Using Number Talks in Middle School

National Council of Teacher of Mathematics

April 14, 2016

San Francisco, California

Joe Giera Math Coach, South Milwaukee, WI
Beth Schefelker, Math Coach, South Milwaukee, WI
Connie Laughlin, UWM Consultant, Milwaukee, WI

Common Concerns from Middle and High School Teachers

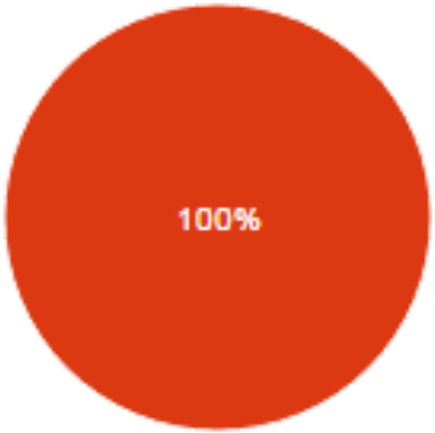
"students don't know their basic facts."

"students can't add and subtract whole numbers much less fractions!"

"students can't divide"

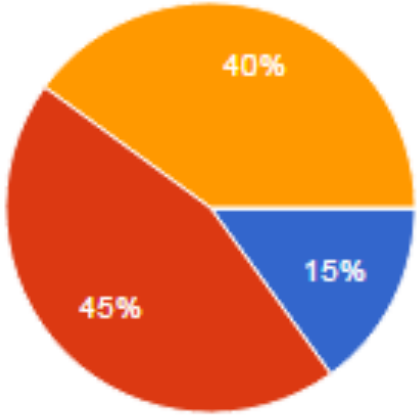
"students can't solve a problem because they can't work with the numbers that are there."

Are you satisfied with our student's ability to "compute" with numbers?



Yes	0	0%
No	20	100%

What percent of our students, do you believe, are fluent in computation?



0 - 20%	3	15%
21 - 40%	9	45%
41 - 60%	8	40%
61 - 80%	0	0%
81 - 100%	0	0%

Shifting Teacher Perspectives

Previous Practice

- Paper/pencil practice
- Unrelated computation problems
- Explicit teacher modeling
- NO Calculators!

Where we want to be

- Computational fluency with a focus on "sense-making".
- Flexible computation based on mental strategies.
- Recognize and articulate the strategy (thinking) used
- Understand connections between strategies

High-Leverage Mathematics Teaching Practices

- Establish mathematics goals to focus learning.
- Implement tasks that promote reasoning and problem solving.
- Use and connect mathematical representations.
- Facilitate meaningful mathematical discourse.
- Pose purposeful questions.
- Build procedural fluency from conceptual understanding.
- Support productive struggle in learning mathematics.
- Elicit and use evidence of student thinking.

Number Talks: A vehicle to change perspectives

- Improve computational fluency.
- Improve classroom mathematical discourse.
- Improve use of representations to develop conceptual understanding.
- Deepen understanding of mathematical properties and how the properties work with different operations and numbers.

Forecast of session

What are Number Talks?

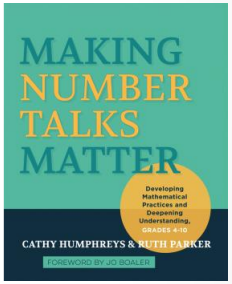
Peeking into Classrooms: Multiplication & Subtraction of Fractions

Lessons Learned

Hearing from Teachers and Students

What are Number Talks?

A brief daily practice where students mentally solve computation problems and talk about their strategies, as a way to dramatically transform teaching and learning in the mathematics classrooms.



Humphreys, C. & Ruth Parker (2015) Making Number Talks Matter: Developing Mathematical Practices and Deepening Understanding Grades 4-10. Stenhouse: Portland ME.

The Key to Number Talks: Purposeful Problems

Select problems that guide students to focus on mathematical relationships.

- Start where students are comfortable… whole numbers.
- Develop a series of related problems that scaffold →Number Strings.
- Develop Number Strings based on strategies.

