

# Community Math Nights

*Engaging Families for Math Success in Elementary School*

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Promising Math 2019

November 15, 2019



# Meet your presenters



Kerry Friedman

*Deputy director and senior education researcher*

**REL Appalachia @ SRI International**



Michelle Smith

*First grade teacher*

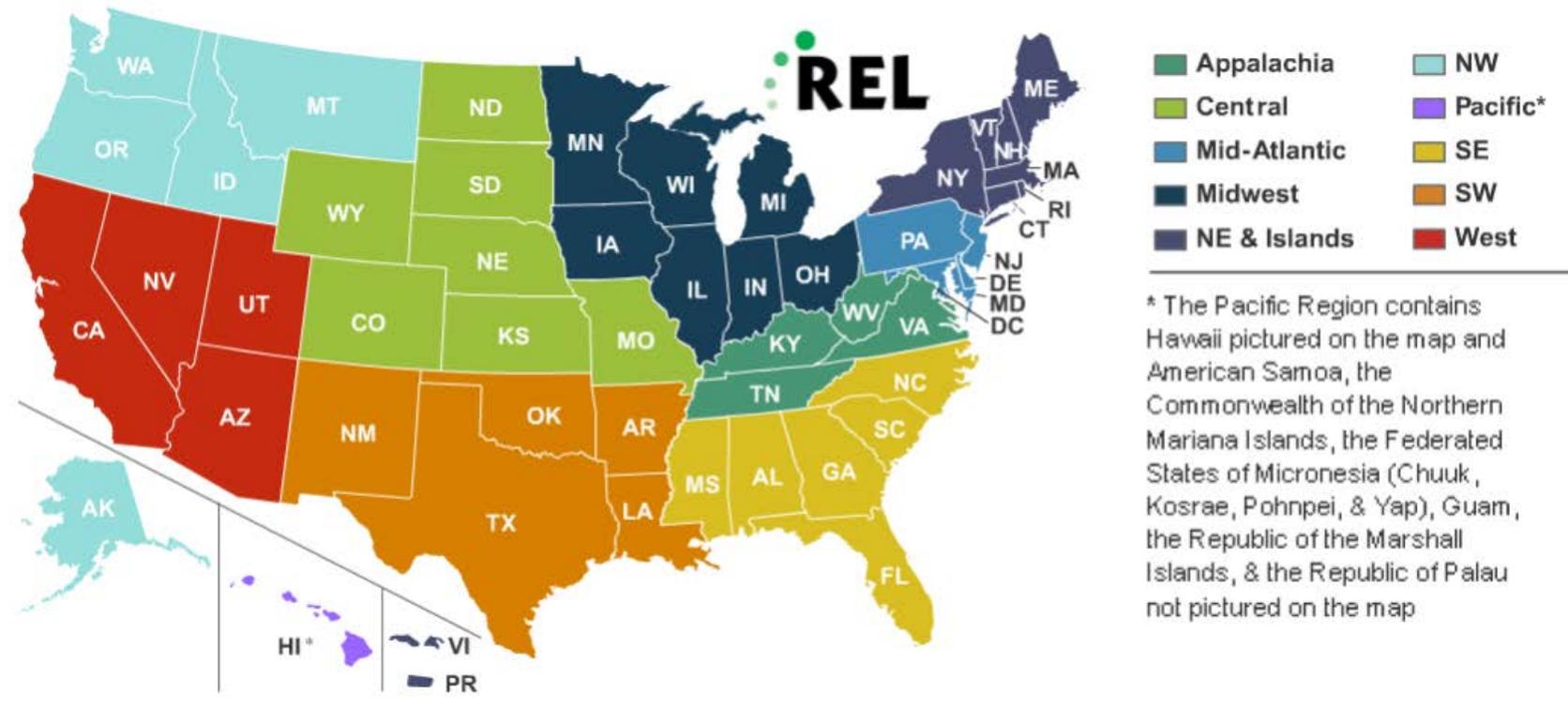
**Harts PreK-8; Harts, West Virginia**

Kimberly Cooper

*Assistant principal*

**Harts PreK-8; Harts, West Virginia**

## The Regional Educational Laboratories



The 10 Regional Educational Laboratories (RELs) work in partnership with stakeholders to conduct applied research and trainings.

