
 **California Mathematics Council - South**
55th Annual Mathematics Conference
October 24 - 25, 2014 | Palm Springs Convention Center
www.cmc-south.org


Number Talks-Fractions

PRESENTED BY
SHELAH FELDSTEIN & KIM WEBB

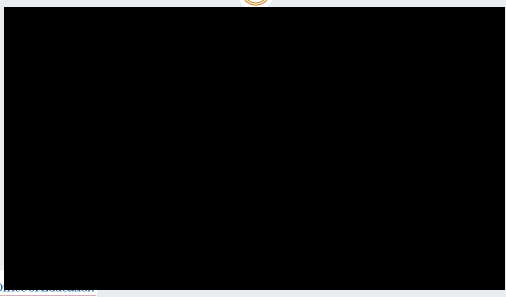

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Let's Number Talk!

15 x 18


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Jo Boaler on Number Talks



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<https://www.youtube.com/watch?v=yXNG6GKPhQM>

Number Talks Overview

- Daily, 5-15 minutes
- Mental math problems posed
- Students are given think time and indicate a solution and multiple strategies
- Students share solutions and explain their thinking
- Encourages students to communicate about math
- The teacher acts as a facilitator and his/her primary function is to question students and record thinking.

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Mathematics Talks – Encouraging Student Thinking and Mathematical Reasoning by Sherry Parrish

Why Number Talks?


“The power in the number talks comes from inspiring each child to think and make sense of the mathematics they are presented. They are never trying to figure out what the teacher wants. Rather, they are totally engaged in their own sense making process...a number talk is an opportunity for children to learn that they can figure things out for themselves in the way that makes sense to them. This is the true meaning of life-long learner.”

-Kathy Richardson

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8 Mathematical Practices

MATHEMATICALLY PROFICIENT STUDENTS...

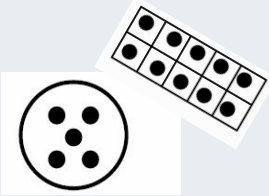


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1. **Make sense of problems and persevere** in solving them
2. Reason abstractly and quantitatively
3. **Construct viable arguments and critique the reasoning** of others
4. Model with mathematics
5. Use appropriate **tools** strategically
6. Attend to **precision**
7. Look for and **make use of structure**
8. Look for and express **regularity in repeated reasoning**

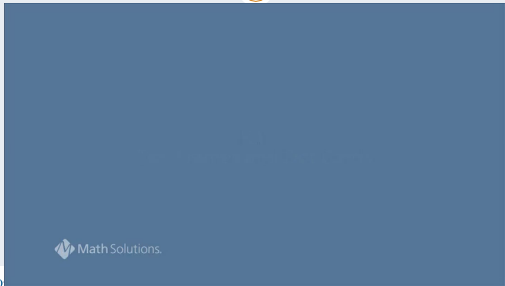
Subitizing

- **Subitizing**- The ability to glance at group of objects and quickly see how many there are without counting them one by one.
 - Perceptual Subitizing
 - Conceptual Subitizing



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Ten Frames-Kindergarten



Math Solutions.
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Tenths and fifths

- What is the relationship between the number ten and fractions?
 - Explain your reasoning and critique the reasoning of your partner.


If students can see ones in a ten, then they can see tenths in a one.

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One is 1...or is it?




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- If a serving is $\frac{1}{2}$ cup of juice, how many students will I be able to serve?


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- Consider the various ways we can think of the quantity:
 - 2 and one half whole cups $(2\frac{1}{2})$
 - 2 whole cups and one half cup serving $(2 + \frac{1}{2})$
 - Five half cup servings $(\frac{5}{2}) = 5 * (\frac{1}{2})$

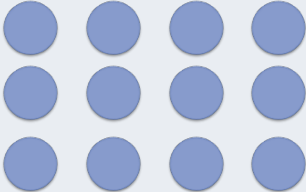
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Tell Me What You See



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How do you see ____?



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“Why Americans Stink At Math”

A&W made a $\frac{1}{3}$ pounder that tasted better than McDonalds $\frac{1}{4}$ pounder and was cheaper...

Why do you suppose the public didn't buy the A&W burger?

New York Times, “Why Americans Stink at Math” July 23rd, 2014

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Decomposing with Whole Number

7

2+5

3+4

1+6

7+0

1+1+1+1+1+1

1+1+5

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Compose/Decompose

- $\frac{7}{10}$ “7 tenths” is composed of:
 - $\frac{2}{10}$ “2 tenths” + $\frac{5}{10}$ “5 tenths”
 - $\frac{3}{10} + \frac{4}{10}$
 - $\frac{1}{10} + \frac{6}{10}$
 - $\frac{7}{10} + \frac{0}{10}$
 - $\frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10}$
 - $\frac{1}{10} + \frac{1}{10} + \frac{5}{10}$

Unit fraction:
A fraction
with a
numerator of
1, such as $\frac{1}{3}$
or $\frac{1}{5}$.

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California Department of Education. Math framework Glossary.