Designing the problems require careful planning in order to push student thinking.

Checking on Multiplication

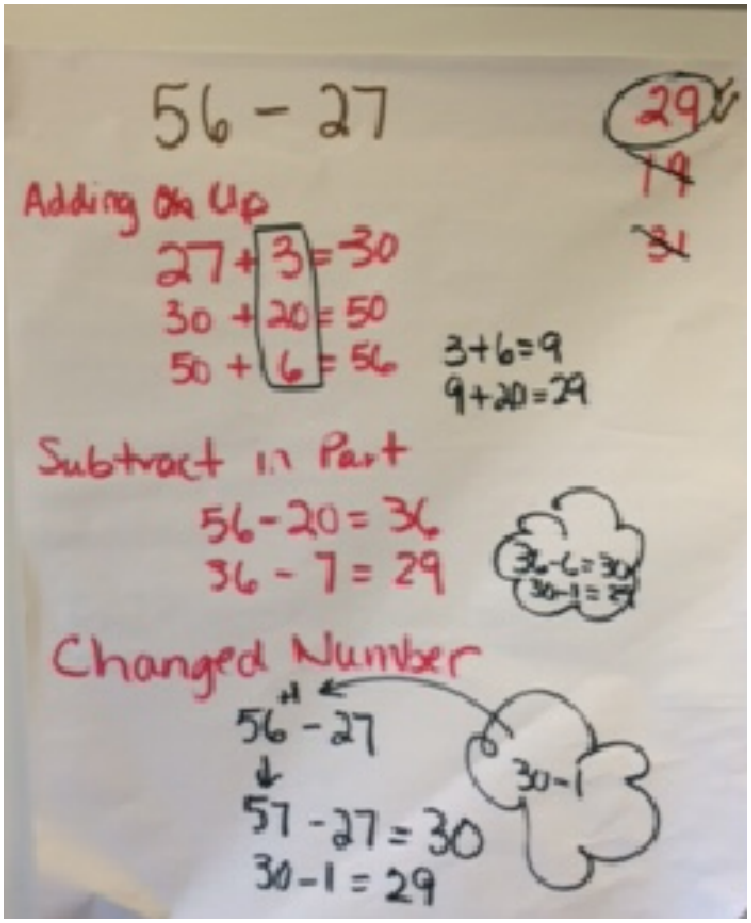
$7 \times \_\_\_\_ = 56$

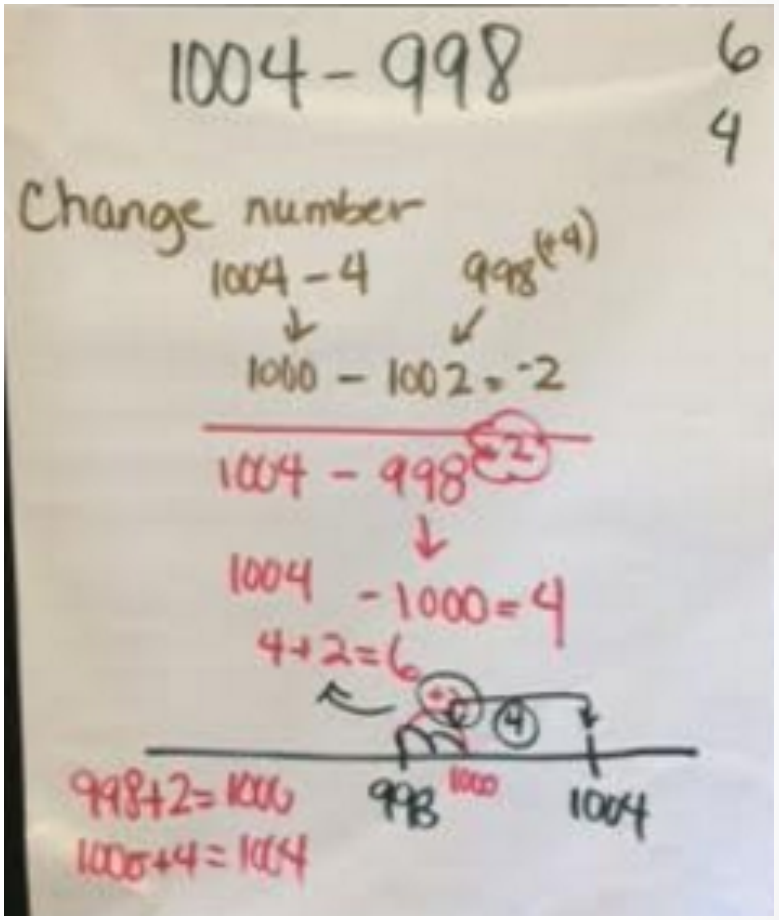
$56 \div 8 =$

$\frac{1}{8}$ of 56