The REL mission is to support a more evidence-based education system.

Administered by the U.S. Department of Education, Institute of Education Sciences (IES)

# Applied Research

# Training, Coaching, and Technical Support

# Dissemination

June 2016

What's Happening

## Dual enrollment courses in Kentucky: High school students' participation and completion rates

Chad R. Lochmiller  
Thomas J. Sugimoto  
Patricia A. Muller  
Gina C. Mosler  
Steven E. Williamson  
Indiana University

**Key findings**

- Approximately one in five Kentucky students in grades 11 and 12 participated in dual enrollment courses between 2009/10 and 2012/13.
- Participation rates were higher for female students, White students, students not eligible for the school lunch program, and students attending high school in Appalachian counties and rural areas.
- Students completed 83–86 percent of dual enrollment courses attempted each year between 2009/10 and 2012/13.
- Completion rates were lower in courses that were attempted by Black students, students eligible for the school lunch program, and students attending school in Appalachian counties.
- About 22 percent of students who completed dual enrollment courses earned at least the equivalent of a full semester's worth of college coursework.

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Institute of Education Sciences  
U.S. Department of Education

**REL** APPALACHIA  
Regional Educational Laboratory



## Supporting Your Child in Developing Math Skills For Future Success

### Math success opens doors to college and careers.

The technical and professional jobs of the future demand more mathematical knowledge and problem solving skills.

Children who believe they can be successful in math are more willing to put in effort, even when they struggle, and this results in better performance.<sup>1</sup>

Success in elementary school math predicts future achievement in middle and high school math and other subjects.<sup>2,4</sup>

Students who complete higher level math in high school earn higher incomes in the future.<sup>3</sup>

The number of STEM (science, technology, engineering, and mathematical) jobs is growing and half of all STEM jobs are available to workers without a four-year college degree. STEM jobs pay 10% more than other jobs available to these workers.<sup>5</sup>

### Families can support children in developing math skills for the future by<sup>6</sup>:

Great problem solving!

Let's try a different method.

$a^2 + bc + c = 0$

praising effort and modeling positive math attitudes

encouraging children to seek help and try new strategies when they are stuck.

confronting stereotypes about who is good at math.

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<sup>1</sup>Boaler, J. (2016). Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and inclusive learning. San Francisco, CA: John Wiley & Sons.

<sup>2</sup>Clayton, A., & Engel, M. (2013). How important is when you start? Early mathematical knowledge and later school success. *Teachers College Record*, 115(6), 1-29. <http://www.tcrecord.org/Default.asp?id=1123177>

<sup>3</sup>Carper, K. S., Dunne, G. J., Davis-Kean, J. E., Duckworth, K., Claessens, A., Engel, M., ... & Chen, M. (2012). Early predictors of high school mathematics achievement. *Psychological Science*, 23(7), 691-697.

<sup>4</sup>Achieve, Inc. (2004). Closing the expectations gap: An annual 50-state progress report on the alignment of high school policies with the demands of college and work. Washington, DC: Author.

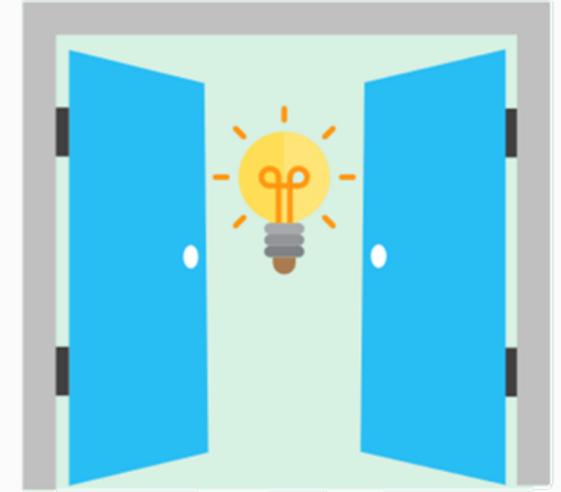
<sup>5</sup>Rothwell, J. (2013). The Hidden STEM Economy. Brookings Institution: Washington, DC.

<sup>6</sup>Epstein, J. L. (2003). School, family, and community partnerships that work. Boulder, CO: Westview Press.

