



# UNIVERSITY-SCHOOL PD PARTNERSHIP

Conceptually Based Basic Skill  
Acquisition for All

NCTM 2018

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[https://padlet.com/sararose\\_lynch/NCTM2018](https://padlet.com/sararose_lynch/NCTM2018)

Who we are...

... Who you are



# What best describes your current position?

Pre-K

K

1st

2nd

Administration

Instructional coach

Other

# What was your primary motivation for attending this session?

I want to learn strategies for basic skills assessment.

**A**

The session description sounded amazing!

**B**

I want to learn about number talks.

**C**

My principal is making me.

**D**

I want to learn some games for basic skill instruction.

**E**

I want to hide from [insert person] and this was the closest room.

**F**

I want to learn about Professional Learning Communities (PLCs)

**G**

This one is to see if my wife actually read the PPT before today

**H**

I want to learn about whole-school contracts

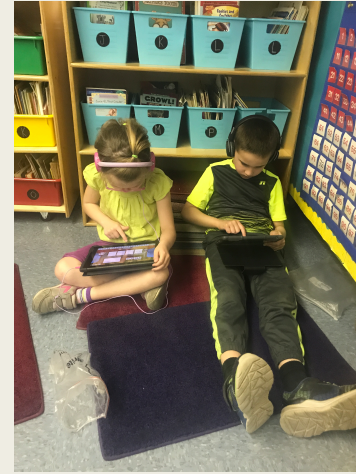
**I**

# Agenda

- Some context
- *Intended* goals and format of the partnership
- Guided math
- Instructional activities/games
- Number talks
- Assessing student progress
- Pre-service teacher involvement
- Lessons learned

# Some Context

- Rural Title 1 school
  - 40% free/reduced lunch
  - 20% receive services under IEP
  - Title services currently focus on reading interventions
  - One family math night a year hosted by preservice teachers
- One-to-one (iPads)
- Prior relationship
  - Conducted research in the school,
  - Embedded class
  - Practicum students/ student teachers



# *INTENDED* GOALS & FORMAT

# Goal and Objective

Based on our conversation in January 2017 regarding the mathematics professional development that you would like to provide for your teachers, our program will focus on the development of basic skills activities and related assessments for teachers in grades K – 4 as a replacement for “timed tests”. The goal of our professional development series is to provide teachers with tools and strategies to effectively and efficiently teach students of varying ability levels. By the end of the 2-day series, teachers will be comfortable and proficient in using the tools and strategies to teach and assess students’ ability to complete problem-based tasks with discourse focused lessons.

**FAILED**

# Professional Development Format

- Summer Institute
- Beginning of the year professional development workshop (1/2 day)
- Monthly grade level meetings (~30 – 40 min. per meeting)
- Professional Learning Communities
- Mid-year PD (1/2 day)
- End of the year PD (1/2 day)

# The What

## ■ Introduce

- *Trajectory of basic skills acquisition*
- *Number Talks,*
- *Number Routines,*
- *Strategies and activities/games that support the strategies,*
- *Assessments*

## ■ Whole School Contract

- *Establishing a mathematics whole-school agreement by Karen S. Karp, Sarah B. Bush, and Barbara J. Dougherty*

## ■ Grade level PLCs

- K aligning to upper grade expectations and observe number talk (ten frames and number line);
- 1st guided math rotations, stop using timed test, how to assess during guided math;
- 2nd guided math rotations, stop using timed tests, learn more about algorithms (other than traditional);



# Working Memory & Fluency

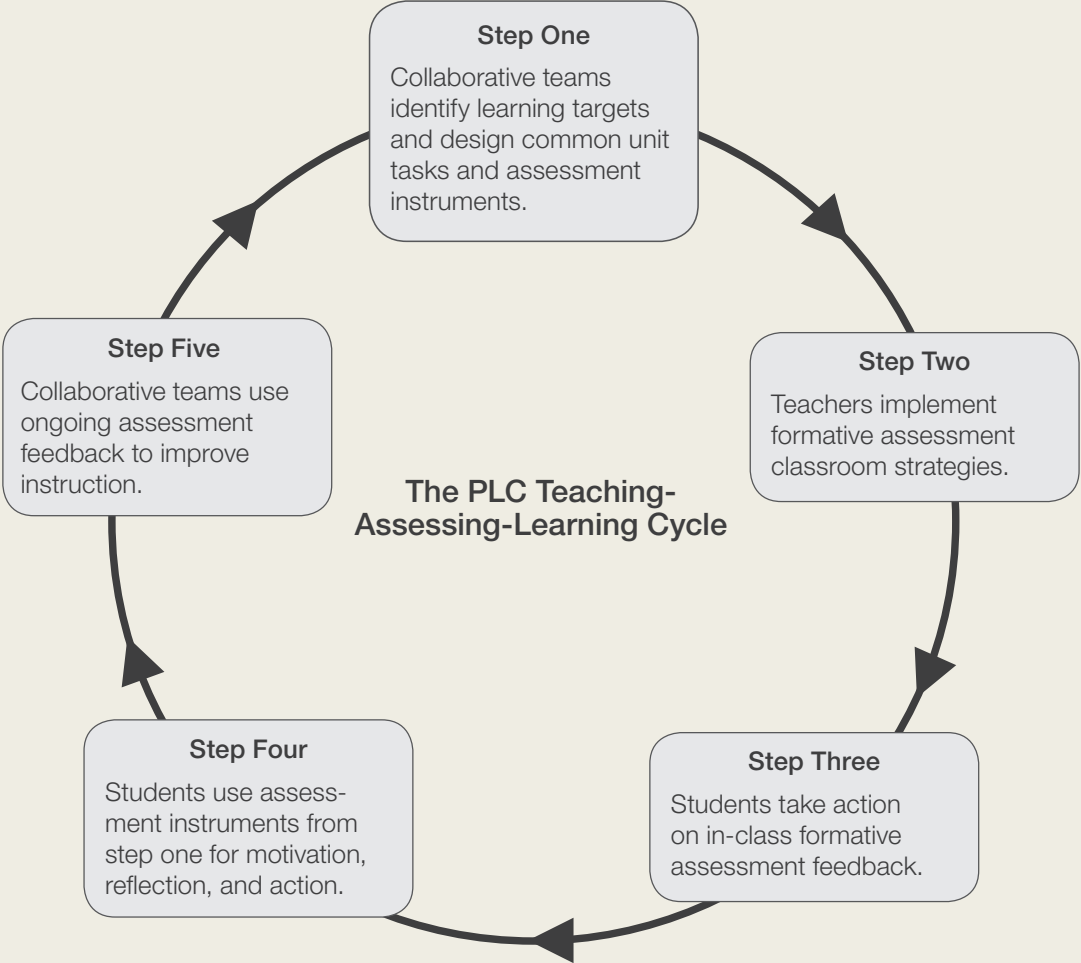
*Computational fluency...* the **efficient**, **appropriate**, and **flexible** application of single-digit and multi-digit calculation skills

*Speed comes with fluency... but you cannot develop fluency with speed.*

The less demand we place on our working memory, the more efficient our brain becomes. When we are fluent in something, we do not have to waste working memory doing it.

Direct recall of abstract facts, with no conceptual understand of those facts, places a lot of stress on our working memory.