$\frac{3}{8}$ of 56

Surfacing Subtraction Strategies Starting with Whole Numbers





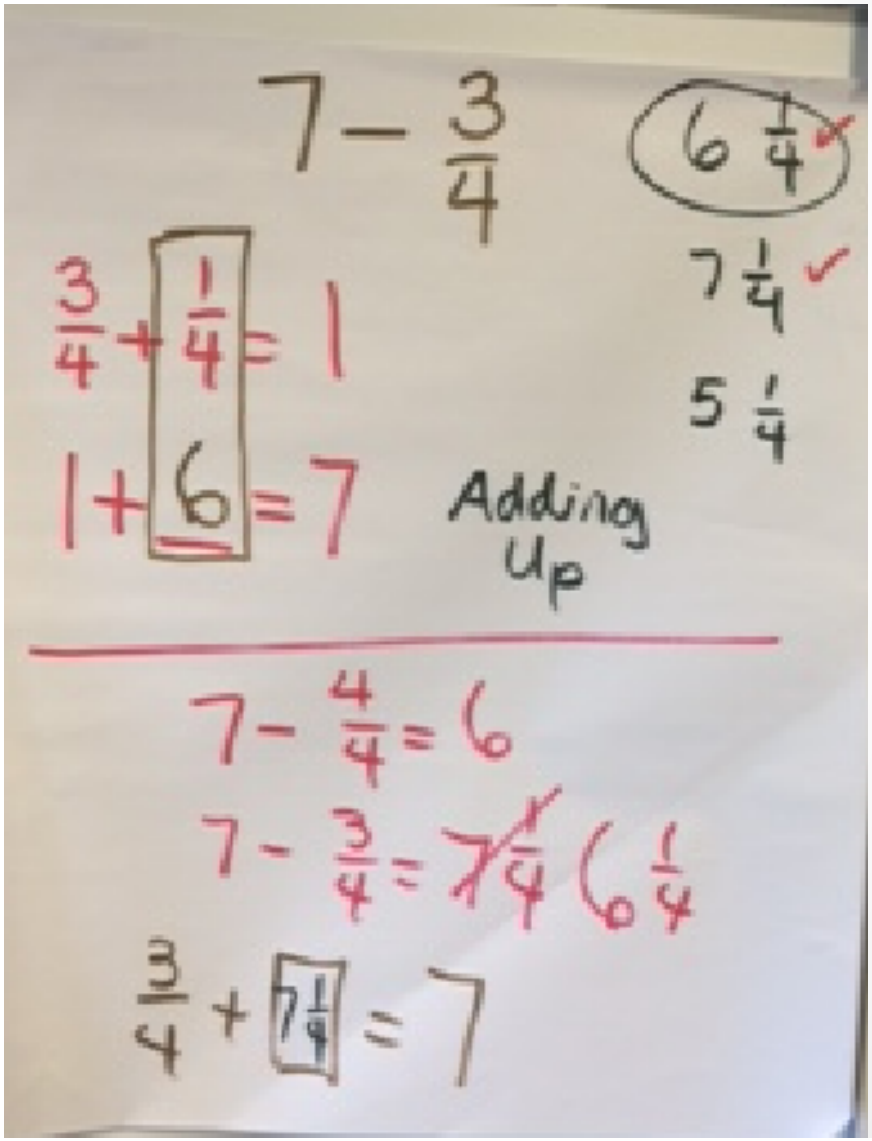
Applying Subtraction Strategies to Reason with Fraction Problems

Adding Up

Same difference

Round the Subtrahend and adjust.