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## Community Math Nights



Children who believe they can be successful in math are more willing to put in effort, even when they struggle, and this results in better performance.<sup>i</sup>

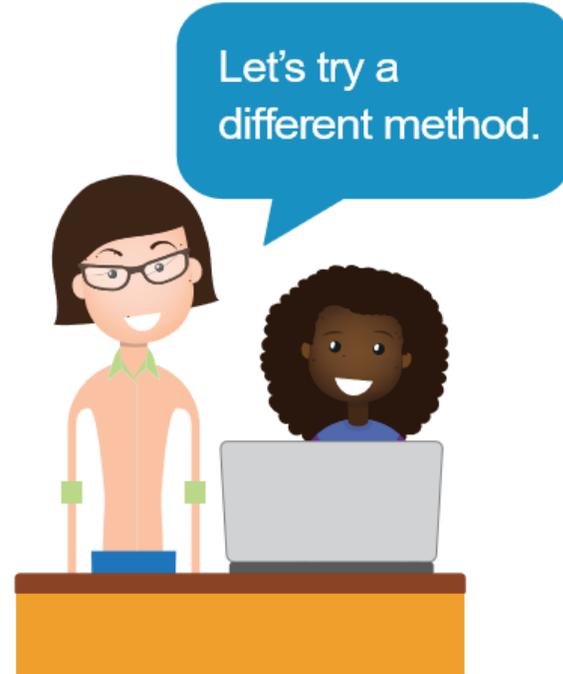
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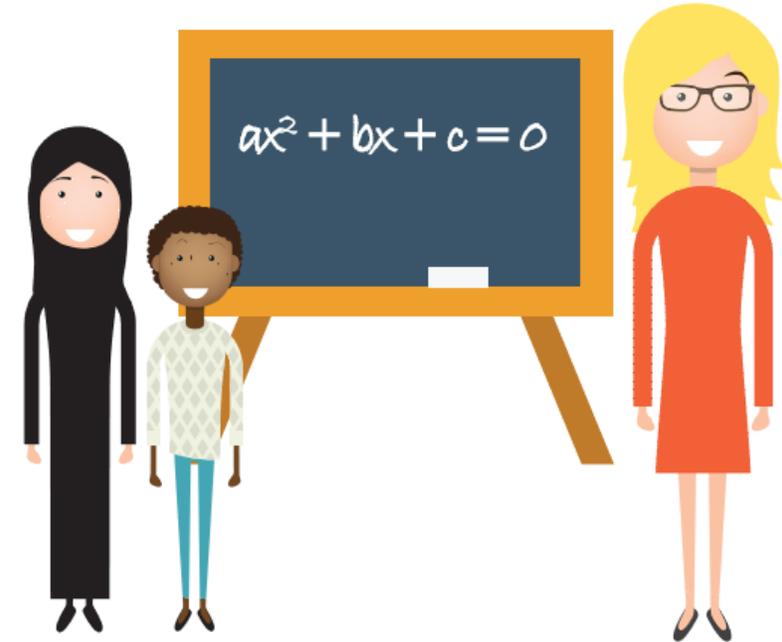
The number of STEM (science, technology, engineering, and mathematics) jobs is growing and half of all STEM jobs are available to workers without a four-year college degree. STEM jobs pay 10% more than other jobs available to these workers.<sup>v</sup>



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# Community Math Nights project

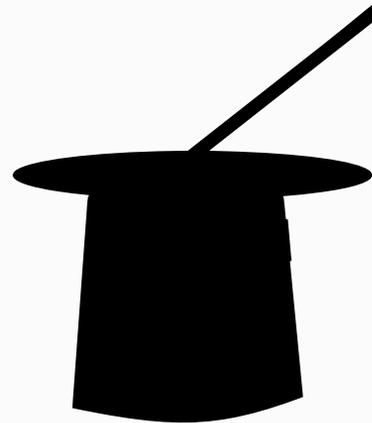
- Community Math Nights were designed to **engage family members in supporting their child's math learning** and helping their child **develop a growth mindset** as it relates to math ability.
- REL AP staff **codeveloped** math night activities with and **provided coaching and support** to educators in Harts and Omar, West Virginia. **Educators facilitated the first math nights** at their schools in April 2019 and their second just this week.