# The PLC Teaching-Assessing-Learning Cycle



# GUIDED MATH

Or rotational math... or math stations... or whatever you want to call it

# What do you know about guided math?

**A**

Everything...  
I'm an expert

**B**

I've used it,  
but I'm not so  
pretentious to  
call myself an  
expert

**C**

I've read  
about it

**D**

I've heard  
about it  
(through the  
Force)

**E**

I have no idea  
what you are  
talking about

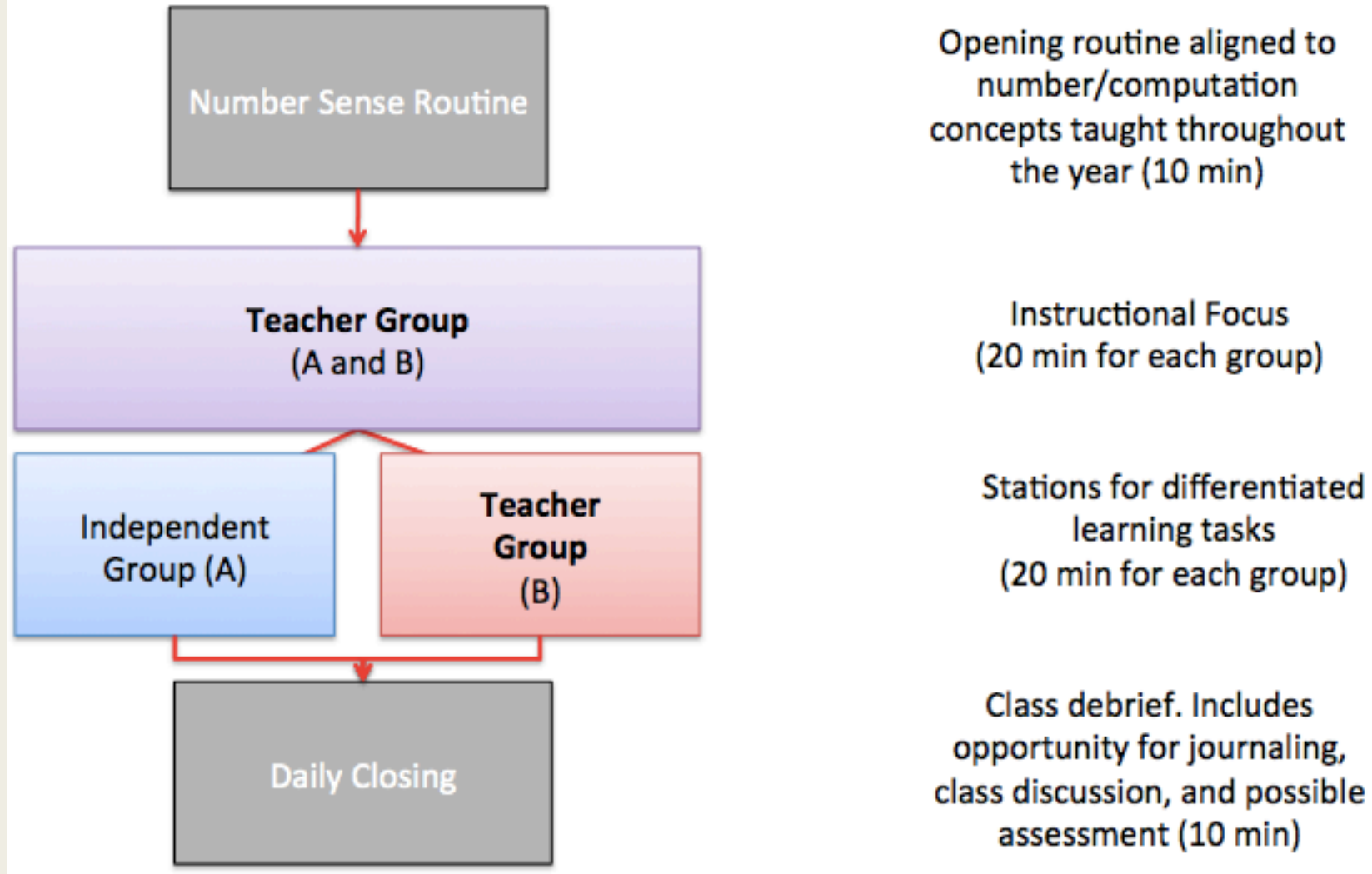
# What is Guided Math?

Textbook definition...

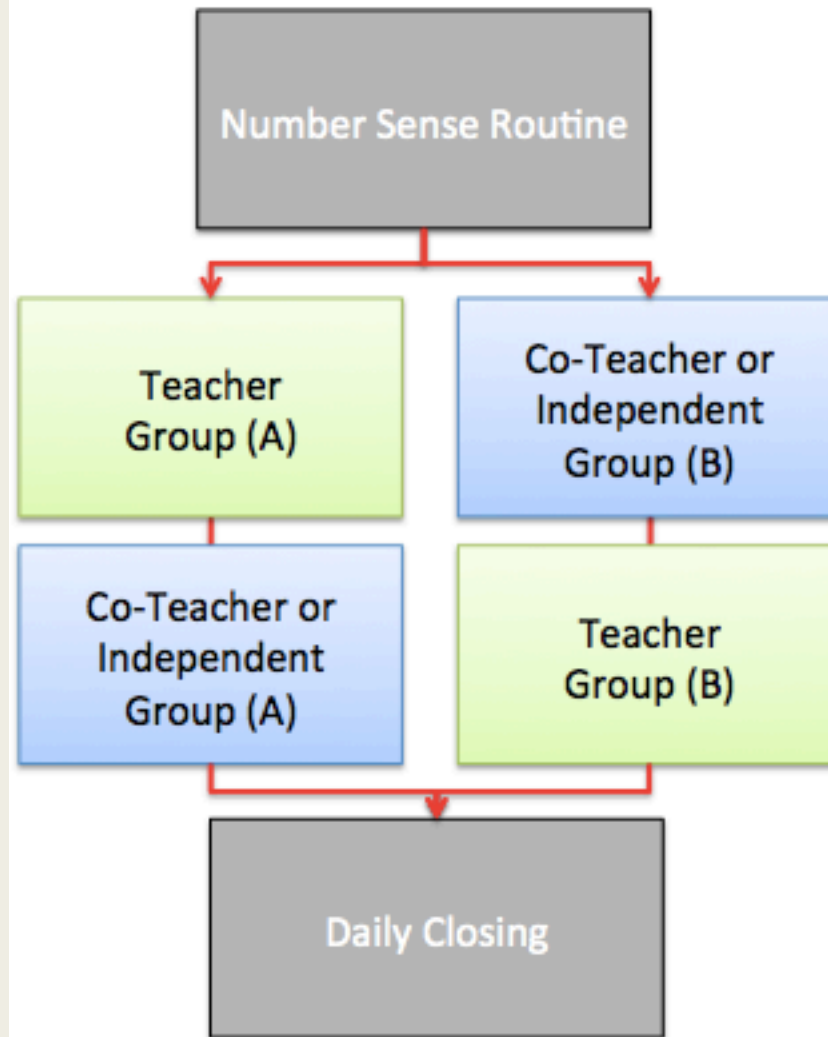
- *A framework for structuring mathematics instruction*
- *Consisting of the following components:*
  1. Morning work and number sense routines
  2. Whole group lessons following CRA or conceptually based format
  3. Small group time based on need, topic, and mixed ability levels
- *Instructional strategies in all components:*
  1. Vocabulary (common across school)
  2. Math journals
  3. Fact fluency



