NAVIGATING THE MATHEMATICS K-2 COMMON CORE STATE STANDARDS

National Council of Teachers of Mathematics Regional Conference
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Missouri Department of Elementary and Secondary Education

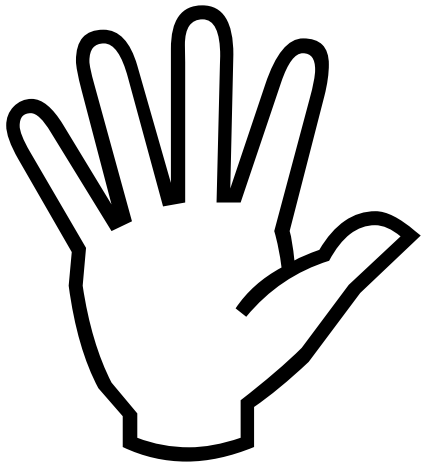
Charting a course that guarantees smooth sailing to implementing the Common Core State Standards (CCSS) can be tricky. This session will include assessment activities and resources that show ways to transition from current standards to the CCSS.

Agenda

- Who Are You?
- Getting Started
- Narrowing the Focus
- Impacting Instruction
- Necessary Nows
- Planning for PD
- Next Steps?

Show-Me What You Know

On a scale of 1 – 5, with 5 being the highest, rate yourself on your knowledge of the Mathematics K– 2 Common Core State Standards?



Getting Started

When you read a book:
Where do you start? Where do you stop?

BEGIN at the beginning…**STOP** at the end.

- Introduction
- Standards for Mathematical Practice K - 12
- Mathematics Content Standards K – 12
- Glossary
- Sample of Works Consulted

Mathematical Content Standards

A balanced combination of procedure and understanding.

Mathematics CCSS, page 8

Standards for Mathematical Practice

"The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education."

Mathematics CCSS, page 6

Standards for Mathematical Practice

- Rest on important processes including:
  - Problem solving, reasoning and proof, communication, representation, and connections.
- Rest on important mathematical proficiencies including:
  - Adaptive reasoning
  - Strategic competence
  - Conceptual understanding
  - Procedural fluency
  - Productive disposition

NCTM—*Principles and Standards for School Mathematics*

National Research Council Report--*Adding it Up!*

Mathematical Practice Standards Grouping

(Source: **Dr. Bill McCallum**, Chair, Mathematics CCSS Writing Group)

1. Make sense of problem solving and persevere in solving them.
6. Attend to precision.

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

Reasoning & Explaining

4. Model with mathematics.
5. Use appropriate tools strategically.

Modeling & Using tools

7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Seeing structure & Generalizing

Organization of the Standards

- **Standards**-define what students should know
- **Clusters** -groups of related standards.
- **Domains**-larger groups of related standards.

Number and Operations in Base Ten **3.NBT** ←Domain

←Cluster heading

Use place value understanding and properties of operations to perform multi-digit arithmetic.

Standard→

1. Use place value understanding to round whole numbers to the nearest 10 or 100.
2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

↓CLUSTER↑

How to Read the Standards

CCSS K-8

- Grade Level
  - Domain
    - Standard

3.OA6

CCSS High School

- Conceptual Category
  - Domain
    - Standard

A-SSE1a

Standards for Mathematical Content

Grade Level Overview Page

Grade 5 Overview

Operations and Algebraic Thinking

- Write and interpret numerical expressions.
- Analyze patterns and relationships.

Number and Operations in Base Ten

- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations—Fractions

- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

The Number System

- Gain familiarity with concepts of positive and negative integers

Standards for Mathematical Practice

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Mathematical Focus: Think BIG!!!

- What is the major focus of your mathematics content instruction in the grade(s) you teach?
- What major topics/concepts are included?

Conceptual Understanding

Five Easy Steps to a Balanced Math Program,

Larry Ainsworth

A conceptual approach to learning mathematics helps students develop depth of mathematical understanding by connecting meaning to procedures.

K – 2 Mathematical Focus: Think BIG!!!

Kindergarten	Grade 1	Grade 2
(1) representing and comparing whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.	(1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating units of length; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.	(1) Extending understanding of base ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

Aligned to NCTM *Curriculum Focal Points*

CCSS Mathematics K - 2 Domains

Domain	K	1	2
Counting and Cardinality	K.CC.1, 2, 3, 4a, 4b, 4c, 5, 6, 7		
Operations and Algebraic Thinking	K.OA.1, 2, 3, 4, 5	1.OA.1, 2, 3, 4, 5, 6, 7, 8	2.OA.1, 2, 3, 4
Numbers and Operations in Base Ten	K.NBT.1	1.NBT.1, 2a, 2b, 2c, 3, 4, 5, 6	2.NBT.1a, 1b, 2, 3, 4, 5, 6, 7, 8, 9
Measurement and Data	K.MD.1, 2, 3	1.MD.1, 2, 3, 4	2.MD.1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Geometry	K.G.1, 2, 3, 4, 5, 6	1.G.1, 2, 3	2.G.1, 2, 3

Mathematics Commonalities

MATHEMATICS COMMONALITIES

Common Core State Standards Aligned at the Same Grade or Course Level as in the v2.0 GLEs/CLEs

