

Evening the playing field through facts fluency development

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Agenda

- ❑ Our Story
 - ❑ Number Talk
 - ❑ Problems
 - ❑ Video: Number Talk
 - ❑ Outcomes
 - ❑ Experience Audio-Notation
 - ❑ Planning for Your Students
 - ❑ Connection to the Standards
 - ❑ Resources
-

Our Story



Problems We Observed

- Last year, 80% of our 6th graders lacked basic fact fluency
 - Lacking basic operation skills (addition, subtraction, multiplication, division)
 - No strategies for calculations
 - All known facts based on memory or counting.
-

Number Talk Rules

1. No pencils or paper
2. Silent thinking time
3. Place a fist on chest when thinking
4. Use your fingers to show how many strategies you have
5. We will not start until everyone has at least **1** strategy
6. No raising hands until after the first strategy is shared
7. Hold comments until the end of the Number Talk

Number Talk

112(2)

112(2) 56(4)

112(2)

56(4)

28(8)

112(2) 56(4) 28(8) 14(16)

How might this activity give
access to all students to
participate?

Equality



Equity



What did we do?

- Began in October 2015
- Started with the addition strategy of Friendly 10's
- 10-15 mins daily (*almost*)



Friendly 10s

Katie

$$9 + 5$$

$$\begin{array}{r} 9 \quad 5 \\ 4 \quad \wedge \\ 1 \end{array}$$

$$9 + 1 = 10$$

$$10 + 4 = 14$$

Connor

$$\begin{array}{r} 9 \\ + 5 \\ \hline 14 \end{array}$$

Brooklyn

$$10 + 5 = 15$$

$$15 - 1 = 14$$

Rebecca

$$19 + 8$$

$$19 + 1 = 20$$

$$20 + 8 = 28$$

$$28 - 1 = 27$$

Shane

$$19 \quad 8$$

$$\begin{array}{r} 7 \quad \wedge \\ 1 \end{array}$$

$$19 + 1 = 20$$

$$20 + 7 = 27$$

Simone

$$20 + 8 = 28$$

$$28 - 1 = 27$$

$$28 + 39$$

Slater

$$\begin{array}{r} 28 \quad 39 \\ 20 \quad \wedge \quad 30 \quad \wedge \\ 8 \quad 9 \end{array}$$

$$8 + 9 = 17$$

$$20 + 30 = 50$$

$$50 + 17 = 67$$

Dylan

$$\begin{array}{r} 28 \\ + 39 \\ \hline 67 \end{array}$$

Kaydence

$$\begin{array}{r} 28 \quad 39 \\ 27 \quad \wedge \end{array}$$

$$39 + 1 = 40$$

$$40 + 27 = 67$$

By mid-October...

Dylan

$$\begin{array}{r} 99 + 38 \\ \text{38} \downarrow \\ 99 + 1 = 100 \\ 100 + 37 = 137 \end{array}$$

Abby

$$\begin{array}{r} 99 \\ + 38 \\ \hline 137 \end{array}$$

← ten

Lily

$$\begin{array}{r} 99 + 38 \\ 100 + 40 = 140 \\ 140 - 3 = 137 \end{array}$$

Colin

$$\begin{array}{r} 98 + 47 \\ \text{45} \downarrow \\ 98 + 2 = 100 \\ 100 + 45 = 145 \end{array}$$

Valentin

$$\begin{array}{r} 98 + 47 \\ \text{90} \quad \text{4} \quad \text{4} \quad \text{40} \quad \text{7} \\ 90 + 7 = 97 \\ 40 + 4 + 4 = 48 \\ 97 + 48 = 145 \end{array}$$

Catie

$$\begin{array}{r} 98 + 47 \\ \text{90} \quad \text{8} \quad \text{40} \quad \text{7} \\ 90 + 40 = 130 \\ 8 + 7 = 15 \\ 130 + 15 = 145 \end{array}$$

Julien

$$\begin{array}{r} 99 + 98 \\ \text{1} \quad \text{97} \downarrow \\ 99 + 1 = 100 \\ 100 + 97 = 197 \end{array}$$

Alain

$$\begin{array}{l} 99 \rightarrow 100 \\ 98 \rightarrow 100 \\ 100 + 100 = 200 \\ 200 - 3 = 197 \end{array}$$

Aria

$$\begin{array}{r} 99 + 98 \\ \text{90} \quad \text{9} \quad \text{40} \quad \text{8} \\ 90 + 90 = 180 \\ 9 + 8 = 17 \\ 180 + 17 = 197 \end{array}$$

Alyssa

$$\begin{array}{r} 99 + 99 + 5 \\ 100 + 100 = 200 \\ 200 + 5 = 205 \\ 205 - 2 = 203 \end{array}$$

Eva

$$197 + 6 = 203$$

Ian

$$\begin{array}{r} 99 + 99 + 5 \\ \text{1} \quad \text{1} \quad \text{3} \downarrow \\ 100 + 100 = 200 \\ 200 + 3 = 203 \end{array}$$

- Decomposing
- Making Friendly 10s
- Compensating
- Standard Algorithm

By February...