# Rotation Model A



# Rotation Model B

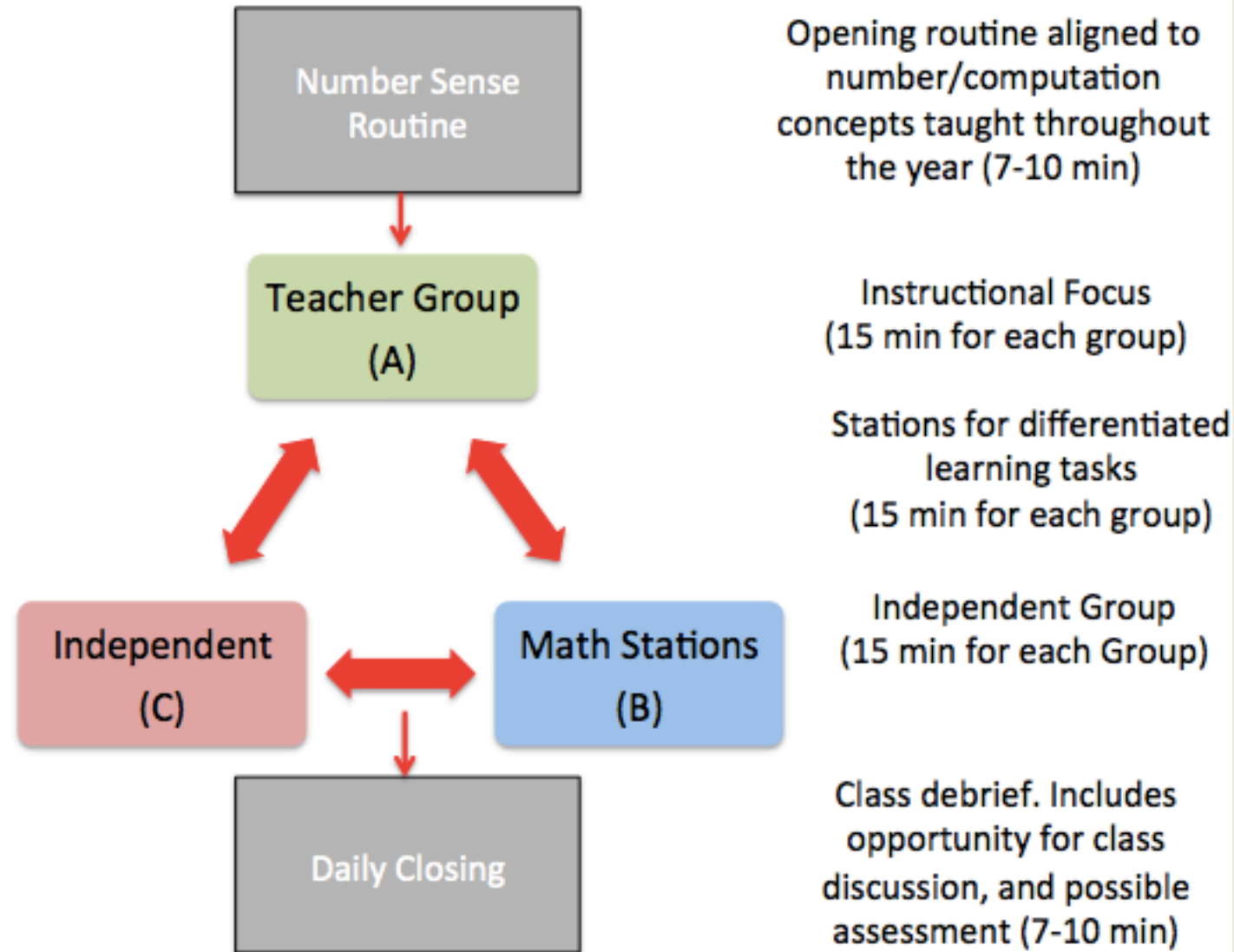


Opening routine aligned to number/computation concepts taught throughout the year (10 min)

Station rotations for differentiated learning tasks (20 min for each group)

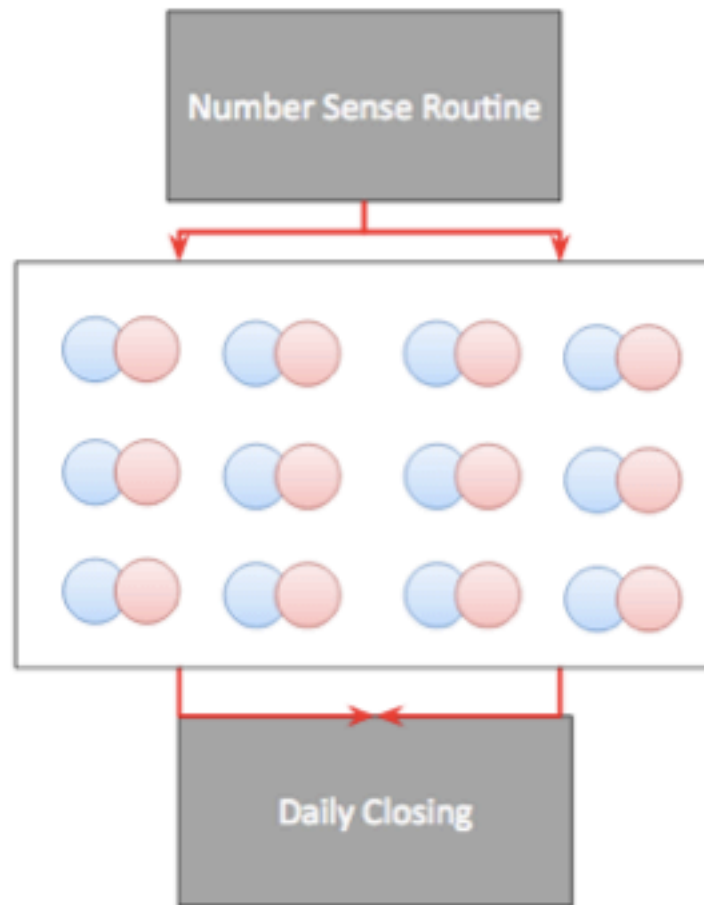
Class debrief. Includes opportunity for journaling, class discussion, and possible assessment (10 min)