Decompose the subtrahend



Peeking into 6th Grade

Solve the problem mentally.

Think carefully about your strategy.

$17\frac{1}{4} - 9\frac{5}{8}$

Work with your shoulder partner.
One person describes his/her strategy.
Your partner records the strategy.
Switch roles.

Peeking into Classroom #3

Mentally solve each problem in the number string.

Turn and Talk:
Why did the teacher develop this set of problems?

What do you think was the intended goal?

17.5 – 8.7

19 – 4 ⅝

19 ⅜ - 4 ⅝

7 ½ - 3 ⅞

Lessons Learned

Number Talks must be done on a regular basis – routinely.

Focus on strategies was critical in helping “all” students make connections and improve their mental math fluency.

Surfacing strategies by starting with whole number operations allowed students to transfer their thinking to rational numbers.

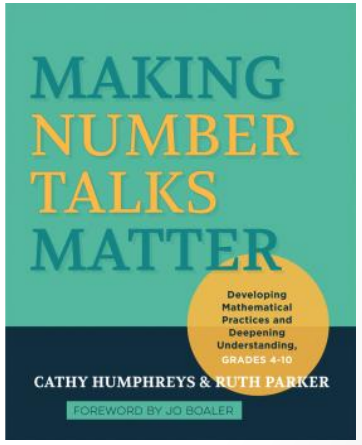
Start with only 2 – 3 problems for students to discuss.

Limit time to approximately 10 minutes.

Use each number talk to learn about your students thinking.
Don’t underestimate your students ability to think.

Lessons Learned: Number Talks

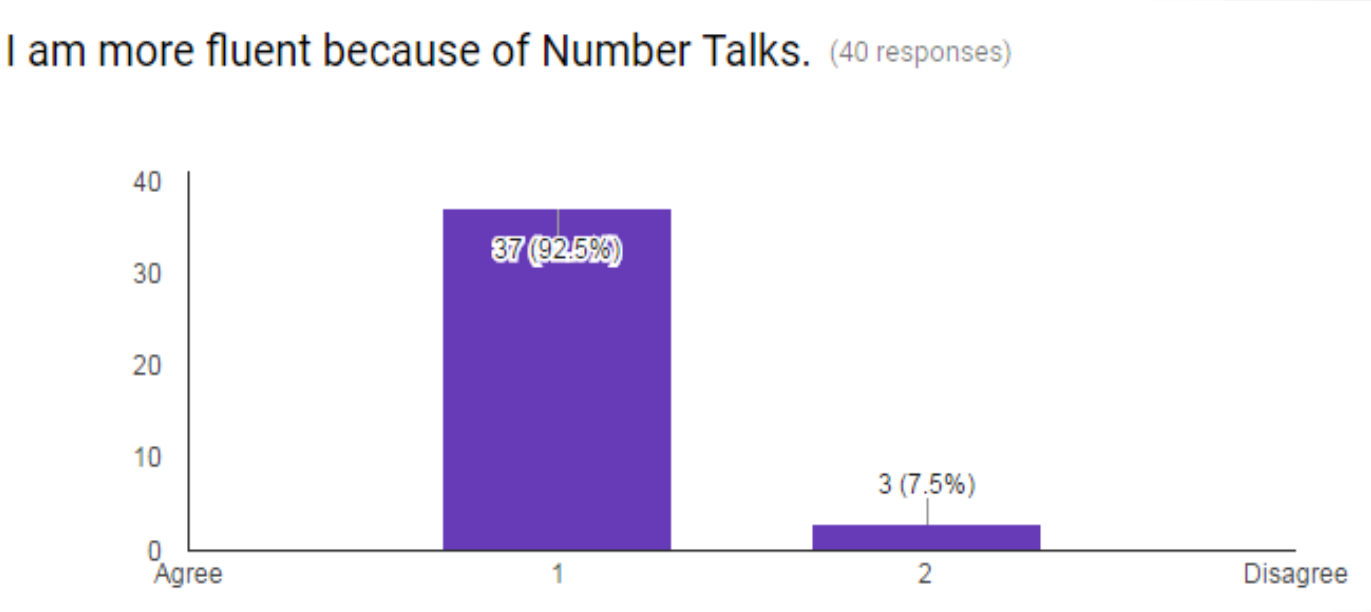
Although Number Talks are a short daily routine, there is nothing routine about them. They appear deceptively easy…but each Number Talk takes on a life of their own…there is no road map to follow. (p.161)