Naveen

$$5 \times 5$$

5, 10, 15, 20, 25

Sofia

$$\begin{array}{r} 5 \times 5 \\ \quad \swarrow \searrow \\ \quad 3 \quad 2 \\ + 5 \times 3 = 15 \\ + 5 \times 2 = 10 \\ \hline 5 \times 5 = 25 \end{array}$$

Sean

$$5 \times 10$$
$$5 \times 1 = 5$$
$$= 50$$

Slater

$$5 \times 10$$
$$\begin{array}{r} \quad \swarrow \searrow \\ \quad 5 \quad 5 \\ 5 \times 5 = 25 \\ 25 \times 2 = 50 \end{array}$$

Andy

$$5 \times 29$$
$$5 \times 29$$
$$\begin{array}{r} 60 \\ 9 \\ \hline 5 \times 9 = 45 \\ 5 \times 20 = 100 \\ \hline 5 \times 29 = 145 \end{array}$$

Brooklyn

$$5 \times 10 = 50$$
$$5 \times 10 = 50$$
$$\hline 5 \times 20 = 100$$
$$5 \times 9 = 45$$
$$\hline 5 \times 29 = 145$$

Kate

$$5 \times 30 = 150$$
$$- 5 \times 1 = 5$$
$$\hline 5 \times 29 = 145$$

Currently: Fractions

Alyssa $\frac{2}{3}(54)$
 $\frac{2}{3} \cdot \frac{54}{1} = \frac{108}{3}$

Idmy $108 \div 3 = 36$

Ava + Simone $54 \div 3 = 18$
 $18(2) = 36$

Phoebe $\frac{1}{3}(54)$
 $54 \div 3 = 18$
 $18 \text{ is } \frac{1}{3} \text{ of } 54$

Catie $\frac{1}{3} \cdot \frac{54}{1} = \frac{54}{3} = 18$

Ian $\frac{1}{2} \text{ of } \frac{2}{3} = \frac{1}{3}$
 $\frac{1}{2} \text{ of } 36 = 18$

Isabella $\frac{1}{6}(54)$
 $\frac{1}{6} \cdot \frac{54}{1} = \frac{54}{6} = 9$

Julian $\frac{4}{6}(54)$
 $\frac{4}{6} \cdot \frac{54}{1} = \frac{216}{6}$
 $54(2) = 108, 108 + 108 = 216$

Sam $\frac{1}{3}(54) = 18$
 $18(2) = 36$

Colin $\frac{4}{6} = \frac{2}{3}$
 $\frac{2}{3}(54) = 36$
 $\frac{1}{3}(54) = 18$
 $\frac{1}{3}(54) = 18$

Andy $\frac{1}{6}(54) = 9$
 $9(4) = 36$

Isabella $\frac{1}{3}(54) = 18$
 $\frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$
 $18 \cdot \frac{1}{2} = 9$

Currently: Fractions

Shane $\frac{2}{3}(54)$

$\frac{2}{3} \cdot \frac{54}{1} = \frac{108}{3}$

Noah $\frac{108}{3} = 36$

Katie $\frac{1}{3}(54)$

$\frac{1}{3} \cdot \frac{54}{1} = \frac{54}{3}$

Coltrane $36 \div 2 = 18$

$\frac{1}{3}$ is half of $\frac{2}{3}$

Alexis $54 \div 3 = 18$

Walter I heard you say, is

Yvonne $\frac{1}{6}(54)$

$\frac{1}{6} \cdot \frac{54}{1} = \frac{54}{6}$

Ellie $54 \div 6 = 9$

Katie $\frac{1}{3}(54) = 18 \rightarrow 18(\frac{1}{2}) = 9$

$\frac{1}{6}$ is half of $\frac{1}{3}$ $\rightarrow \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$

$18 \div 2 = 9$

Eva $18(\frac{1}{2}) = 9$

I'm wondering why

$\frac{4}{6} \div \frac{2}{2} = \frac{2}{3}$

$\frac{4}{6}(54)$

James $\frac{1}{6} \rightarrow \frac{4}{6}$

$9(4) = 36$

Kaylene $\frac{4}{6} \cdot \frac{54}{1} = \frac{216}{6}$

Slater $\frac{108(2) = 216}{3(2) = 6}$

Alexis 18 is $\frac{1}{3}$ of 54

$18(2) = 36$

Where do
YOU see
gaps?