# Rotation Model C





# Collaborative Model • 60 Minutes

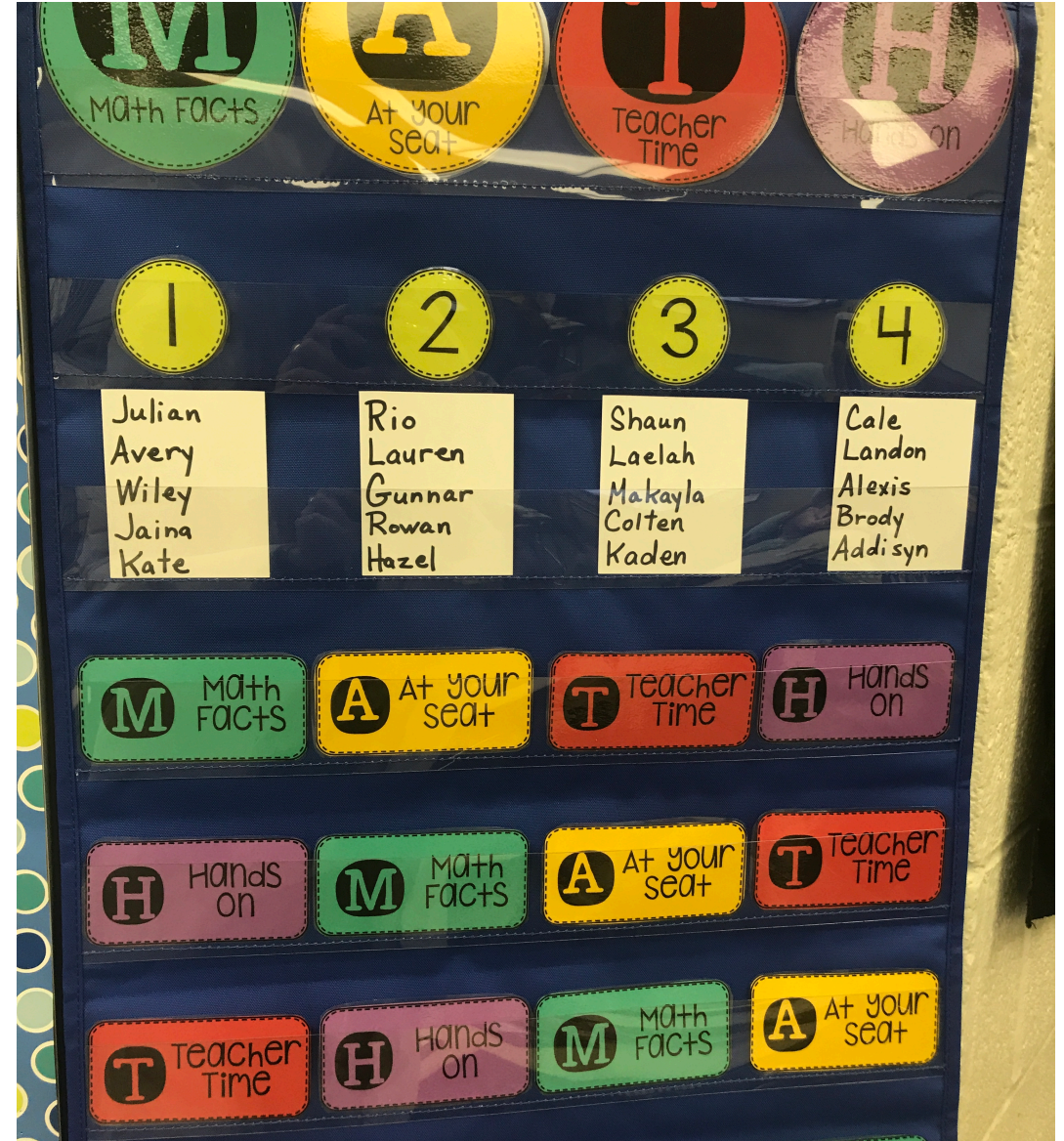
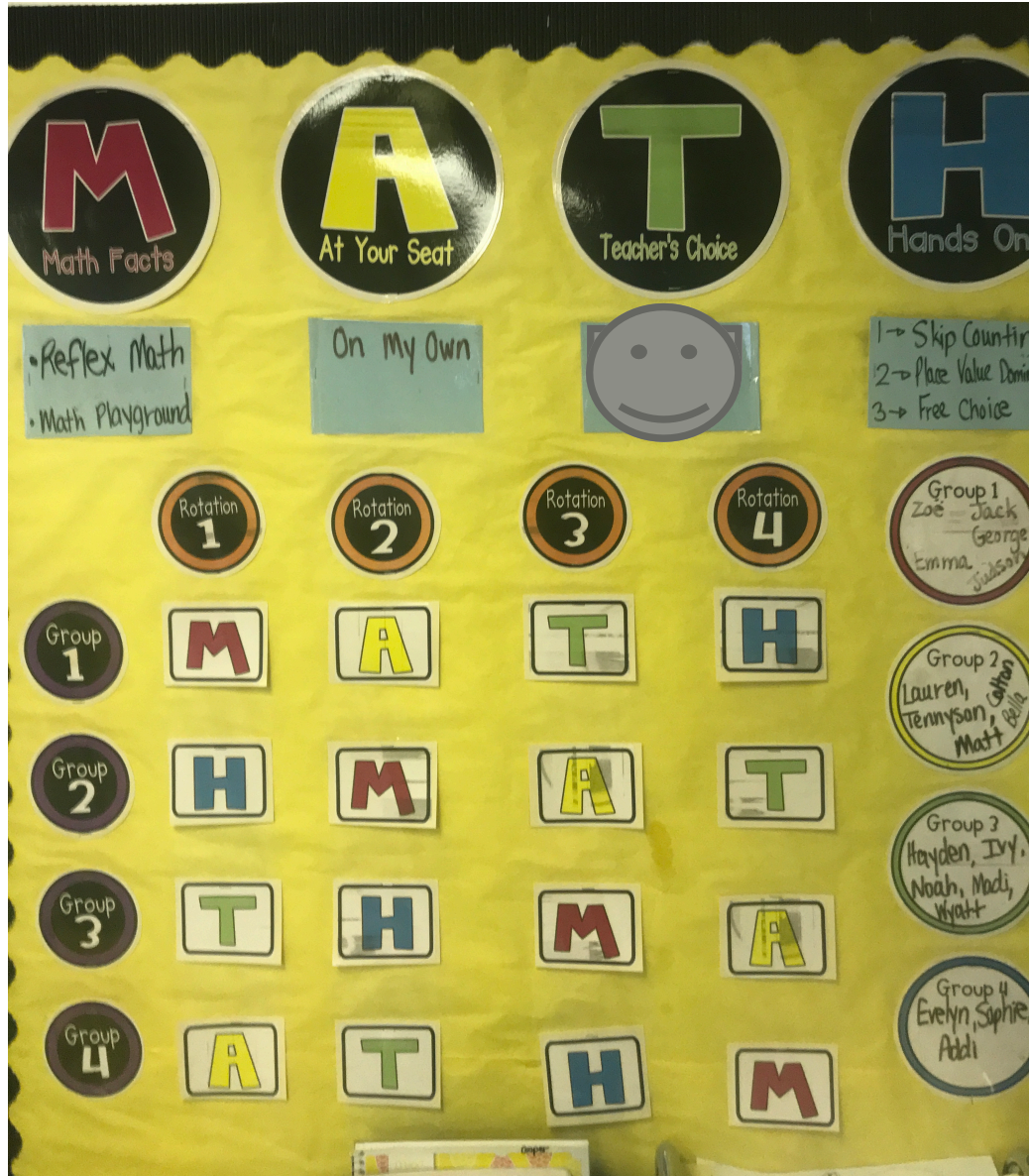


Opening routine or read aloud  
aligned to number/computational  
concepts taught throughout the year  
(7-10 minutes)

Intentional math task to apply  
content through cooperative /  
collaborative learning. Individual  
students can work with teachers for  
focused support, as needed.  
(30-40 minutes, as appropriate for  
student need)

Opportunity to debrief. Includes  
opportunity for class discussion and  
possible assessment (EPR, TPS, etc.)  
(10 minutes)



