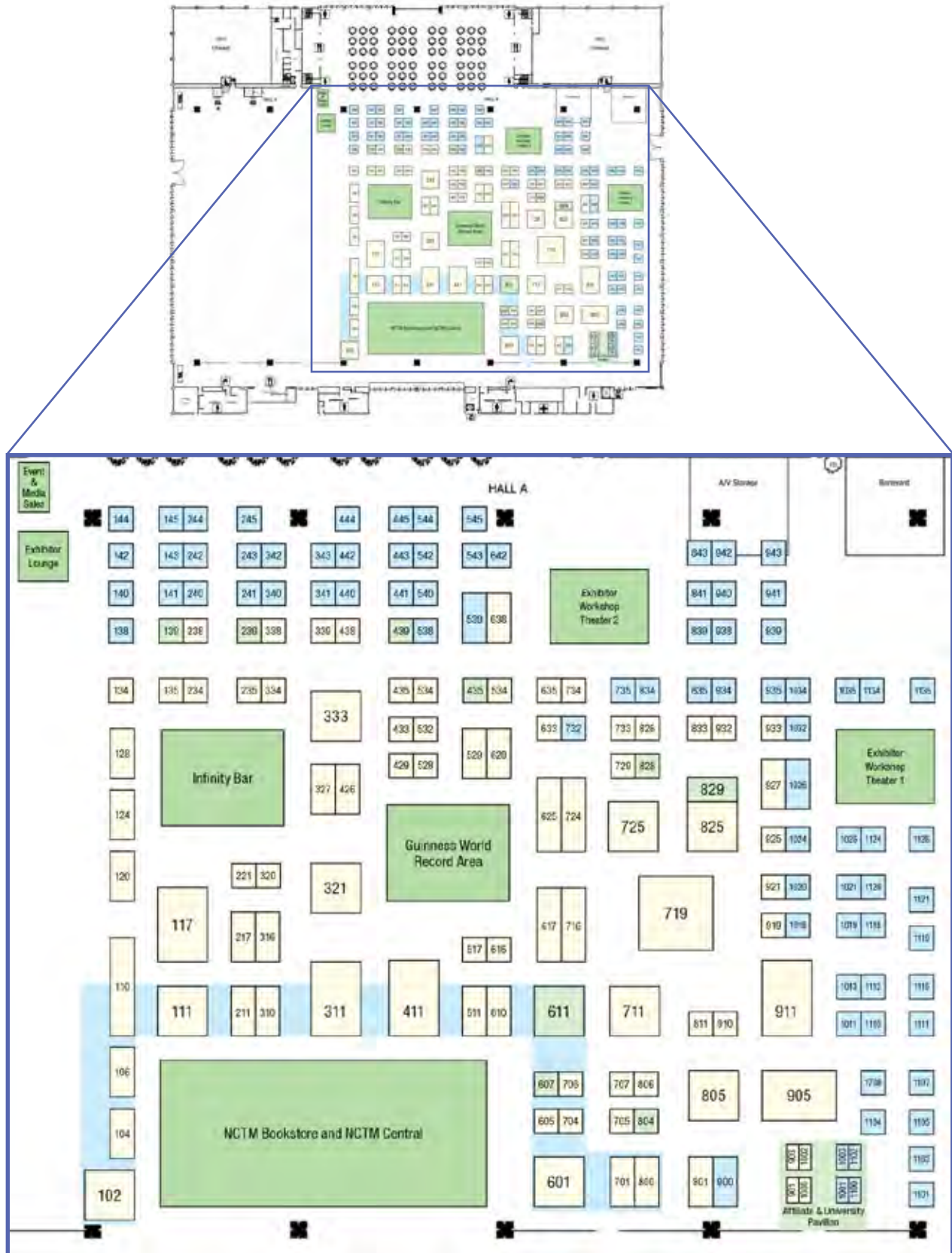


LEVEL TWO MEETING ROOMS

- West Hall Meeting Rooms
- Concourse Meeting Rooms
- South Hall Meeting Rooms
- Pre-function/Registration
- Show Offices
- FD** Freight Door
- FE** Freight Elevator
- PE** Passenger Elevator
- M** Men's Restroom
- W** Women's Restroom
- AG** All Gender Restroom
- Column



Floor Plans



Exhibitor Directory

ADAPTA Education

Booth 734

Bend, IN

adaptaeducation.com

Age of Learning, Inc.

Booth 801

Glendale, CA

ageoflearning.com/schools/mymathacademy/

At Age of Learning, we help educators reimagine education by delivering personalized, equitable instruction that accelerates achievement. Our school solutions are designed to enable every student to achieve mastery through a holistic approach that supports child learning and development. Our groundbreaking solution My Math Academy, for pre-K through 2nd grade, blends the research behind how children learn with game-based instruction, adaptive practice, and ongoing feedback.

