

Community Math Night

Purpose: Since most parents experienced mathematics as a set of rules, procedures, and facts to memorize, our goal is to engage them in doing mathematics the way in which the NC Mathematics Standards envisions it. To this end, teacher leaders will pose a problem that can be solved in multiple ways and have parents communicate their findings to each other.

The following structure is recommended, but can be altered depending on the school context [*roughly 90 minutes*].

Attendance tips:

1. If fiscally possible, we have found it nice to have dinner prior to starting the night.
2. Providing childcare can also increase parent participation and may be done by having students (if in high school) care for them in a separate room.
3. A community parent math night is also a great opportunity to engage your PTO and increase membership.
4. Providing extra credit to students *who bring their parent(s)* can also increase participation.
5. Send invitations home with students, post information on the school website, have teachers send a personal email message to parents of students in their classes, and put information on the school sign, if appropriate.

Materials:

1. Powerpoint slides
2. If appropriate, speaker/sound system (e.g., if held in a large cafeteria)
3. Post it notes and Parking Lot posters taped around the room
4. Parent briefs in English and Spanish (can be downloaded from nc2ml.org)
5. Copies of the math problem
6. Pencils
7. Parent survey

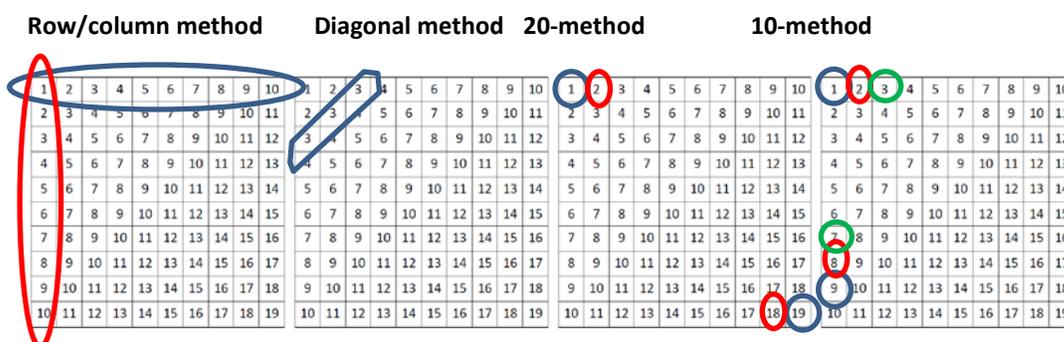
Possible Flow of the Night:

- **Pre-session:** *As families and participants enter the room, hand them a post-it note and ask them to write a question they have about the NC Standards. Have them post it on a "Parking Lot" board. Have extra post-it notes near the Parking Lot for anyone who wants to add more than one question. If your school is in a high tech area, you can have participants use their phones, tablets or computers to post a note to padlet.com. This is a good time to have the parent briefs available for parents to pick up and read while they eat. We have found it helpful to have families eat just prior to beginning the night and through introductions.*
- **Introduction:** Welcome community members and introduce the leaders and purpose of the night. Ask participants to list as many one-word descriptors for what mathematics is to them. Some examples: *hard, rules, formulas, algebra, basics, numbers, etc.* Record these on the board (if you have the technology capability, have participants participate in a wordle using their electronic devices). Which word(s) seem to be the most popular? *Expect that words like hard, rules, computations, etc. will be most prominent.* This can be a jumping off point to say that mathematics needs to be different for their children; let's try a math problem.

As an alternative, some schools may invite a community member to give a ten minute talk about how they use mathematics in their jobs [10 minutes].

- Mathematics Lesson:** Explain to participants that they are about to engage in a mathematics lesson that teaches the NC Standards for Mathematical Practice. Present the Number Grid problem and ask them to take 2 -4 minutes privately to get an idea of how to solve it (use a timer) and then instruct them that they will work with a partner when the timer goes off. They may use a calculator as long as they don't use it to add all numbers (ex. 1 plus 2 plus 3 plus 4...). Encourage them to write on the paper. As participants are working both privately and in pairs, monitor their work to gather multiple strategies that can be used to engineer the whole class discussion. NOTE: If you know that there is a group of parents sitting together that are negative, you may want to be strategic in your organization of groups.