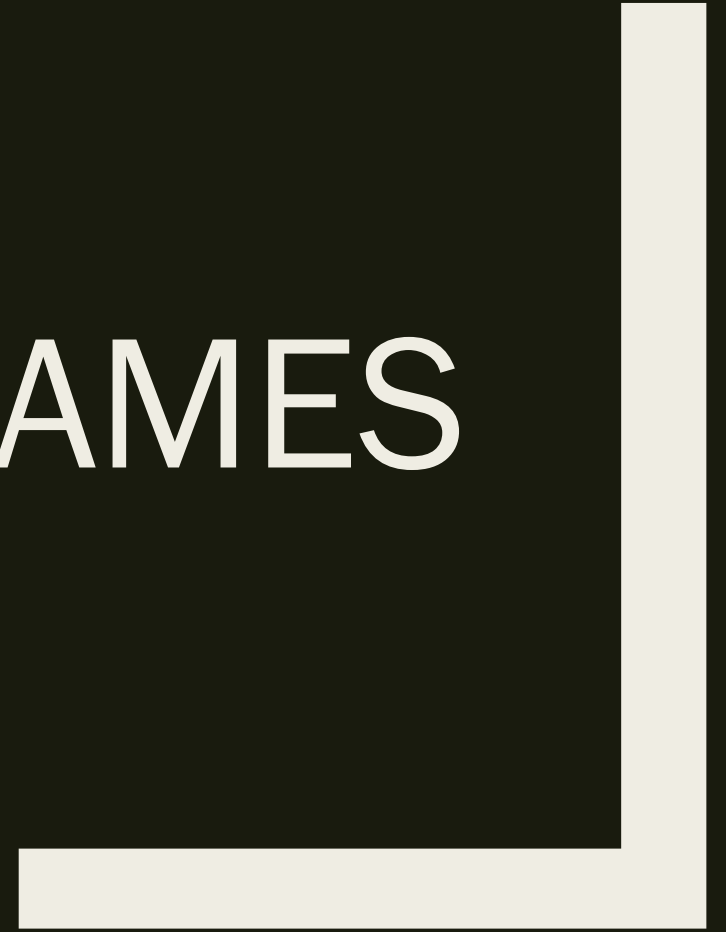




# What is happening in your classroom during guided math?



ACTIVITIES/GAMES



# Phases of Learning Basic Facts

1. Modeling and/or counting all or counting on to find the answer; for example, using fingers to help keep track of their counts to solve  $5 + 7 = ?$
2. Deriving answers using reasoning strategies based on known facts, such as solving  $5 + 7$  by thinking, “Five plus five equals ten, and two more will make twelve.”
3. Mastery or efficient production of answers. For example, when asked, “What is  $5 + 7$ ?” a child might call out, “Twelve,” and explain, “I just knew it.”

# Common Addition and Subtraction Strategies

**+1/+2** ...These facts add (and subtract) 1 or 2.

**+0/+10** ...These facts add (and subtract) 0 or 10.

**Make 10...** addition facts for sums of 10

**Doubles...** all the facts that have two addends that are the same quantity

**Make ten and some more...** These facts rely on making a ten and then adding the left over amount

**Near doubles...** derive facts from known doubles

**Using a Make Ten Strategy...** addition of two one digit numbers with a sum above ten

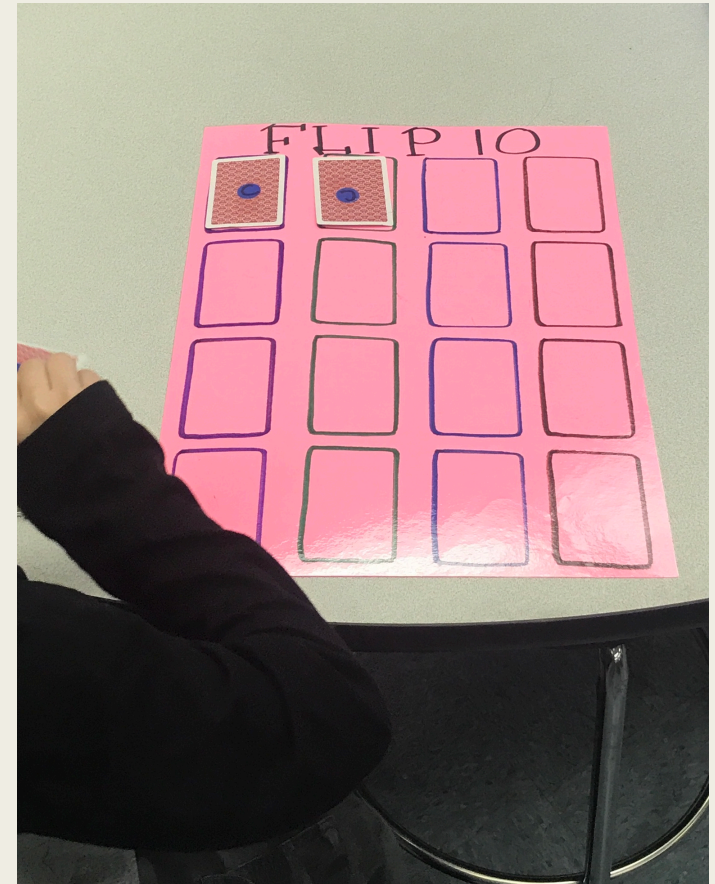
# Games

## Materials:

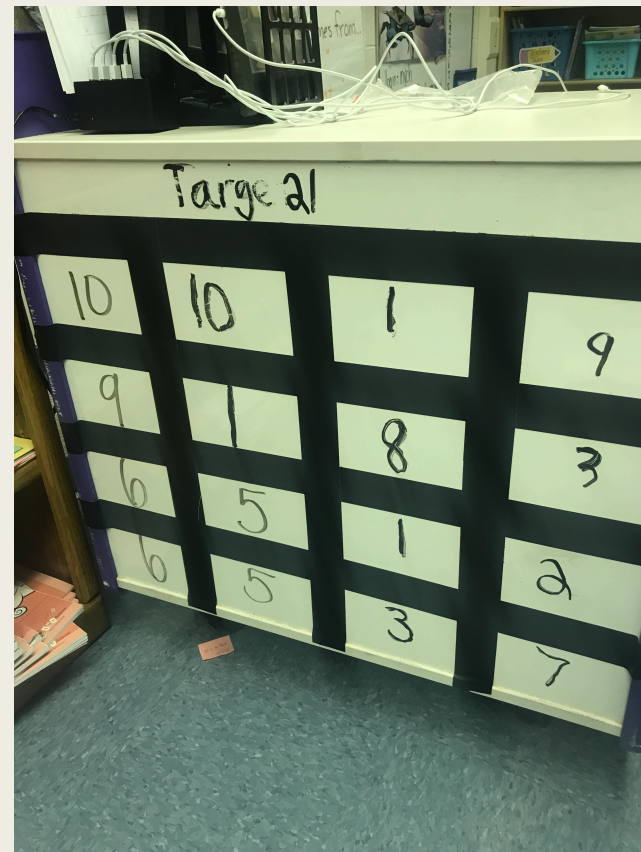
- Cards
- Dominos
- Dice
- Flash cards
- Number lines
- Strategy Templates
- Paper protector sleeves

## Games:

- Top It (Double or more War)
- Salute
- I-Spy
- Making Ten Matching
  - Go Fish
  - Flip Ten