Alef Education

Booth 532

Ashburn, VA

alefeducation.com/

AlgebraKiT

Booth 706

Sterling, VA

Almost Fun

Booth 635

New York, NY

almostfun.org

Amplify

Booth 117

Brooklyn, NY

amplify.com/math

Desmos Classroom lessons surface student thinking and spark interesting and productive discussions. Start teaching today by registering for free at teacher.desmos.com. Visit with us for demos, to learn more about the platform, lesson building tools, and interactive lessons. The Grade 6-Algebra 1 core curriculum is available now and we are currently hard at work creating Amplify Math + Desmos Classroom, the most engaging core program based on Illustrative Mathematics' IM K–12 Math™. amplify.com/math

Be An Actuary

Booth 633

Schaumburg, IL

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.

Bedford, Freeman & Worth Publishers

Booth 921

Hamilton, NJ

bfwpub.com/high-school/us

Bedford, Freeman & Worth (BFW) Publishers is your trusted source for innovative high school mathematics resources. We're the standard in High School Statistics, publishing the best-selling The Practice of Statistics program for AP® Statistics, along with the leading on-level options for Statistics! For AP® Calculus we publish the 100% CED Aligned, Sullivan/Miranda's Calculus for AP® 3e. We have unmatched resources, online homework, and accessible e-books. Stop our booth for a sample or demo.

Benjamin Banneker Association, Inc.

Booth 1000

Richmond, VA

bbamath.org

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.

Big Ideas Learning

Booth 102

Erie, PA

bigideaslearning.com/

Big Ideas Learning publishes content-rich educational programs that provide a cohesive, coherent, and rigorous mathematics curriculum to empower teachers and support student learning from kindergarten through high school. From the instructional design to the flexible technology, these programs are intentionally created to inspire confidence in both teachers and students to achieve success in math. Big Ideas Learning partners exclusively with National Geographic Learning.

BirdBrain Technologies

Booth 438

Pittsburgh, PA

birdbraintechnologies.com/

BirdBrain Technologies cultivates creativity and makes abstract concepts hands-on by designing flexible and inspiring classroom tools: the Finch Robot, the Hummingbird Robotics Kit, and the new Owlet Math Tools collection for K-5.

Box Cars & One-Eyed Jacks Inc

Booth 919

Edmonton, AB

boxcarsandoneeyedjacks.com

Box Cars and One-Eyed Jacks is the leader when it comes to math games. All of our award winning K - 10 resources are correlated to the common core standards and are used across the country. We are one of the leading suppliers of dice, cards, dominoes and other math manipulatives. The Box Cars consulting team provides the best hands-on training in the country when it comes to games as a teaching strategy. We offer half, full and intensive school wide trainings.

Brainiaccamp LLC

Booth 925

Austin, TX

brainiaccamp.com

Exhibitor Directory

Brilliant For Educators

Booth 932

San Francisco, CA

Brilliant is on a mission to inspire and support students to achieve their goals in STEM – we enable great teachers to illuminate the soul of math, science, and computer science through interactive learning experiences. With over 60 courses spanning topics from foundational math to quantum computing, our content explores the laws that shape our world. Our Brilliant for Educators program allows you to bring the full Brilliant experience into your in-person or remote classrooms for free!

Capture Thought

Booth 634

San Juan Capistrano, CA

capturethought.com

The story of Capture Thought begins with a desire to give my students a more authentic way to demonstrate their knowledge. Frustrated by grading papers and not being able to see my students explain their thinking, I knew there had to be a better way for them to communicate their understanding. Capture Thought allows for authentic assessment to happen because it uses any smartphone to record student thinking. It's lightweight, folds flat, and fits inside any standard 3-ring binder.

Carnegie Learning

Booth 333

Pittsburgh, PA

carnegielearning.com

Born from more than 30 years of learning science research at Carnegie Mellon University, the company is a recognized leader in the ed tech space, using artificial intelligence, formative assessment, and adaptive learning to deliver groundbreaking solutions to education's toughest challenges. With high-quality offerings for K-12 math, literacy, world languages, computer science, professional learning, and tutoring, Carnegie Learning creates powerful results for teachers and students alike.

Casio America, Inc.

Booth 628

Dover, NJ

casio.com

CASIO® has a full line of calculators for every level of education. As a leading producer of graphing, scientific and basic calculators, CASIO calculators are easy-to-use and their time-saving operation makes it easier for students to learn. CASIO also provides calculator emulators, print materials and professional development for a total math solution. To see the full line of easy-to-use, cost-savings CASIO Calculators, visit: www.casioeducation.com.

Catherine Fosnot & Associates: New Perspectives

Booth 128

New London, CT

NewPerspectivesOnLearning.com

New Perspectives now offers a full core k-5 program with 10 units per grade, an online professional learning and support system for teachers, and a related formative assessment tool. We also offer on-site support for coaches and teachers in the form of in-class work, learning communities, and workshops. Come to the booth for a preview of all of our new units and online tools and see what curriculum for the 21st century can look like.

Center for Education in Mathematics and Computing (CEMC) 200

Booth 235

Waterloo, ON

uwaterloo.ca

Center for Mathematics and Teaching, Inc.

Booth 811

Redondo Beach, CA

mathandteaching.org

Transition to the Common Core with the Center For Mathematics and Teaching. We provide engaging, student-centered programs for middle school students and professional development for teachers.