- Addition
 - Multiplication
 - Single-digit
 - Multi-digit
 - Subtraction
 - Division
 - Fractions
 - Decimals
-

Observations & Outcomes

Video

What was our Number Talk targeting?

Jay

$$\begin{array}{r} 4(120) \\ + 4(100) = 400 \\ + 4(20) = 80 \\ \hline 4(120) = 480 \end{array}$$

Bella

$$\begin{array}{r} 4(10) = 40 \\ + 4(20) = 80 \\ + 4(100) = 400 \\ \hline 4(120) = 480 \end{array}$$

Na

$$\begin{array}{r} 12 < \frac{6}{6} \\ 6(4) = 24 \\ 24 + 24 = 48 \\ 48(10) = 480 \end{array}$$

Zachary

$$\begin{array}{r} 8(60) \\ 120 \div 2 = 60 \\ 4 + 4 = 8 \\ 60(8) = 480 \end{array}$$

Calie

$$\begin{array}{r} 60 < \frac{20}{30} \\ + 8(30) = 240 \\ 8(30) = 240 \\ \hline 8(60) = 480 \end{array}$$

Jon

$$\begin{array}{r} 8 \div 4 = 2 \\ 60(4) = 240 \\ 2(240) = 480 \end{array}$$

Anna

$$\begin{array}{r} 16(30) \\ 60 \div 2 = 30 \\ 8(2) = 16 \\ \hline 16(30) = 480 \end{array}$$

Colin

$$\begin{array}{r} 16 \div 2 = 8 \\ 30(2) = 60 \\ 8(60) = 480 \end{array}$$

Dylan F.

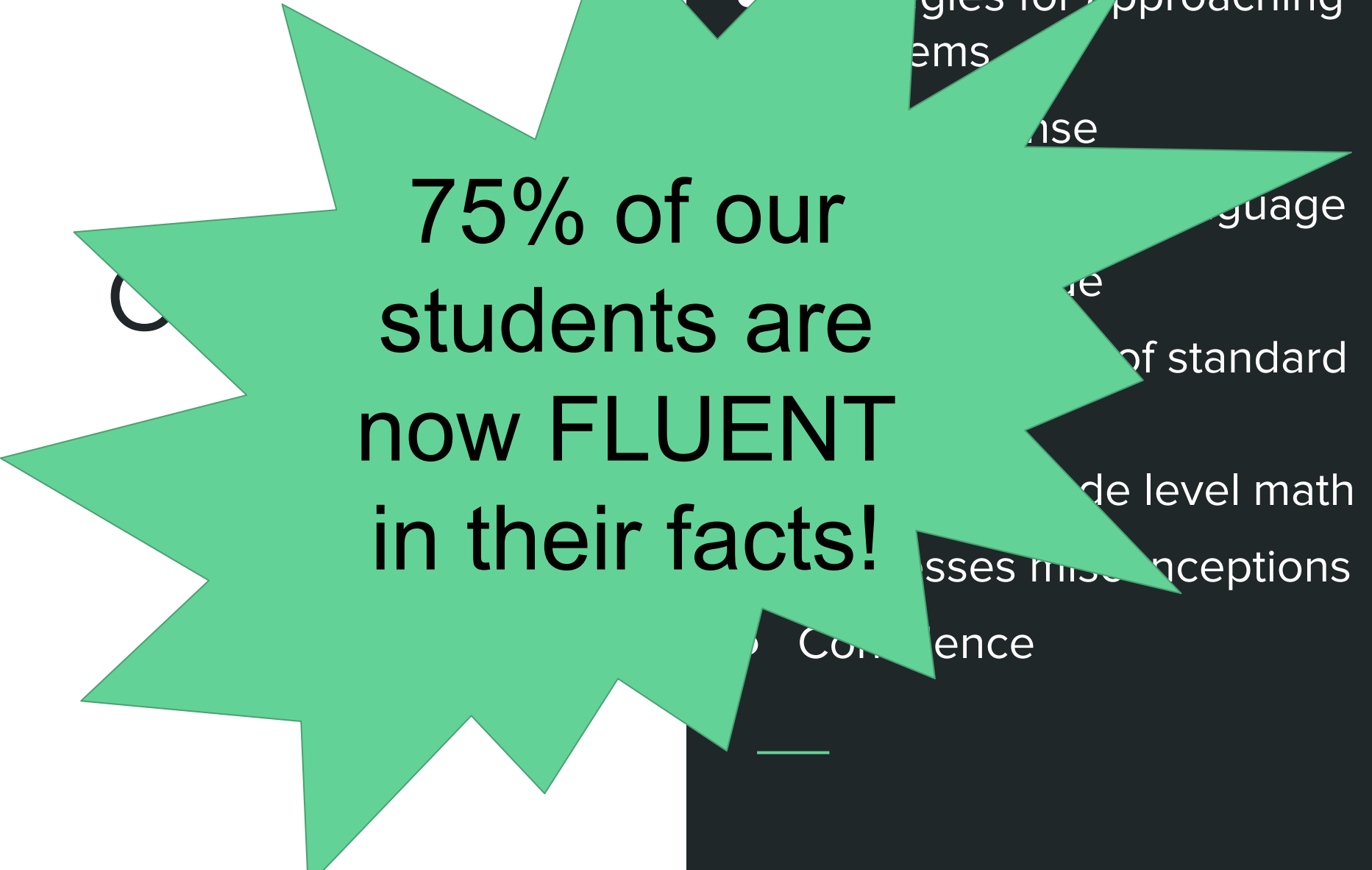
$$\begin{array}{r} 32(15) \\ 32 \div 2 = 16 \\ 15(2) = 30 \\ 16(30) = 480 \end{array}$$