# Games





# Games

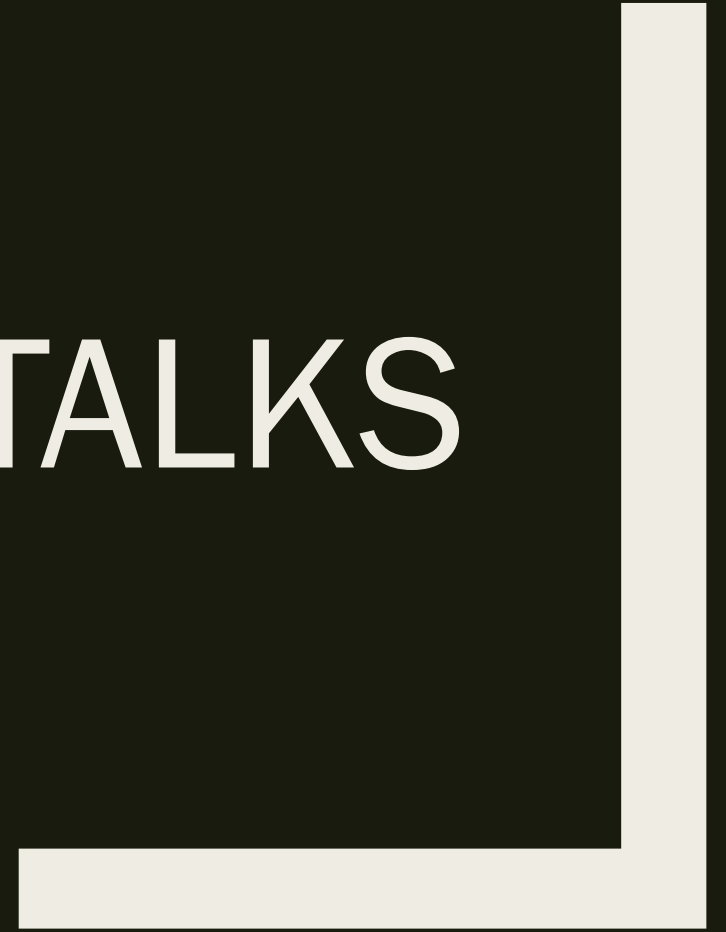


# What instructional supports do you need to have in place before beginning any instructional activity/game?



When poll is active, respond at **PollEv.com/jeremylynch267**  Text **JEREMYLYNCH267** to **22333** once to join

# NUMBER TALKS



# What do you know about Number Talks?

Everything...  
I already  
told you I'm  
an expert



I've read  
about it

I heard  
(about) it  
through the  
grapevine

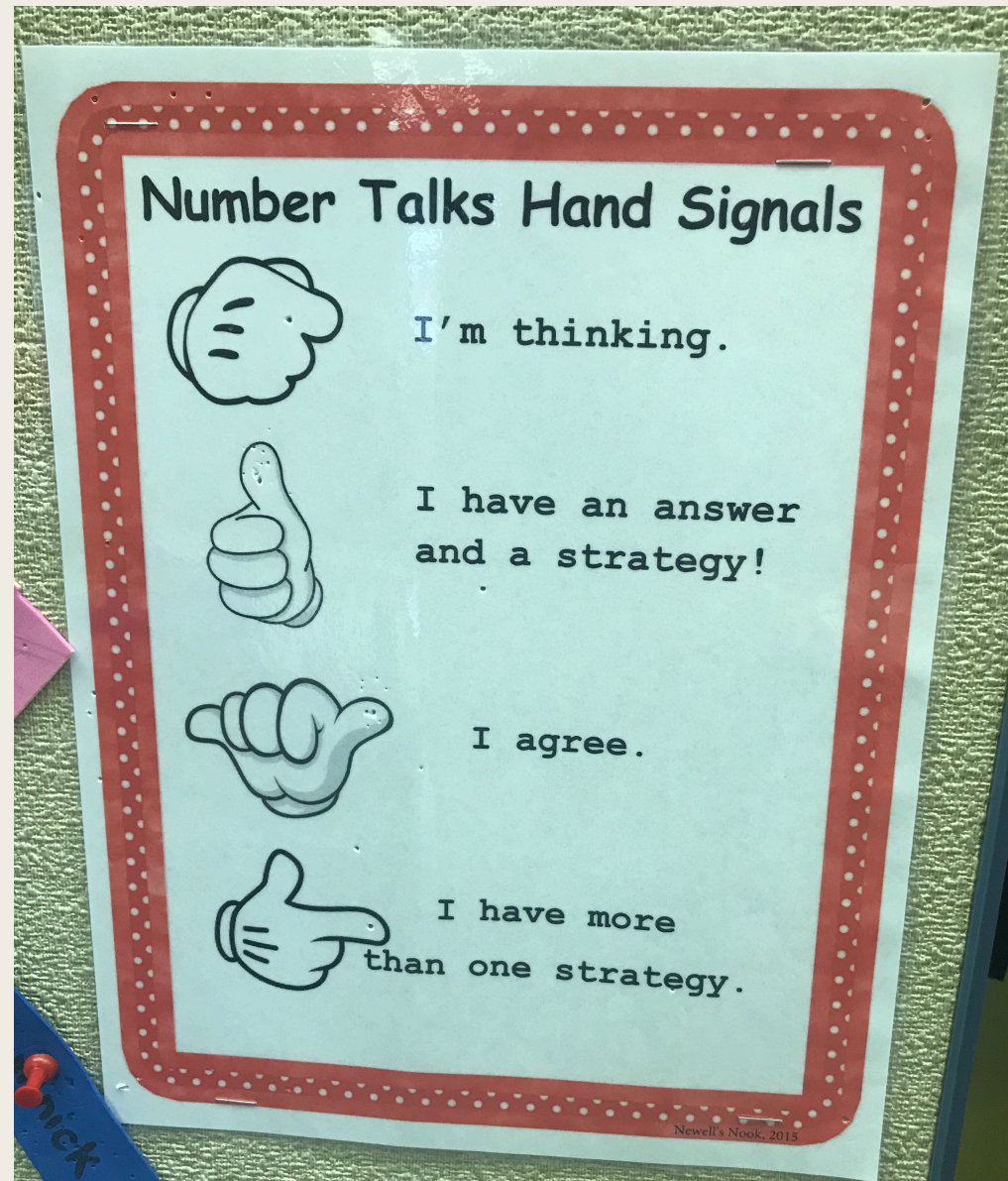
I talk about  
numbers all  
the time

# Number Talks Grounded in Sherry Parrish's Work





# Number Talks hand signals



# ASSESSMENTS

The useful kind



# What type of assessments do you typically use to assess basic skill understanding?



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# Assessments

"They are more than timed tests, check my progress and end of the chapter tests"

- 1<sup>st</sup> grade teacher

- Check sheets (Accuracy Table) grounded in strategy acquisition
- Automaticity interviews
- Notecards used during games
- Strategy Identified Fact Fluency Quiz
- Reflex

# Automaticity Interviews

## Math Fact Automaticity Interview

Student: _____		Date: _____	
Fact Set: _____		Score: _____	
Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:
Fact:	Fact:	Fact:	Fact:
Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:
Fact:	Fact:	Fact:	Fact:
Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:
Fact:	Fact:	Fact:	Fact:
Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:	Automatic (2)____ Strategy (1)____ Unknown (0)____ Note:
Fact:	Fact:	Fact:	Fact:
<p>14-20 points: Student demonstrates automaticity of the fact set.</p> <p>11-13 points: Student demonstrates some automaticity and strategies for finding facts. Further practice is needed.</p> <p>0-10 points: Student demonstrates challenges with basic facts. Reteaching and practice is needed.</p>			

