Common Core State Standards Instructional Shifts:

RIGOR
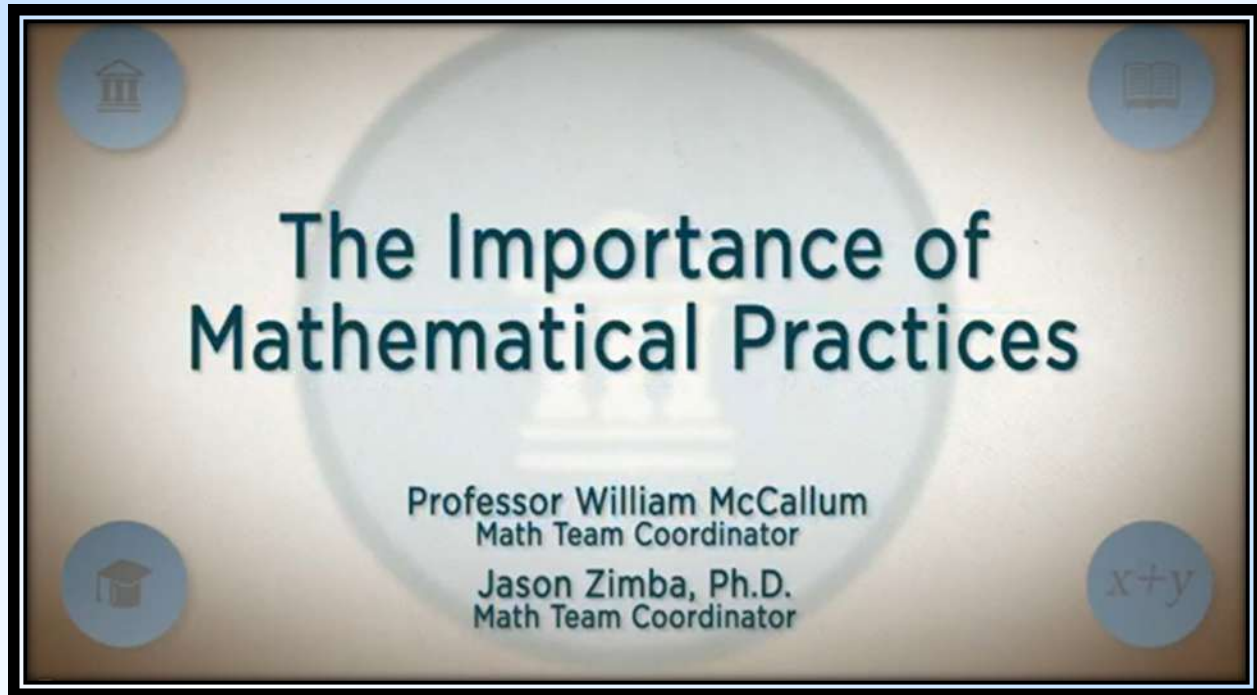
First Grade

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CCSS-Mathematics Overview

What I already know about the Common Core State Standards.	What I would like to learn about the Common Core State Standards.	What I learned today about the CCSS and how I can apply this knowledge in my classroom.

Rigor

The Hunt Institute

The Importance of
Mathematical Practices

Professor William McCallum
Math Team Coordinator

Jason Zimba, Ph.D.
Math Team Coordinator

http://www.youtube.com/watch?v=dnjbwJdcPjE

Common Core State Standards for Mathematics: Three Key Shifts

CCSS Shifts Background

1. **Focus:** Focus strongly where the standards focus.

2. **Coherence**: **Think** across grades, and **link** to major topics.

3. **Rigor:** In major topics, pursue **conceptual understanding,** procedural skill and **fluency,** and **application.**

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The Why: Shift One
Focus strongly where the Standards focus

- Significantly narrow the scope of content and deepen how time and energy is spent in the math classroom.

- Focus deeply only on what is emphasized in the standards, so that students gain strong foundations.

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The Why: Shift Two
Coherence Think across grades, and link to major topics within grades

- Carefully connect the learning within and across grades so that students can build new understanding onto foundations built in previous years.