Alexis

$$\begin{array}{r} 32 \\ \times 15 \\ \hline 160 \\ + 150 \\ \hline 300 \\ \hline 480 \end{array}$$

Outcomes

- Strategies for approaching problems
 - Number sense
 - Use of academic language
 - Place value
 - Understanding of standard algorithms
 - Access to grade level math
 - Addresses misconceptions
 - Confidence
-



**75% of our
students are
now FLUENT
in their facts!**

- Strategies for approaching
problems

use

language

re

of standard

grade level math

addresses misconceptions

• Confidence

Application

Notating Student Strategies

67(8)

Notating Student Strategies

Shane

$$67(8)$$

$$67 \overset{60}{<} 7$$

$$\begin{array}{r} 60(8) = 480 \\ + 7(8) = 56 \\ \hline 67(8) = 536 \end{array}$$

$$\begin{aligned} &60(8) + 7(8) \\ &= 480 + 56 \\ &= 536 \end{aligned}$$

Sample Pre-Plan

112(2)

$$112 + 112 = 224$$

$$\begin{array}{r} 100(2) = 200 \\ + 10(2) = 20 \\ \hline 2(2) = 4 \\ \hline 112(2) = 224 \end{array} \quad \begin{array}{r} 100(2) + 10(2) + 2(2) \\ = 200 + 20 + 4 \\ = 224 \end{array}$$

$$\begin{array}{r} 112 \\ \times 2 \\ \hline 224 \end{array}$$

$$\begin{array}{r} 112 \\ \times 2 \\ \hline 224 \end{array}$$

56(4)

$$\begin{array}{r} 50(4) = 200 \\ + 6(4) = 24 \\ \hline 56(4) = 224 \end{array} \quad \begin{array}{r} 50(4) + 6(4) \\ = 200 + 24 \\ = 224 \end{array}$$

$$56(2) = 112 > 112(2) = 224$$

$$\begin{array}{r} 2 \\ 56 \\ \times 4 \\ \hline 224 \end{array} \quad \begin{array}{r} 56 \\ \times 4 \\ \hline 224 \end{array}$$

28(8)

$$\begin{array}{r} 20(8) = 160 \\ + 8(8) = 64 \\ \hline 28(8) = 224 \end{array} \quad \begin{array}{r} 20(8) + 8(8) \\ = 160 + 64 \\ = 224 \end{array}$$

$$28(2) = 56 > 56(4) = 224$$

$$28(4) = 112 > 112(2) = 224$$

$$\begin{array}{r} 28 \\ \times 8 \\ \hline 224 \end{array}$$

$$\begin{array}{r} 28 \\ \times 8 \\ \hline 224 \end{array}$$

14(16)

$$\begin{array}{r} 14(10) = 140 \\ + 14(6) = 84 \\ \hline 14(16) = 224 \end{array} \quad \begin{array}{r} 14(10) + 14(6) \\ = 140 + 84 \\ = 224 \end{array}$$

$$\begin{array}{r} 10(16) = 160 \\ + 4(16) = 64 \\ \hline 14(16) = 224 \end{array} \quad \begin{array}{r} 10(16) + 4(16) \\ = 160 + 64 \\ = 224 \end{array}$$

$$14(2) = 28 > 28(8) = 224$$

$$14(4) = 56 > 56(4) = 224$$

$$14(8) = 112 > 112(2) = 224$$

$$\begin{array}{r} 14 \\ \times 16 \\ \hline 224 \end{array}$$

$$\begin{array}{r} 14 \\ \times 16 \\ \hline 224 \end{array}$$

- key
- ☒ Repeated addition
 - ☒ Decomposing / Distributive Property
 - ☒ Standard Algorithm
 - ☒ Standard Algorithm w/ Place value
 - ☒ connection to previous problem

