December 2, 2017

BUILDING FRACTION UNDERSTANDING THROUGH NUMBER TALKS

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Tulare County Office of Education
Jim Vidak, County Superintendent of Schools

www.commoncore.tcoe.org

SESSION DESCRIPTION

Fractions are often difficult for students.

This session will focus on **number talks** and **routines** that support students in **communicating** their thinking and deepening their **understanding of fractions** and **fraction operations.**

Participants will learn key types of fraction number talks and routines that support the development of **student visualization** and **reasoning.**

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Mathematically proficient students…

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

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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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NAEP RESULTS

When eighth-grade students estimate the sum of 7/8 and 12/13?

a.	1	(7%)
b.	2	(24%)
c.	19	(28%)
d.	21	(27%)
e.	Don't know	(14%)

National Assessment of Educational Progress (NAEP)

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BUILDING AN EQUITABLE MATH EXPERIENCE FOR ALL

- Fractions are a pivotal point at which students often decide they are not "good at math." What can we as teachers do to turn these students around with regard to understanding fractions?

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NUMBER TALKS

- Counting by Fractions
- Number Talks to Build Fraction Reasoning
- Number of the Day
- Number Talks for Fraction Operations

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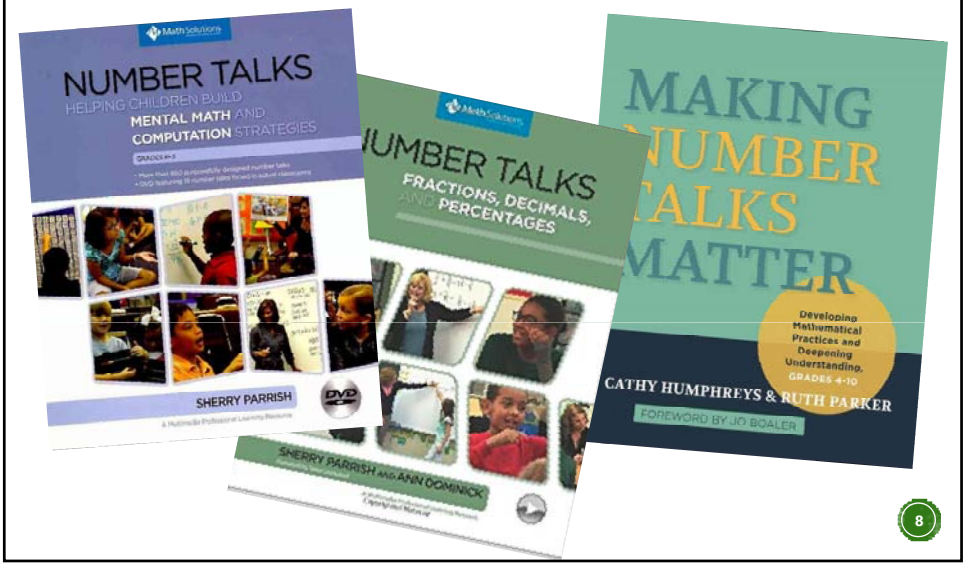
RESOURCES



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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.

Number Talks: Helping Children Build Mental Math and Computation Strategies, by Sherry Parrish

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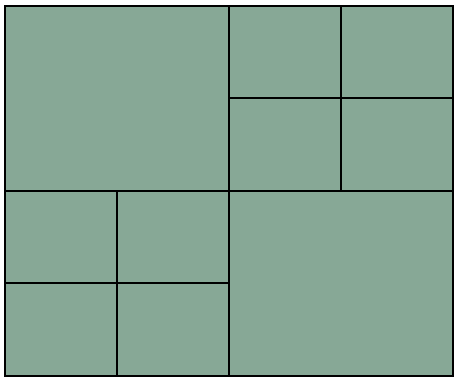
HOW DO YOU SEE $\frac{1}{8}$?



COUNTING BY FRACTIONS

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COUNTING BY FRACTIONS

- "Students should come to think of counting fractional parts in much the same way as they might count apples or any other objects."
- Example: " ...tell students what type of piece is being shown and simply count them together: "*one*-fourth, *two*-fourths, *three*-fourths, *four*-fourths, *five*-fourths." Ask, "If we have five-fourths, is that more than one whole, less than one whole, or the same as one whole?"