- Begin to count on solid conceptual understanding of core content and build on it. Each standard is not a new event, but an extension of previous learning.

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The Why: Shift Three
Rigor In major topics, pursue conceptual understanding, procedural skill and fluency, and application

- The CCSSM require a balance of:
  - Solid conceptual understanding
  - Procedural skill and fluency
  - Application of skills in problem solving situations

- This requires equal intensity in time, activities, and resources in pursuit of all three.

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A Closer Look at: Rigor
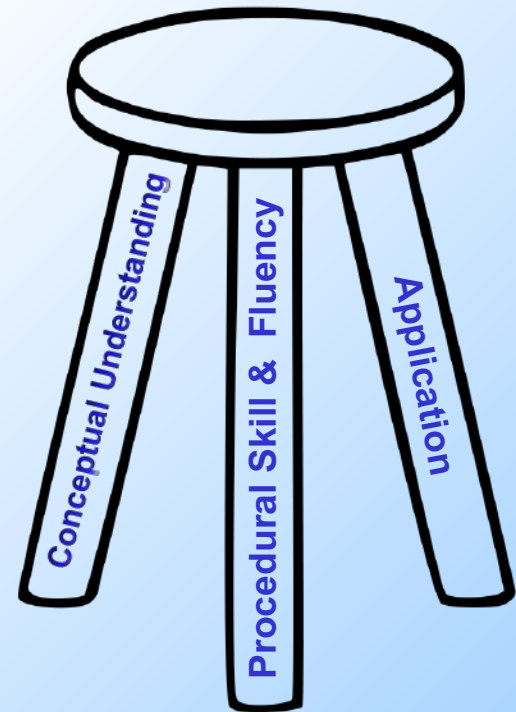
Rigor

- A conceptual approach to learning mathematics in which students develop a depth of understanding by connecting meaning to procedures.

- Requires a balance of:
  - ❿ Solid conceptual understanding
  - ❿ Procedural skill and fluency
  - ❿ Application of skills in problem solving situations

Conceptual Understanding

- More than just "how to get the answer"
- Support ability to access concepts from a number of different perspectives
- More than a set of mnemonics or separate procedures
- Deep conceptual understanding of core math concepts
- Applying math in new situations and speaking about their understanding

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"Conceptual knowledge of mathematics consists of logical relationships constructed internally and existing in the mind as a network of ideas … By its very nature, conceptual knowledge is knowledge that is understood."

John Van De Walle (2004)

Elementary and Middle School Mathematics Teaching Developmentally (Sixth Edition) ISBN 0-205-48392-5

The Math Progressions

- Develop conceptual understanding
- Support conceptual knowledge
- Develop informal strategies to solve problems within the domain
- Refine the informal strategies to develop fluency with standard procedures

Frequently Asked Questions

- How can we assess fluency other than giving a timed test?

- Is it really possible to assess conceptual understanding? What does it look like?

- Aren't the Common Core State Standards for Math all about application and meaningful tasks?

General method: Adding tens and ones separately

46
+37
‾‾‾
8 3

combine ones
view 6 + 7 as 1 ten and
3 ones

combine 4 tens and
3 tens with the newly
composed ten (shown
on the addition line)

This method is an application of the associative property.

Special strategy: Counting on by tens

46
+37
‾‾‾
8 3

56 66 76   77 78 79 80 81   82 83

starting from 46 count
on 3 tens then count on
7 ones

*This strategy requires counting on by tens from 46, beginning
56, 66, 76, then counting on by ones.*