# Participant Roles



**Learner Hat**

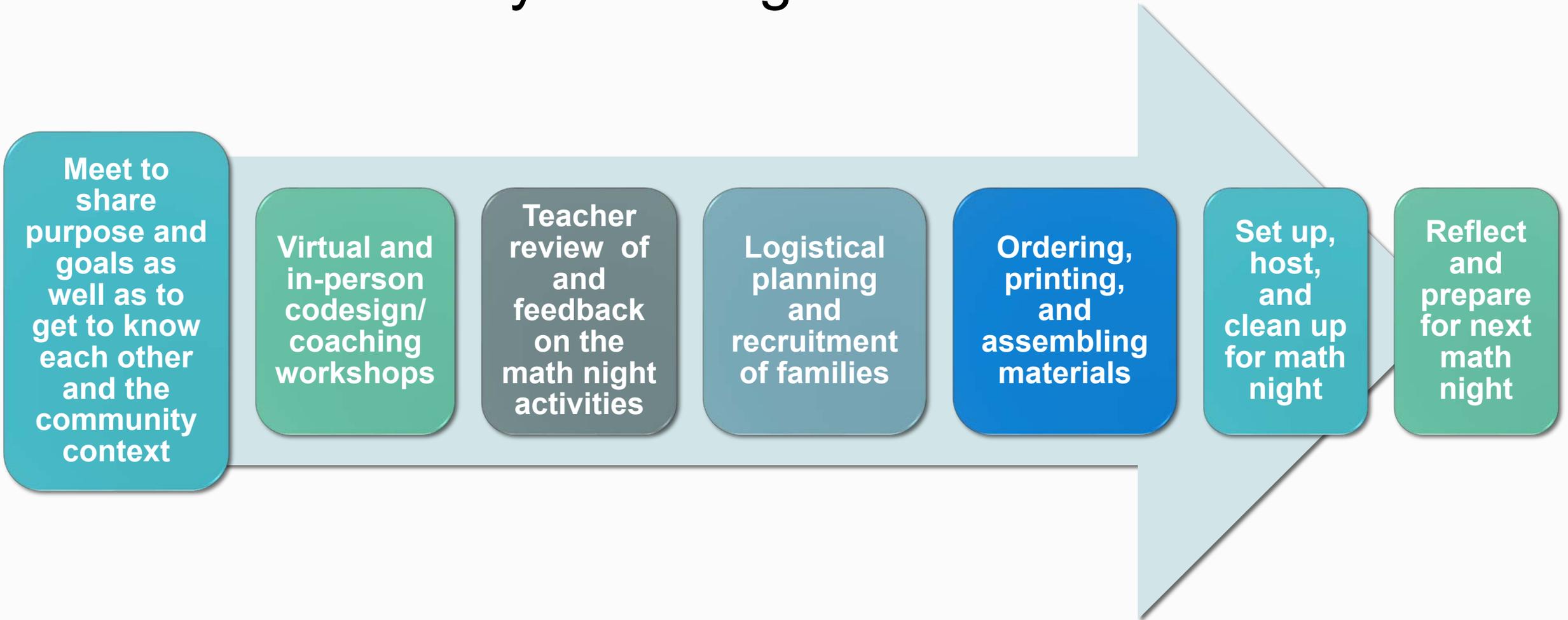


**Facilitator Hat**



**Codesigner Hat**

# What was the process for developing and hosting the Community Math Night?



# Facilitator guide

The facilitator guide includes all **background information**, **activity instructions**, **facilitator notes**, and **materials/handouts** for our Community Math Night.

## Contents

- Overview
- Math night at a glance
- Background and facilitator notes on math night activities
- Table handouts
- Parent handouts
- Table materials



## Community Math Night Facilitator Guide

Spring 2019  
West Virginia

Check out the guide!

[https://ies.ed.gov/ncee/edlabs/regions/appalachia/events/event\\_4-10-19\\_math-nights.asp](https://ies.ed.gov/ncee/edlabs/regions/appalachia/events/event_4-10-19_math-nights.asp)

## Table 1b: Grades 2–3: Diamond Challenge

Facilitator(s): \_\_\_\_\_

### Purpose

Students and families use pattern blocks to play a game in which they practice building and analyzing 2-D shapes to develop foundations for area, volume, and geometry in later grades.