Teaching Student-Centered Mathematics: Grades 5-8.
Van de Walle and Lovin, page 67.

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ROUTINE: COUNTING BY FRACTIONS

- Count by fourths
- Count by fourths and clap when we say a whole number
- Count by thirds
- ....

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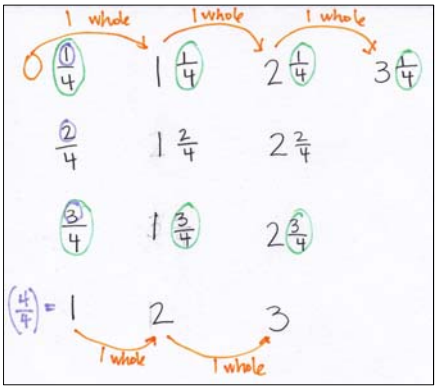
REPRESENTING COUNTING BY FRACTIONS

Charting and looking for patterns



http://tedd.org/wp-content/uploads/2015/01/Choral-Counting-Tasks-Ideas.pdf

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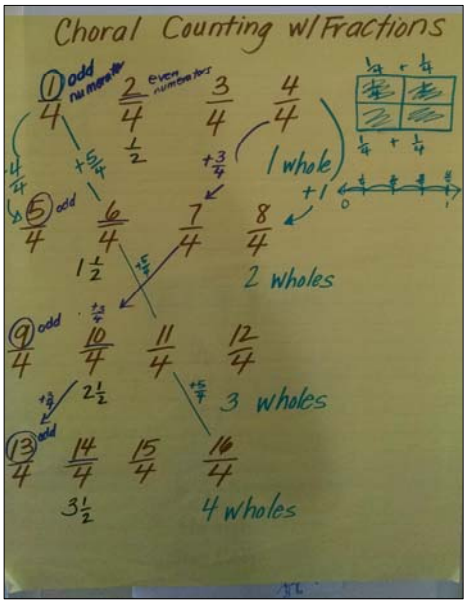
Looking for patterns



https://www.teachingonemoore.org/gallerynew/

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NUMBER TALKS - To Build Fractional Reasoning

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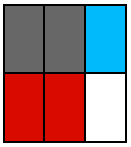
MODELS

- Set (not 3rd grade)
- Area
- Linear
  - Number Line
  - Tape Diagram



ONE		
1/2	1/2	
1/3	1/3	1/3

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HOW DO YOU SEE ____?

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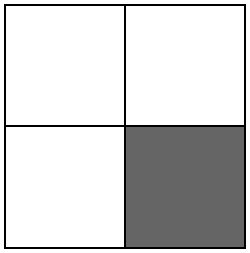
Which of these models represent ¼ of the whole? How do you know?

A.



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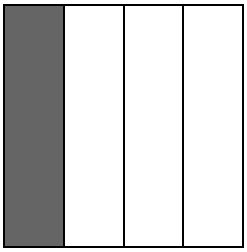
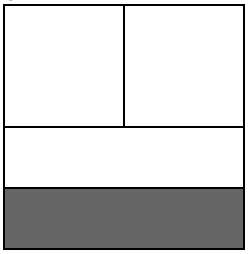


C.



Number Talks: Fractions, Decimals and Percentages Parrish and Dominik pg. 78

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NUMBER LINE

Place the following numbers on the number line?

How do you know where they go?

$\frac{1}{2}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{3}{4}$

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NUMBER LINE

Where should $\frac{5}{8}$ be placed on the number line?

How do you know?

Number Talks: Fractions, Decimals and Percentages Parrish and Dominik pg. 97

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COMPARISON

Which is less? How do you know?