**1st grade snapshot from Progressions for the Common Core
State Standards in Mathematics, University of Arizona**

CCSS.Math.Content.1.NBT.C.5   CCSS.Math.Content.1.NBT.C.6

Hundreds, Tens and Ones

234 = _____ hundreds, _____ tens, _____ ones

809 = _____ hundreds, _____ tens, _____ ones

571 = _____ hundreds, _____ tens, _____ ones
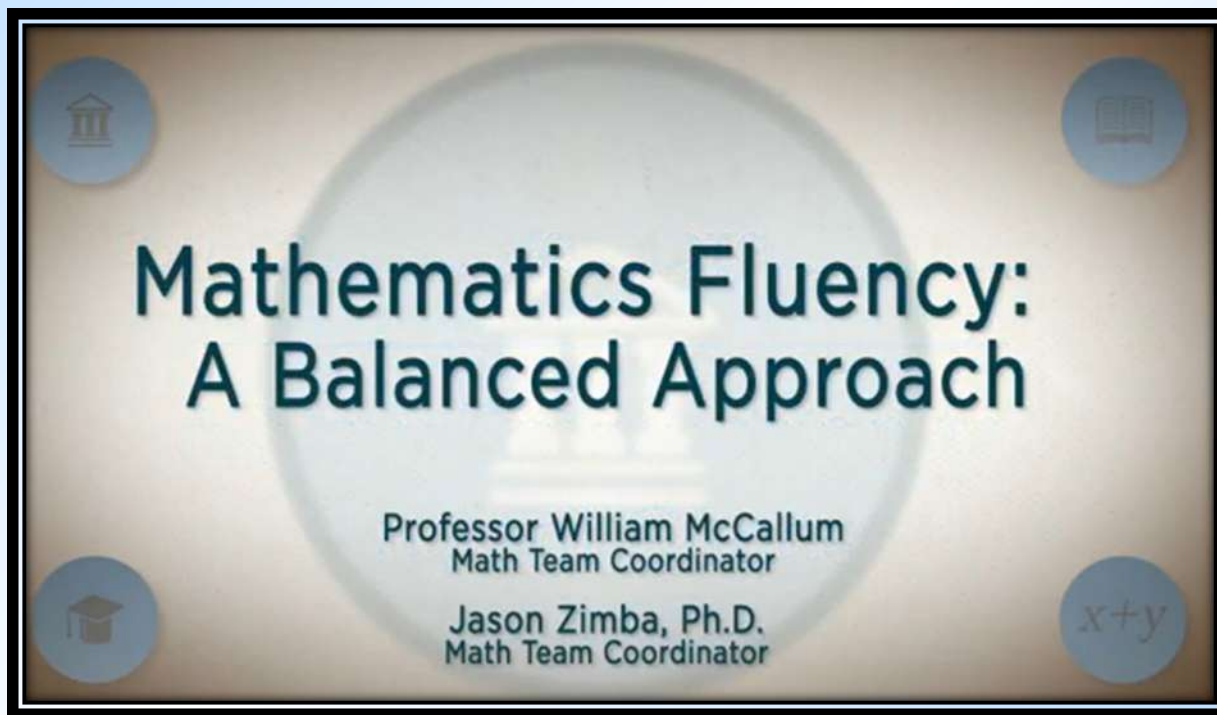
160 = _____ hundreds, _____ tens, _____ ones

6)   106 = __**1**__ hundred + _____ tens + _____ ones

Non-example of conceptual understanding

Procedural Skill and Fluency

- Speed and accuracy in calculation
- Class time and/or homework time is structured for students to practice core functions such as addition facts

The Hunt Institute

Mathematics Fluency:
A Balanced Approach

Professor William McCallum
Math Team Coordinator

Jason Zimba, Ph.D.
Math Team Coordinator

http://www.youtube.com/watch?v=ZFUAV00bTwA&list=UUF0pa3nE3aZAfBMT8poM5PA

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Fluency

Fluent in the Common Core State Standards means "fast and accurate."

It helps to think of fluency as meaning the same thing as when we say somebody is fluent in a foreign language: when you're fluent, you flow. Fluent isn't hesitancy, faltering, or reversing oneself.

Grade	Standard	Required Fluency
K	K.OA.5	Add/subtract within 5
1	1.OA.6	Add/subtract within 10
2	2.OA.2 2.NBT.5	Add/subtract within 20 (know single-digit sums from memory) Add/subtract within 100
3	3.OA.7 3.NBT.2	Multiply/divide within 100 (know single-digit products from memory) Add/subtract within 1000
4	4.NBT.4	Add/subtract within 1,000,000
5	5.NBT.5	Multi-digit multiplication
6	6.NS.2,3	Multi-digit division Multi-digit decimal operations

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Application of Skills in Problem Solving Situations

- Use appropriate concepts and procedures for application even when not prompted.