### Materials

- Instructions and parent prompts
- Diamond game board
- Opaque bag with pattern blocks

### Facilitator Notes

1. In the game, players use four different types of pattern blocks to fill in a rhombus-shaped board game. The game will engage players of different ages and allow students to develop and demonstrate strategies along with their parents.
2. The game can be played by one to four people, but it's best played in pairs.
3. Show parents how they can use the prompts, model asking questions (e.g., Are there shapes you can't use? Why?) and point out the geometry glossary poster.
4. Model using the correct vocabulary for shapes, but do not correct families if they use color names instead.



### West Virginia Standards

#### Second grade:

- M.2.26** Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc.; describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

#### Third grade:

##### Cluster Reason with shapes and their attributes.

- M.3.24** Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
- M.3.25** Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as  $\frac{1}{4}$  or the area of the shape.

## Table 4a: Grades K–1: No-Bake Playdough

Facilitator(s): \_\_\_\_\_

### Purpose

Students and families will compare and use different measuring tools as they put together ingredients to make playdough.

### Materials

- Multiple measuring cup and tablespoon sizes
- Ingredients for playdough

### Facilitator Notes

1. Support parents as they go through the activity, particularly when they order the tools they will use for measuring (spoons and cups) by size.
2. Show parents how they can use the prompts and model asking questions, such as "How do you know that the tablespoon is bigger than the half tablespoon?" (e.g., because I see the half spoon looks smaller, or because I can use two half tablespoons to fill up one tablespoon).
3. This recipe may not work exactly as intended, as it depends on the ingredients. If the playdough doesn't come out just right, help them by measuring small quantities of oil and water (don't just add splashes of the wet ingredients). That way, the families can suggest changes to the recipe for the next person.



### West Virginia Standards

#### Kindergarten

- M.K.15** Directly compare two objects with a measurable attribute in common to see which object has "more of" or "less of" the attribute and describe the difference.

#### First grade

##### Cluster Measure lengths indirectly and by iterating length units.

- M.1.15** Order three objects by length and compare the lengths of two objects indirectly by using a third object.
- M.1.16** Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Instructional Note: Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

#### Second grade

##### Cluster Measure and estimate lengths in standard units.

- M.2.17** Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.



# Community Math Night content and reactions

# What did the first Community Math Night include?

- Dinner
- Introductory presentation from a teacher on the importance of math, positive math attitudes, and growth mindset
- Standards-aligned, hands-on mathematics activities in four core areas:
  - Geometry
  - Operations and algebraic thinking
  - Numbers and operations in base 10
  - Measurement and data

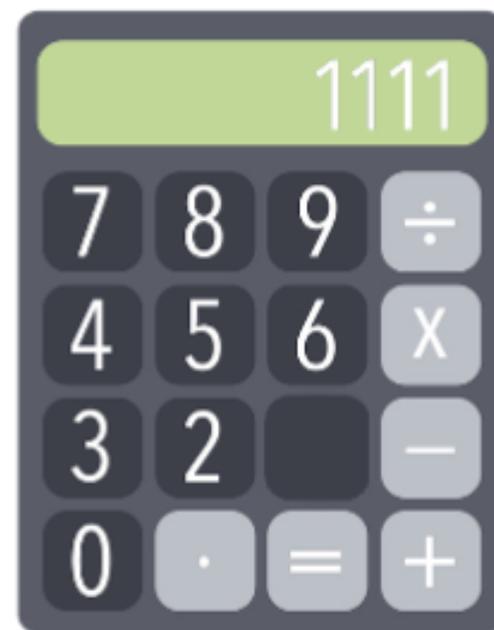


## *Where's the 1?*

**Restriction:** The #1 key is broken!

**Goal:** We need to make the number 1,111 show up on the calculator screen.

1. Explain your strategy.
2. How many moves did it take you?
3. Can you do it in fewer moves? More?
4. Is there a different operation you can use?



# Family reactions

What did you like most?

**“Just made it more obvious as to how much MATH is involved in our lives”**

**“Spending more time with my son and watching him learn with his friends”**

**“Fun”**

What would you improve?