Do not use common denominators or cross-multiplication

$\frac{7}{11}$ *or* $\frac{7}{9}$ $\quad$ $\frac{3}{7}$ *or* $\frac{5}{9}$ $\quad$ $\frac{8}{9}$ *or* $\frac{7}{8}$

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NUMBER OF THE DAY

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DECOMPOSING A WHOLE NUMBER

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2 + 5

3 + 4

1 + 6

1 + 1 + 1 + 1 + 1 + 1 + 1

1 + 1 + 5

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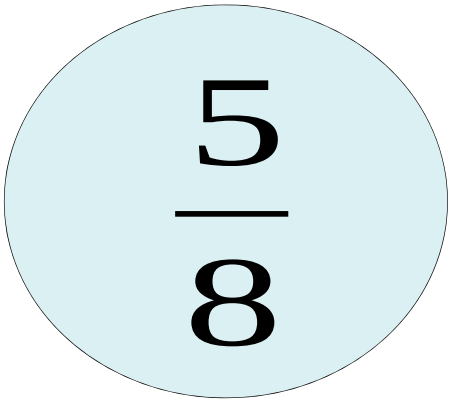
NUMBER TALK



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OPERATIONS WITH FRACTIONS

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ESTIMATE THE SUM

$$\frac{9}{10} + 2\frac{7}{8} =$$

Explain your reasoning.

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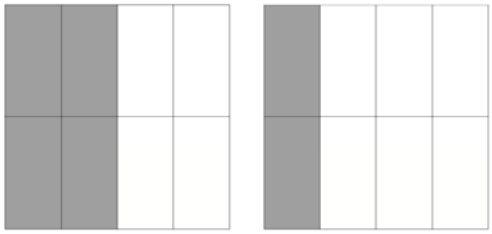
USING VISUALS

How can you solve ___ + ____?

B.



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

Number Talks: Fractions, Decimals and Percentages Parrish and Dominik pg. 151

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WHAT IS THE SUM?

$$\frac{1}{2}+\frac{7}{8}=$$

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NUMBER STRINGS

$$\frac{1}{2}+\frac{1}{2}=$$

$$\frac{1}{2}+\frac{3}{4}=$$

$$\frac{1}{2}+\frac{7}{8}=$$

Number Talks: Fractions, Decimals and Percentages Parrish and Dominik

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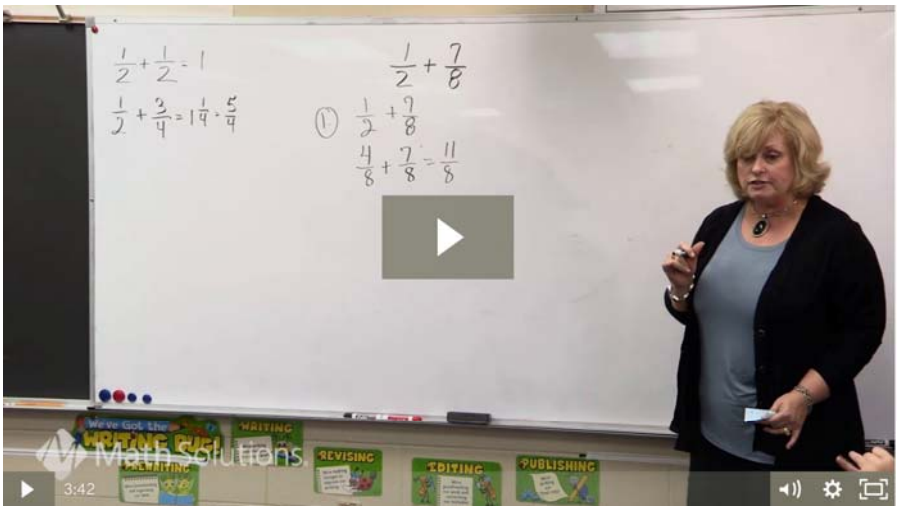

https://mathsolutions.wistia.com/medias/atho41a5fz

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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?

Ruth Parker, Central Valley Mathematics Network, 2014

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APPROXIMATING SUMS AND DIFFERENCES

▪ $\frac{88}{91}+\frac{5}{6}$	About $\frac{1}{2}$	About 1	About 2
▪ $\frac{1}{7}+\frac{5}{16}$	About $\frac{1}{2}$	About 1	About 2
▪ $5\frac{3}{4}-2\frac{1}{5}$	Less than 3	Greater than 3	

Making Number Talks Matter – Humphreys and Parker 33

NUMBER STRING

$$35 \times \frac{1}{5} =$$

$$35 \times \frac{3}{5} =$$

$$35 \times \frac{7}{5} =$$

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LET'S TRY IT!

$$\frac{1}{4} \times \frac{1}{3} =$$

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Classroom Clip 8.1_1/4 x 1/3: Developing Multiplication Strategies with Fractions
5:04

https://players.brightcove.net/5387496875001/experience_598925356205d5000f6480e3/share.html