Clark County School District

Booth 234

Las Vegas, NV

teachvegas.ccsd.net/

Clark County School District in Las Vegas, Nevada

Cognitive Surplus

Booth 729

Redmond, OR

cognitive-surplus.com

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 Learningplus, 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.

Exhibitor Directory

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

eaiducation.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

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.

Innovamat

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

Morrestown, 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.

Exhibitor Directory

Learn Fresh

Booth 704

Philadelphia, PA

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.

Legends of Learning

Booth 426

Washington, DC

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

mceducation.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 Communities

Booth 535

San Jose, CA

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.

Math Wiz Flashcards

Booth 221

Green Valley, AZ

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.

MATHCOUNTS Foundation

Booth 435

Alexandria, VA

mathcounts.org

MATHCOUNTS provides fun and engaging programs for 6th, 7th and 8th grade students. Through 3 programs—the MATHCOUNTS Competition Series, the National Math Club and the Math Video Challenge—we strive to foster talent, curiosity and a love of math in all students. Stop by the MATHCOUNTS booth to register for the National Math Club for free!

MATHLOVE Inc

Booth 517

Seocho-gu, Seoul

MathLove is a Korea manufacturer of innovative, hands-on math educational products trusted by teachers and parents and loved by students. Our 200+ high-quality products are sold in Republic of Korea, serving children and their families, preschool, primary, middle and high-school markets.

Mathspace

Booth 529

New York, NY

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

MathWorks Math Modeling Challenge, a program of SIAM

Booth 804

Philadelphia, PA

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 14 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

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.

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: rosenthalprize.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.

Origo 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.

Exhibitor Directory

The Markerboard People

Booth 616

Lansing, MI

dryerase.com

Student dry erase markerboards and response boards in class sets. Great for instant response and instant assessment. Unbeatable prices! Single- and double-sided available. Perfect for math, science, language arts, graphing, handwriting and more. Long-lasting, non-toxic, ultra-low odor markers too!

The Math Learning Center

Booth 111

Salem, OR

mathlearningcenter.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

methodology.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.

TODOS: 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 and 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!

MTLT Studio

INCREASING
Multilingual Learners'

ney:

Learning Trajectories for Vertical Coherence

Three learning trajectories and their connections show how to promote vertical coherence in PK–22 mathematics education.

Jessie Conroy, Meetal Shah, and Alan Maloney

Although standards are essential in identifying what topics to teach and when to teach them, they often provide little insight into how to teach those topics. Learning trajectories (LTs) are empirically grounded descriptions of how students' reasoning evolves from less sophisticated to more sophisticated. They can provide deep insight into how students' reasoning evolves during a single class session, across a semester, or over a longer period of time. Research on LTs has shown that they can be used to inform instruction and to develop assessment tools.

crack eggs my very own self? How could she ever learn to crack an egg properly if I rubbed her of every single opportunity to try it herself? I stand, how many



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5-8

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of personal power in the classroom to
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learning experience.

by
e Baker, Scott A. Morrison, and Mirela



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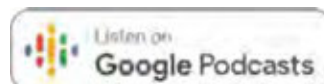
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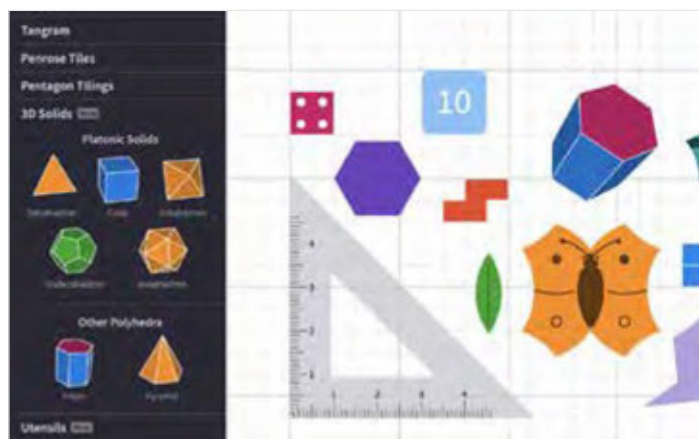
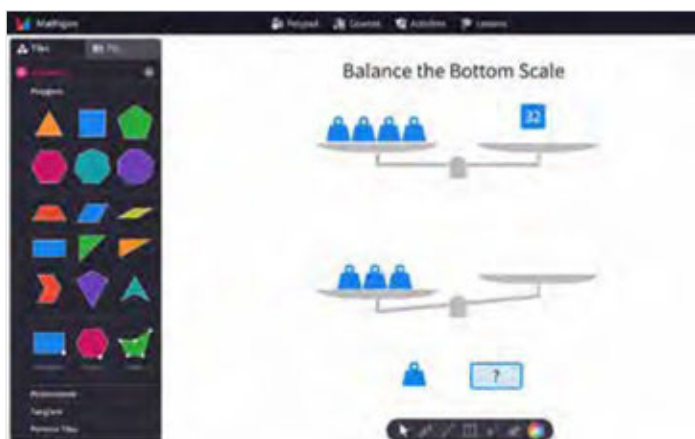
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