Number Talks - Tips

- Commit the time **daily** for at least 2 weeks.
- **Pose** a problem in written form.
- Provide appropriate **wait time** for students to access the problem.
- **Accept**, **respect** and **consider** all answers.
- Encourage student **communication** throughout the talk.

Source: *Number Talks* by Sherry Parrish

How can you start?

1. Look for gaps
 - a. Formative assessments
 - b. Classwork
 - c. “Show your work”
 2. Consider which topic or operation to start with
 3. Consider what strategies students may come up with
 4. Commit 10-15 mins of your class time DAILY!
-

Why Do Number Talks?

“Computational fluency is **strongly related to number sense** and involves so much more than the conventional view of it encompasses.

Developing students’ computational fluency **extends far beyond having students memorize facts** or a series of steps unconnected to understanding”
(Baroody 2006; Griffin 2005)

“The depressing thing about **arithmetic badly taught** is that it **destroys a child’s intellect**, and, to some extent, his integrity. Before they are taught arithmetic, children will not give their assent to utter nonsense: afterwards, they will.”

W.W. Sawyer 1961. *A Mathematician’s Delight*

Source: *Making Number Talks Matter* by Cathy Humphreys & Ruth Parker

“Arithmetic algorithms are remarkable tools; they are reliable and efficient and they work with all numbers. The trouble is that their very compactness hides the meaning and complexity of the steps involved”
(Hyman Bass 2003, 323)

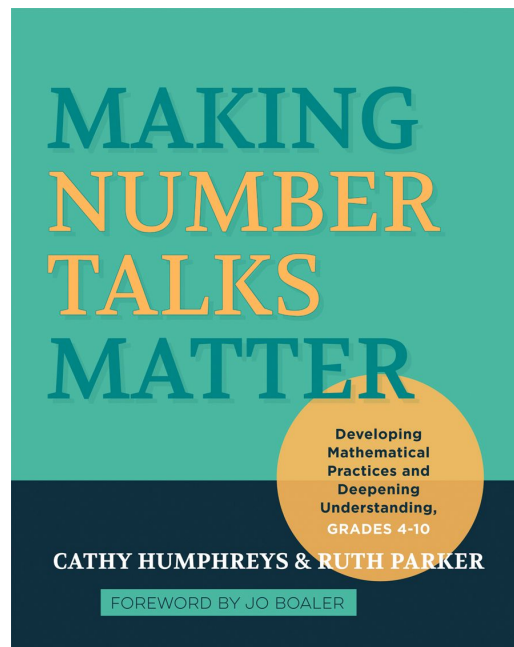
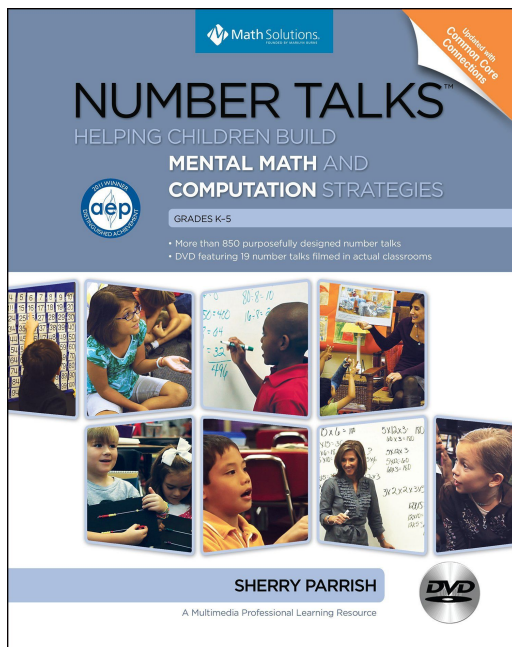
Common Core Math Practice Standards

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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Resources



FactsWise
by Val Henry

factswise.blogspot.com

goo.gl/cZsryj

goo.gl/UDsVLB

Let's put it into action
NOW!

goo.gl/dCMn77



Share your plans
and/or commitments!

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