**“Have them more often”**

**“Have events like this more often”**

**“More time”**



# Survey results

## Overall, how would you rate the Community Math Night?

- 75 percent rated Excellent
- 25 percent rated Very Good

### 96 percent agreed:

- I increased my understanding of the importance of math for my child's success in school.
- I learned new strategies to support my child's math education.
- I thought the math activities were fun for my child.
- I can use some of what I learned at home.



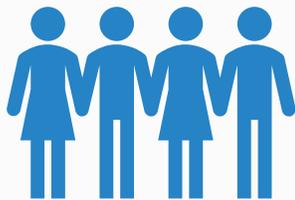


## Lessons learned

# Lessons learned

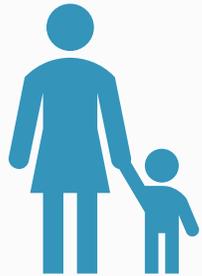


- Get people to the Community Math Night
  - Provide dinner
  - Consider providing transportation
  - When scheduling, consider other student activities and community events and release time of siblings



- Consider local context
  - Existing attitudes and preconceptions
  - Reading levels of community members

# Lessons learned



- Get family members actively engaged
  - Provide parent/family member prompts
  - Encourage participation of the whole family



- Preview activities in class
  - Especially for younger students, try some of the activities in class beforehand so they can show their families what they know



# Questions?

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The technical and professional jobs of the future demand more mathematical knowledge and problem solving skills.



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### Families can support children in developing math skills for the future by<sup>iv</sup>:



praising effort and modeling positive math attitudes.

encouraging children to seek help and try new strategies when they are stuck.

confronting stereotypes about who is good at math.

## Engaging Families for Math Success

SRI International

Megan Cox, Community Math Nights Project Co-Lead  
Kerry Friedman, Community Math Nights Project Co-Lead

How many ways are there to count these blocks? How can you group the blocks to count them faster? Asking children simple questions about the world around them can reinforce math skills and help them apply their math knowledge in new ways. Young children who have lots of opportunities to develop and apply their mathematical knowledge are more likely to achieve in school and in life.<sup>1</sup> Helping families understand the importance of math and of supporting their children's math learning outside the classroom is one way to set children up for success.



### Supporting family math

Well-designed partnerships of families and community members can increase students' self-confidence and achievement, generally, and in mathematics specifically.<sup>2-3</sup> Community engagement activities, such as math nights, create an opportunity for educators, children, and families to learn and talk about math and can help family members participate in their child's learning and support their academic success.<sup>4</sup>

As natural teachers and role models for students, families can also encourage positive attitudes towards learning. Yet some family members may need support around their own math attitudes. Most of us have heard the phrase, "When will I ever use math?" or "I was never good at math." Sometimes these attitudes toward math can affect children's math success.<sup>5</sup>

Teachers and school staff can support parents in developing positive math attitudes by introducing growth mindset thinking and strategies for building math confidence and persistence. A growth mindset means that you believe that your intellectual abilities can be increased with effort and hard work.<sup>6</sup> This promotes engaging in productive struggle and trying new methods. Community engagement activities and school-family math supports can reinforce the importance of growth mindset and persistence in math to children and their families alike.

# Community Math Nights Toolkit



(forthcoming)



<sup>i</sup>Boaler, J. (2015). Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching. San Francisco, CA: John Wiley & Sons.

<sup>ii</sup>Claessens, A., & Engel, M. (2013). How important is where you start? Early mathematics knowledge and later school success. *Teachers College Record*, 115(4), 1-29. <http://erdc.ed.gov/tcrE11020177>

<sup>iii</sup>Engler, P. S., Dunson, D. J., Davis-Kean, P. E., Duckworth, K., Claessens, A., Engel, M., ... & Chen, M. (2012). Early predictors of high school mathematics achievement. *Psychological Science*, 23(7), 691-697.

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<sup>v</sup>Rothwell, J. (2013). *The Hidden STEM Economy*. Brookings Institution, Washington, DC.

<sup>vi</sup>Epstein, J.L. (2001). *School, family, and community partnerships* (1st ed.). Boulder, CO: Westview Press.

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Thank you!

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