Anticipated methods and reasoning:



Row/Column Method: Add a row or column to get 55. Add the next one to get 65. Notice that each row or column goes up by ten from the previous so add 55, 65, 75, 85, 95, etc. to get 1000.

Diagonal Method: notice that the diagonals have the same numbers in them (ex., three 3s; four 4s). Some participants will say that three 3s is 3^3 while others will say that it is 3×3 . Once participants find the sum of each diagonal, they add them all up, 1, 4, 9, 16, etc., to get 1000 unless they used the exponent way.

20- Method: Some might start pairing numbers in the grid to make 20s (ex. 1 and 19, 2 and 18) and notice there are forty-five 20s (900). Add the 100 along the diagonal (the tens) to get 1000.

10-Method Some might start matching numbers to create tens. They will get 100 tens for 1000.

There are other methods that may emerge, but those are the most popular.

Whole group discussion: Ask participants what answers they got and record them on the board. Most people get 1000 but you might have some who get a different answer because of inefficient methods or incorrect methods (i.e., the exponent diagonal method). Once one or more answers is on the board, call on participants by name to share their reasoning. Start with the most common which is typically the diagonal method. Then have someone explain the row/column method. Do not just accept the method, but push for all participants to explain why the row goes up by ten each time. The third method can be the 20-method. After a participant explains this method, it might be a helpful visual to have them fold their grid along the 10-diagonal and see where the 1 matches (i.e., with the 19). Some participants might refer to the diagonal as a line of symmetry or reflection line. Capitalize on the vocabulary usage. The last method shared can be the 10-method. In past classes, we have had some students just

multiply $10 \times 10 \times 10$ and get the answer. Challenge participants to explain why that calculation works and where the tens show up in the grid. Most participants will say it is volume but that doesn't quite make sense on a 2-D grid. Ask participants where the first 10×10 is in the grid and what it stands for. They might say 100 squares with numbers in them. Then, where is the last $\times 10$? Some might say that it is the 10 created in every square when pairing the numbers like in the 10-method. Some might relate it to volume and imagine that there are 9 pennies on one square and 11 pennies on another and you take one penny off the 11-stack and put it with a 9-stack to get two 10-stacks. All 100 squares will have a 10 penny-stack. *[15 minutes for exploration, 30 minutes for discussion]*

- **Summary of Mathematics:** Have a teacher briefly explain what mathematics students learn in their grade (or courses). For example, if this is a high school setting, have one teacher explain Math 1, another teacher Math 2, and another Math 3. If this is a middle or elementary school, several different teachers can give a brief overview of the mathematics in each grade. Emphasis should also be placed on the standards for mathematical practice. *[15 minutes]*
- **Video:** Show about 6 minutes of <https://www.youcubed.org/why-we-need-common-core-math/> in which Dr. Jo Boaler explains her view of mathematics for schools. We recommend giving a brief introduction of the speaker and her background and starting at the 1:42 mark. Starting here cuts down on time and keeps references to Common Core minimal. Stop the video at 7:52.

Ask participants to share at their table: *how has your vision of math instruction changed after tonight?* Brief share out from the tables and then lead into the questions on the post it notes *[15 minutes]* NOTE: Someone should have sorted through the post-it notes to find the most common and important questions for the night.

- **Post-it Notes:** Answer questions about the standards from the post it notes. Be ready to address several common misconceptions such as:

Do the NC Standards prepare students for college?
Why don't we have algebra 1, geometry, and algebra 2 anymore?
How do I help my child with homework?
Why don't we have textbooks?

- Survey

WHAT'S THE SUM PROBLEM (FIRST GRID)

What is the sum of all the numbers in the table? Try to do it without adding each of the numbers one by one.

1	2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11	12
4	5	6	7	8	9	10	11	12	13
5	6	7	8	9	10	11	12	13	14
6	7	8	9	10	11	12	13	14	15
7	8	9	10	11	12	13	14	15	16
8	9	10	11	12	13	14	15	16	17
9	10	11	12	13	14	15	16	17	18
10	11	12	13	14	15	16	17	18	19