- Apply math concepts in "real world" situations.

- In content areas outside of math, particularly science, ensure students use grade-level-appropriate math to make meaning of and access science content.

How can I use this problem to teach the mathematics of this unit/concept?"

Depth of Knowledge

Level 1 -

• Requires students to recite or recall of information including fact, formula, or simple procedure.

• May be asked to demonstrate a rote response, use a well-known formula, follow a set procedure (like a recipe), or perform a clearly defined series of steps.

Level 2 -

• Requires some mental processing beyond a habitual response.

• Requires students to make some decisions on how to approach a task or problem

Level 3 -

• Requires reasoning, planning, using evidence and in most cases to "explain their thinking."

• Requires students to go beyond; to explain, to generalize, or connect ideas

Level 4 -

• Requires some complex reasoning, planning, developing and thinking over an extended period of time.

• May be asked to develop a hypothesis and perform complex analysis

Rigor in First Grade

Operations and Algebraic Thinking 1.OA

Jasmine has eight daisies and three vases - one large, one medium-sized and one small. She puts 5 daisies in the large vase, 2 in the medium vase and 1 in the small vase.

Can you find another way to put daisies so that there are the most in the large vase and least in the small vase?

Try to find as many ways as you can put the daisies in the vases with the most in the large vase and the least in the smallest vase. If you think you have found them all, explain how you know those are all the possibilities.
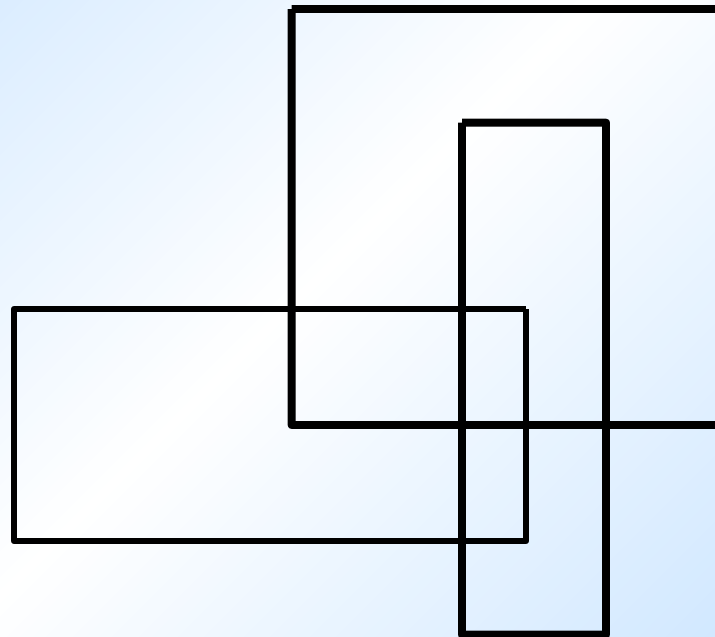
Number and Operations in Base Ten 1.NBT

Louis wants to give $15 to help kids who need school supplies. He also wants to buy a pair of shoes for $39. If Louis gets $1 every day for his allowance, how many days will it take him to save enough money for both? Explain how you know.

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Geometry
1.G

How many rectangles are in this picture?

Group Discussion

Shift Three: Rigor In major topics, pursue conceptual understanding, procedural skill and fluency, and application

Question One:

"What does it mean for students to have a Conceptual Understanding and why is it important in the CCSS?"

Shift Three: Rigor In major topics, pursue conceptual understanding, procedural skill and fluency, and application

Question Two*:*

"What is the Fluency expectation for First Grade and how are teachers supposed to support students their learning process of these?"

Shift Three: Rigor In major topics, pursue conceptual understanding, procedural skill and fluency, and application

Question Three:

"What are the three key goals of the Application of Problem Solving?

Hint: 1 applies to students and the other 2 apply to instruction.

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Rigor

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Resources

- www.corestandards.org

- http://ime.math.arizona.edu/progressions/

- www.insidemathematics.org

- www.teachingchannel.org

- www.achievethecore.org

- www.illustrativemathematics.org

- commoncoretools.me

Next Steps?