Number Talks: Fractions, Decimals and Percentages Parrish and Dominik pg. 265

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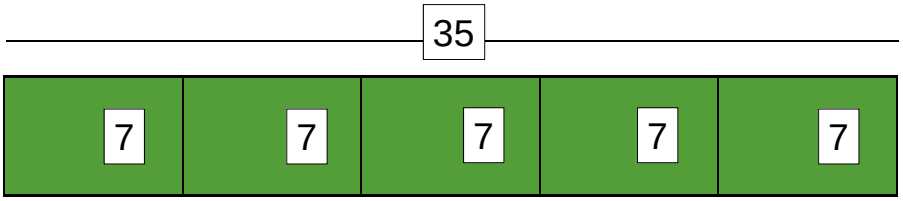
CONNECTIONS TO WHOLE NUMBERS

$$35 \div 7 =$$



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WHAT ARE YOU VISUALIZING?

$$1 \div \frac{1}{3} =$$

$$2 \div \frac{1}{3} =$$

$$2 \div \frac{2}{3} =$$

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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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RESOURCES

- Number Talks: Helping Children Build Mental Math and Computation Strategies by Sherry Parrish
- Number Talks: Fractions, Decimals, and Percentages by Sherry Parrish and Ann Dominick
- Making Number Talks Matter by Cathy Humphreys and Ruth Parker
- Website: Downey Unified – Fraction Number Talks
  - http://www.dusd.net/cgi/files/2012/12/fraction-number-talks.pdf

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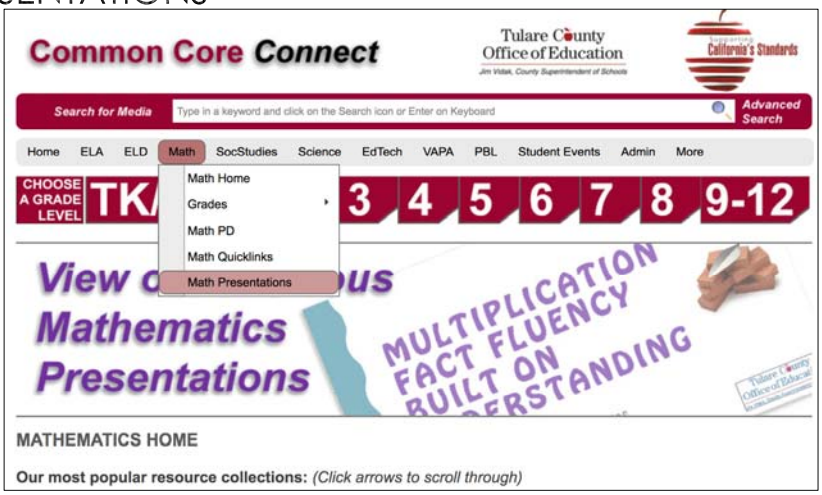
HTTP://COMMONCORE.TCOE.ORG/MATH/PRESENTATIONS



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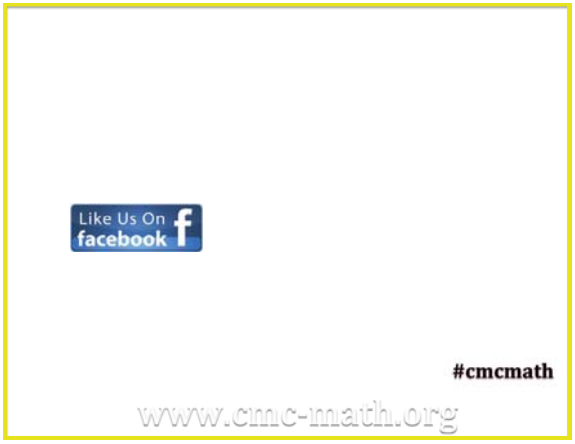

SESSION EVALUATION

- Please take the time to me give feedback on my session, it helps my planning for future sessions and it helps the conference committee determine your needs and wants.
- Use the EduPlus app by downloading it from the App Store or Google Play.
- Or go to http://e.confplusapp.com/
- Or ask the session presider for the paper version.
- At the end of the conference, don't forget to do the conference evaluation for a chance to win free registration and on-grounds housing for next year.