Composing to Solve

- $\frac{1}{4} + \frac{1}{16} + \frac{1}{8} + \frac{1}{16} + \frac{1}{2}$
- $\frac{1}{2} + \frac{1}{12} + \frac{1}{6} + \frac{1}{6} + \frac{1}{12}$
- $\frac{1}{4} + \frac{1}{2} + \frac{1}{16} + \frac{1}{16}$
- $\frac{1}{4} + \frac{1}{2} - \frac{1}{16} - \frac{1}{16}$

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Group Chant

- Fractions = Numbers
- “Fractions are Numbers”
- “Fractions are the same as Numbers”

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Fractions as Distinct Numbers

Scheme:
Unit (whole)
Unitizing (parts)

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Guiding Questions

- How did you think about that?
- How did you figure it out?
- What did you do next?
- Why did you do that? Tell me more.
- Who would like to share their thinking?
- Did someone solve it a different way?
- Who else used this strategy to solve the problem?
- What strategies do you see being used?
- Which strategies seem to be efficient, quick, and simple?

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Number Talks

$35 \times 1/5 =$

$35 \times 3/5 =$

$35 \times 7/5 =$

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Number Talks

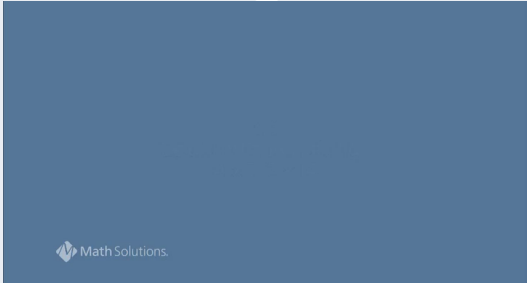
About what is the sum of $7/8$ and $12/13$?

a. **1** (25%)
b. **2** (25%)
c. **19** (25%)
d. **Don't know** (25%)

National Center for Education Statistics
<http://nces.ed.gov/nationsreportcard/>

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Multiplication Number Talk



Math Solutions.
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Let's Try It!

$$\frac{1}{4} \times \frac{1}{2}$$

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Models

- Set
- Area
- Linear
 - Number Line
 - Tape Diagram

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Let's Fractions Talk

- $2 \times 1\frac{1}{2} \times 1\frac{1}{3} \times 1\frac{1}{4} \times 1\frac{1}{5} \times \dots \times 1\frac{1}{99}$

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Do you see...How do you see it?

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Can you see...How do you see it?

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Try some mental math

- $3 \frac{1}{2} - \frac{5}{8}$
- $3.6 - 1.95$

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NAEP

○

Estimate 3.04×5.3

	13 years	17 years
A) 1.6	28%	21%
B) 16	21%	39%
C) 160	18%	17%
D) 1600	23%	11%
E) I don't know	9%	12%

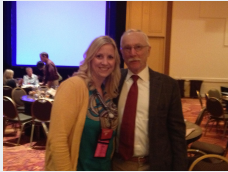
National Assessment of Educational Progress

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“...you can't really do mental math without doing algebra. This is algebraic reasoning at its purest level.”

-Phil Daro, 2010



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Introduction of Fraction Concepts	
3rd Grade <ul style="list-style-type: none"> • Equivalence • Unitizing • Compare <ul style="list-style-type: none"> ○ Same Denominator ○ Same Numerator 	5th Grade <ul style="list-style-type: none"> • Adding/Subtracting <ul style="list-style-type: none"> ○ Uncommon Denominators • Multiplying <ul style="list-style-type: none"> ○ Fraction by a Fraction • Dividing <ul style="list-style-type: none"> ○ Whole number by a fraction ○ Fraction by a whole number
4th Grade <ul style="list-style-type: none"> • Compare <ul style="list-style-type: none"> ○ Different Numerator and Denominators • Adding/Subtracting <ul style="list-style-type: none"> ○ Common Denominators • Multiplying <ul style="list-style-type: none"> ○ Fraction by a whole number • Decimal Fractions <ul style="list-style-type: none"> ○ Tenths and Hundredths 	6th Grade <ul style="list-style-type: none"> • Division <ul style="list-style-type: none"> ○ Fraction by a fraction • Ratios

Number Talks-Fractions: Emphasis

- Procedural Fluency with Fractions
- Estimation
- Fraction as a Distinct Number
- Properties - Reasoning
- Multiple Contexts and Models

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Sherry Parrish

Let's Reflect

- "I used to think my job was to teach students to see what I see. I no longer believe this. My job is to teach my students to see; and to recognize that no matter what the problem is, we don't all see things the same way. But when we examine our different ways of seeing, and look for the relationships involved, everyone sees more clearly; everyone understands more deeply."

-Ruth Parker

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Number Talking with Ruth Parker



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Resources

- California Department of Education
<http://www.cde.ca.gov/ci/ma/cf/draft2mathfwchapters.asp>
- Number Talks-Sherry Parrish
- Visible Learning for Teachers – John Hattie
- Ruth Parker, Ph.D – CEO of the Mathematics Education Collaborative
- Edmodo: Small Schools (join code: rvkwvc)
www.edmodo.com



Feedback and Contact

Please go to the following link and give us feedback:
<http://bit.ly/TCOE2014>

Shelah Feldstein - [@FeldsteinShelah](https://twitter.com/FeldsteinShelah)
o Shelahf@ers.tcoe.org

Kim Webb - [@NoodleKimw](https://twitter.com/NoodleKimw)
o Kimw@ers.tcoe.org



Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

Send your text message to this Phone Number: 37607

5 digit poll code for this session

39809

(1 space)

Speaker was engaging and an effective presenter (0-3)

(no spaces)

Other comments, suggestions, or feedback (words)

(1 space)

Speaker was well-prepared and knowledgeable (0-3)

Session matched title and description in program book (0-3)

Example: **38102 323 Great session!**

Non-Example: 38102 3 2 3 Great session!

Non-Example: 381023-2-3Great session!