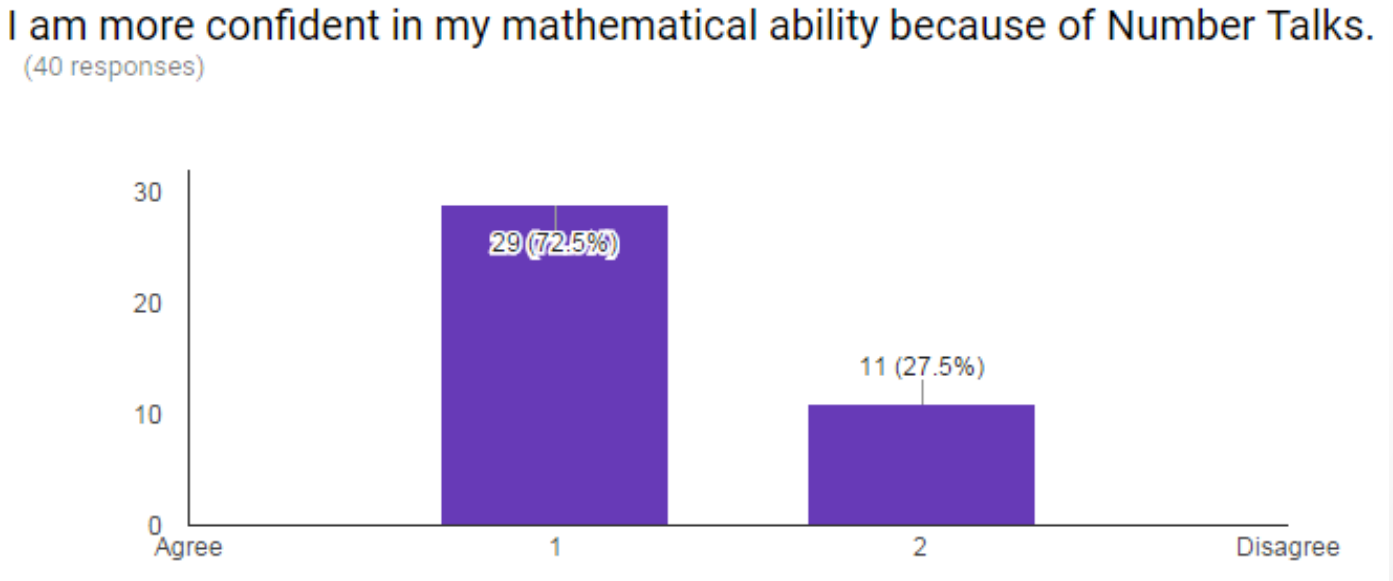


Benefits of doing number talks

- Students clarify their own thinking.
- Students investigate and apply mathematical relationships.
- Students take ownership to listen and respond to each other.
- Builds a repertoire of efficient strategies.
- Strengthens the mathematical community within a classroom.