Student Name \_\_\_\_\_

Date: \_\_\_\_\_

Fact Set: Make Ten, Near Doubles, Count On, Derived Fact

Score: \_\_\_\_\_

Auto (2)____ Strategy (1)____ Unknown (0)____ Note:	Auto (2)____ Strategy (1)____ Unknown (0)____ Note:
<b>Fact: 9+7</b>	<b>Fact: 7+6</b>
Auto (2)____ Strategy (1)____ Unknown (0)____ Note:	Auto (2)____ Strategy (1)____ Unknown (0)____ Note:
<b>Fact: 8+6</b>	<b>Fact: 4+9</b>
Auto (2)____ Strategy (1)____ Unknown (0)____ Note:	Auto (2)____ Strategy (1)____ Unknown (0)____ Note:
<b>Fact: 9+6</b>	<b>Fact: 4+6</b>
Auto (2)____ Strategy (1)____ Unknown (0)____ Note:	Auto (2)____ Strategy (1)____ Unknown (0)____ Note:
<b>Fact: 7+8</b>	<b>Fact: 3+8</b>
Auto (2)____ Strategy (1)____ Unknown (0)____ Note:	Auto (2)____ Strategy (1)____ Unknown (0)____ Note:
<b>Fact: 9+8</b>	<b>Fact: 7+5</b>

# Accuracy and Strategy Tables

## -- "Assessing Basic Fact Fluency" appendix

### Accuracy Table for Addition Facts

[illegible]

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→ "Assessing Basic Fact Fluency" appendix

### Strategy Tracking Table: Addition Facts

[illegible]

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# Fact Fluency Quiz and Strategy Rubric

→ activity sheet

Name \_\_\_\_\_

## Multiplication Fact Fluency Quiz

Solve these problems and tell how you solved them.

$4 \times 5 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

$10 \times 6 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

$6 \times 2 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

$5 \times 3 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

$2 \times 9 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

$3 \times 10 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

$5 \times 7 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

$8 \times 10 =$  \_\_\_\_\_ Check one: \_\_\_\_\_ I used this strategy: \_\_\_\_\_  
 \_\_\_\_\_ I just knew.

From the April 2014 issue of **children's mathematics**

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### Addition & Subtraction within 20 Strategy Rubric

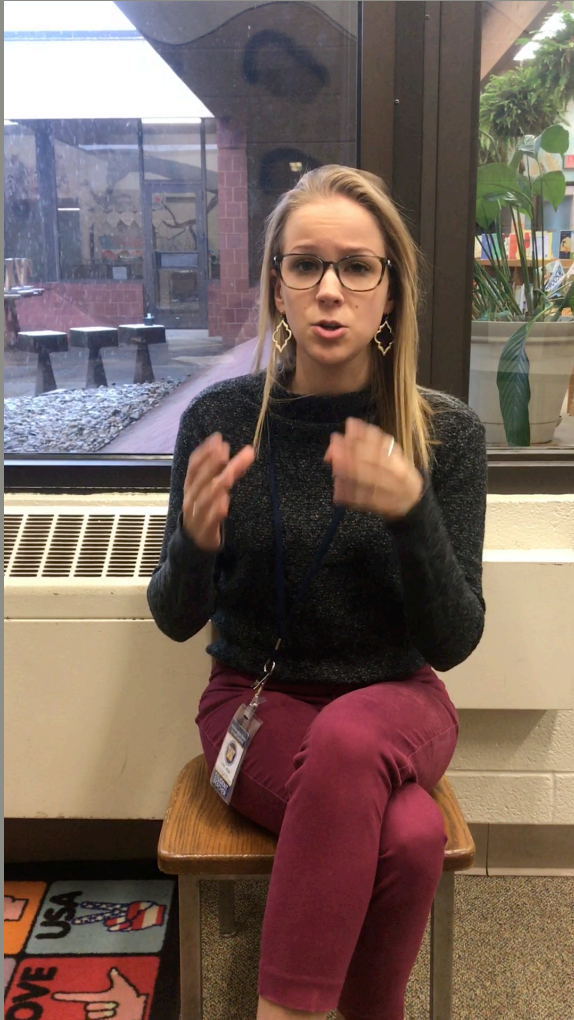
Categories	Problem	Student Work/Thoughts	Rubric Score
<b>Add within 5</b> K.CC.B.5 & 1.OA.C.6	$3 + 2$		
<b>Add 1 or 2 more than a number</b> K.CC.B.5 & 1.OA.C.6	$7 + 2$		
<b>Subtract 1 or 2 less than a number</b> K.CC.B.5 & 1.OA.C.6	$9 - 1$		
<b>Add 0 &amp; Subtract 0</b> 1.OA.B.3	$13 + 0$ $17 - 0$		
<b>Using 5 as a Benchmark</b> 1.OA.C.6	$3 + 4$		
<b>Create combinations that make 10</b> K.CC.B.5 & K.OA.A.4	What number can be combined with 4 to make ten?		
<b>Add 10 more than a given number within 20</b> K.NBT.A.1 & 1.NBT.C.5	$6 + 10$		
<b>Subtract 10 from a given number within 20</b> K.NBT.A.1 & 1.NBT.C.5	$18 - 10$		
<b>Double Facts</b> K.CC.B.5 & 1.OA.C.6	$4 + 4$ $9 + 9$ $7 + 7$		
<b>Addition: Uses Doubles</b> K.CC.B.5 & 1.OA.C.6	$7 + 6$		

# iPads and Reflex Math



# PRE-SERVICE TEACHER INVOLVEMENT





- Co-teaching with us
- Embedded course with number talks each semester
- PSTs participated in PLC meetings
- “Looping”
  - Spring 2017 the teachers and PSTs were introduced to games that promote basic skill acquisition via math stations
  - Spring 2018 the PSTs returned to the classroom where their cooperating teacher is now using guided math as the main mode of instruction.