Student Survey

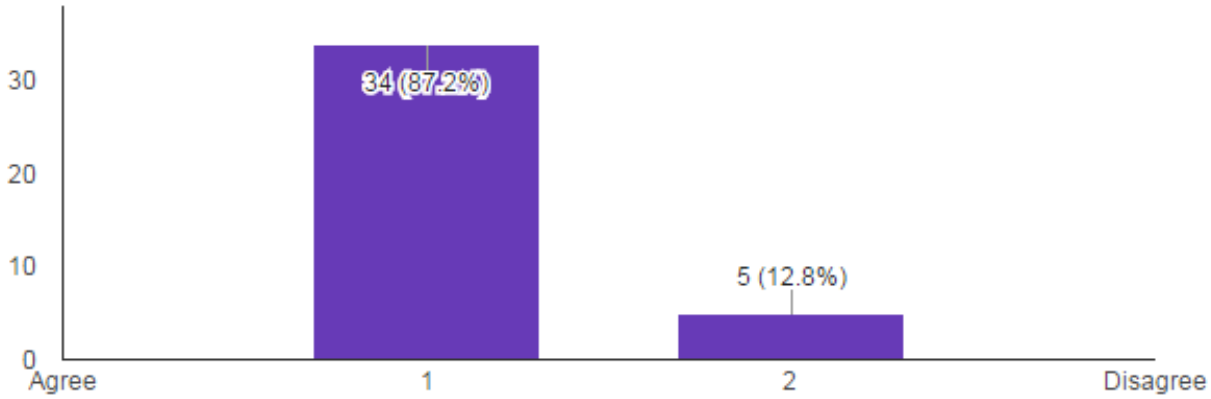




Student Survey

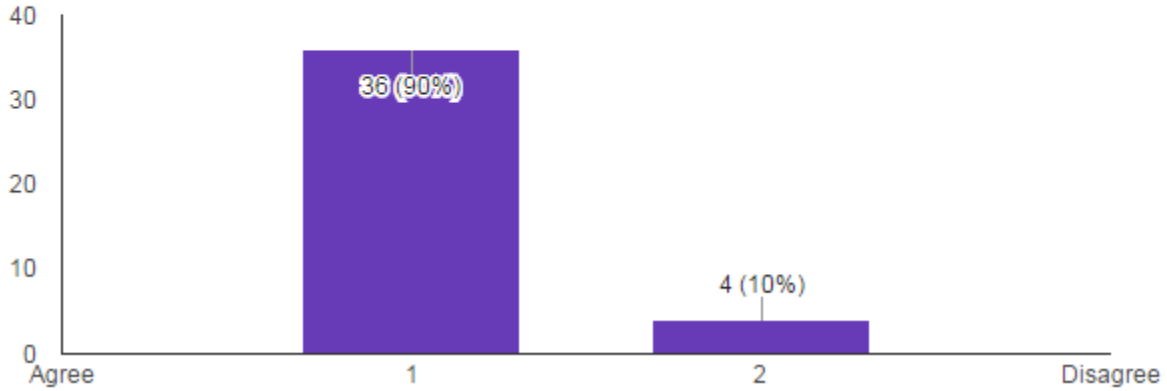
Participating in daily Number Talks has made me more flexible with numbers?

(39 responses)



Participating in daily Number Talks has increased the number of strategies I know and use.

(40 responses)



Hearing from Teachers

I have watched number talks have a positive impact in terms of building a math community. My students respectfully listen to one another. *5th Grade Teacher*

My struggling learners are more engaged and willing to share ideas in class. *7th Grade Teacher*

Number talks have really helped me understand student thinking. *9th Grade Teacher*

Baily's Thoughts…

"In the past, I didn't share my ideas in class. I just listened to what the teacher told us to do. In number talks I am learning from other students. And LOVE to share my ideas."

"I could never do fractions, those were too hard, really though, I only need to use the same strategies I use with regular numbers [whole numbers].

I even taught my mom to "add up" but she wasn't sure if we were allowed to use that method!

Grade 6

Thank You For Coming

- Joe Giera, Math Coach
  - School District of South Milwaukee
  - South Milwaukee, WI
  - jgiera@sdsm.k12.wi.us

- Beth Schefelker, Math Coach
  - School District of South Milwaukee,
  - South Milwaukee, WI
  - bschefelker@sdsm.k12.wi.us

- Connie Laughlin, Consultant
  - University of Wisconsin – Milwaukee
  - Milwaukee, WI 53211
  - Laughlin.connie@gmail.com