LESSONS LEARNED





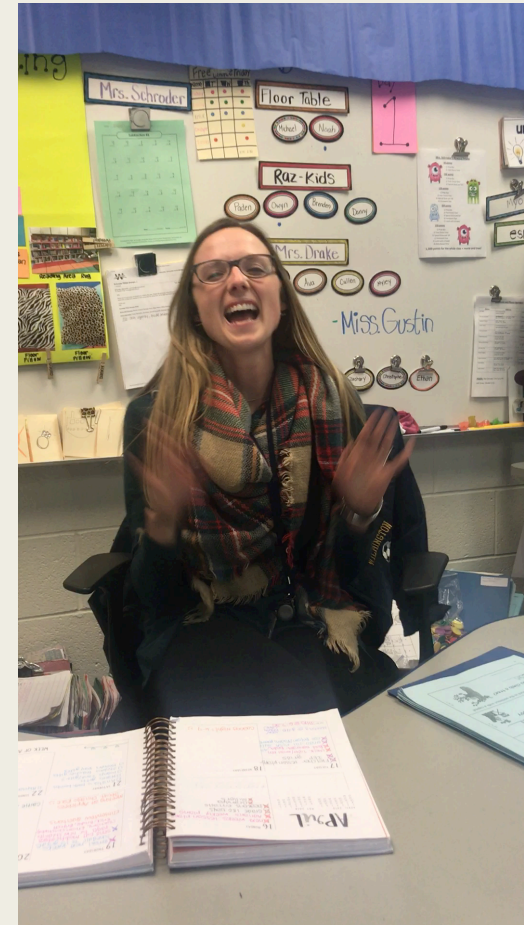
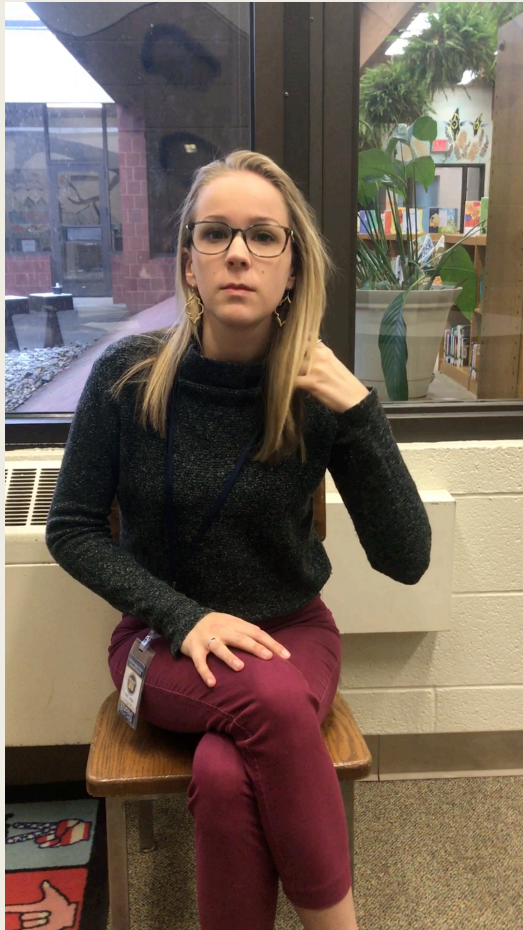
# Our thoughts...

- Administrative support is *critical*
- Patience and persistence
- Trial and error
- Support... support... and more support

- *In case you missed the previous information, we think support is pretty important for the success of just about anything you want to do/change in a school (or the world). Well maybe not the world because you can change the world on your own...*

*Rosalind Franklin did.*

# Now from people who actually matter...



# More from people who actually matter...

2<sup>nd</sup> grade teacher:

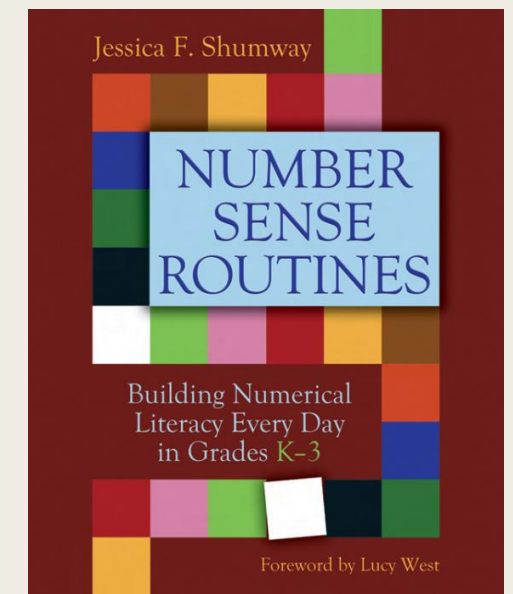
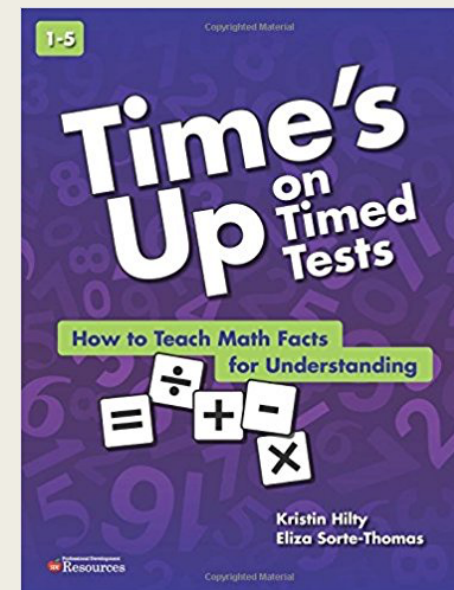
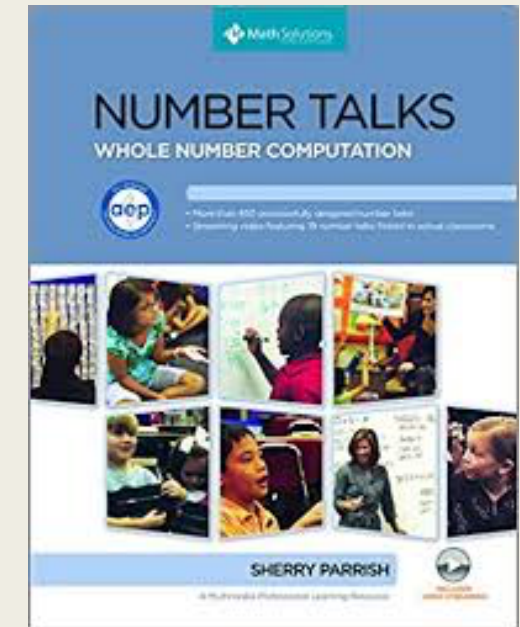
*“I prefer working with small groups in math because my instruction is tailored to the students I am working with. My students feel less intimidated to explain their thinking in a small group and it’s helped to build confidence.”*

1<sup>st</sup> grade teacher:

*“I can not imagine teaching my class in other way now. It is a lot of work but it is what is best for me and the students.”*

# Book Resources

- Mastering Basic Math Skills by Bonnie Britt, NCTM
- Number Talks Sherry Parrish, Math Solutions
- Times Up on Timed Tests by Kristin Hilty and Eliza Sorte-Thomas, SDE Resources
- Number Sense Routines: Building Numerical Literacy Every day in grades K-3, Jessica Shumway, Stenhouse



# Related Sessions at NCTM 2018

- 149.1 Deepen the Fun! Engage Students in Number Games as They Communicate to Understand Number Concepts, Tutita Casa & Linda Sheffield Thursday 1:30-1:45
- 181 Number Talk: A Classroom Routine to Elicit Student Thinking and Build Procedural Fluency, Esther Billings & Kathryn Coffey, Thursday 3-4 PM
- 223 Five Fantastic Fluency Routines, Jennifer Bay-Williams, Thursday 3:15-4:30 PM
- 314 Crafting Powerful Number Talks in Elementary Classrooms, Thomas Hodges, George Roy, and Lindsay Head, Friday 9:30-10:30AM
- 336 Whole School Agreements: Avoiding Rules That Expire, Barb Dougherty, Karen Karp, and Sarah Bush, Friday 9:30-10:30 AM
- 352 Conceptual vs. Procedural Understanding: Empowering Students through Concept Development, Judy Rodgers & Shirley Fortenbaugh Friday 9:45- 11 AM
- 377 Formative Assessment: Brought to You by the Number 5, Jon Wray, Friday 11AM- 12PM

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# YOUR THOUGHTS

Questions and ideas for moving forward