DRAFT

Ratios and Proportional Relationships (RP) – Grades 6-8			
CCSS Standards Cluster	**Grade 6**	**Grade 7**	**Grade 8**
Understand ratio concepts and use ratio reasoning to solve problems.	N3E6, A3A6, M2E6		
Analyze proportional relationships and use them to solve real-world and mathematical problems.		N3E7, A1D7, A2A7, A3A7	

The Number System (NS) – Grades 6-8			
CCSS Standards Cluster	**Grade 6**	**Grade 7**	**Grade 8**
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	N2B6, N3C6, G4B6		
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.		N1A7, N1B7, N2B7, N2C7, N3C7, A2B7	
Know that there are numbers that are not rational, and approximate them by rational numbers			N1B8
Compute fluently with multi-digit numbers and find common factors and multiples.	N3C6, A2B6		
Apply and extend previous understandings of numbers to the system of rational numbers.	G3A6		

Impacting Instruction

Progressions Drafts Currently Available at…

http://commoncoretools.wordpress.com/tools

Narrative documents describing the progression of a topic across a number of grade levels, informed both by research on children's cognitive development and by the logical structure of mathematics.

K – 5 Progressions in Number and Operations in Base Ten **K.NBT1**

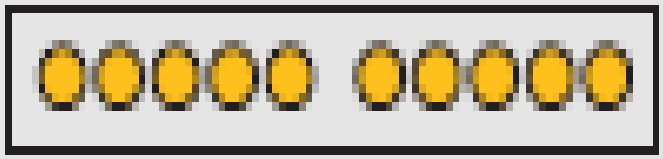
Number-bond diagram and equation

$17 = 10 + 7$

Decompositions of teen numbers can be recorded with diagrams or equations.

K – 5 Progressions in Number and Operations in Base Ten **K.NBT1**

5- and 10-frames



Children can place small objects into 10-frames to show the ten as two rows of five and the extra ones within the next 10-frame, or work with strips that show ten ones in a column.

K – 5 Progressions in Number and Operations in Base Ten **Grade 1**

Part of a numeral list

91	101	111
92	102	112
93	103	113
94	104	114
95	105	115
96	106	116
97	107	117
98	108	118
99	109	119
100	110	120

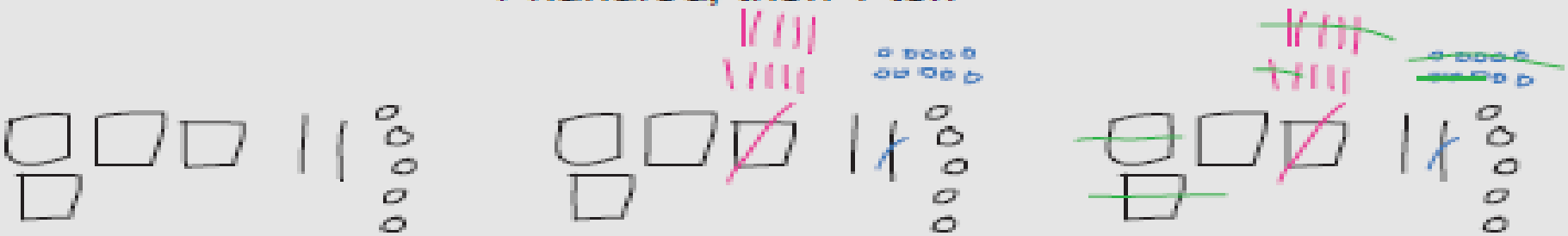
In the classroom, a list of the numerals from 1 to 120 can be shown in columns of 10 to help highlight the base-ten structure. The numbers 101, . . . , 120 may be especially difficult for children to write.

K – 5 Progressions in Number and Operations in Base Ten **2.NBT7**

Subtraction: Decomposing where needed first

decomposing left to right, 1 hundred, then 1 ten

now subtract



$$\begin{array}{r} 425 \\ -\ 278 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 3\,{\scriptstyle 12}\,15 \\ \not{4}\not{2}\not{5} \\ -\ 278 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 3\,{\scriptstyle 12}\,15 \\ \not{4}\not{2}\not{5} \\ -\ 278 \\ \hline 147 \end{array}$$

All necessary decomposing is done first, then the subtractions are carried out. This highlights the two major steps involved and can help to inhibit the common error of subtracting a smaller digit on the top from a larger digit. Decomposing and subtracting can start from the left (as shown) or the right.

Planning for PD

Gearing up for the Common Core State Standards in Mathematics

-Institute for Mathematics & Education, University of Arizona
-Center for Science, Mathematics & Computer Education, University of Nebraska
-Institute for Research on Mathematics and Science Education, Michigan State University

http://commoncoretools.files.wordpress.com/2011/05/2011_05_07_gearing_up1.pdf

Domain	K	1	2
Counting and Cardinality	★		
Operations and Algebraic Thinking	★	★	★
Numbers and Operations in Base Ten	★	★	★
Measurement and Data			
Geometry			

Initial domains for professional development:

- **Counting and Cardinality**
- **Numbers and Operations in Base Ten**
- **Operations and Algebraic Thinking**

ALL professional development should incorporate the Standards for Mathematical Practice

Necessary Nows

Missouri Immediate Implementations…

- Access the Common Core State Standards and support documents/resources created by DESE at http://www.dese.mo.gov/divimprove/curriculum/common-core-math.htm
- Identify common content within the v2.0 GLEs/CLEs and CCSS that may not be included in grades or courses now and include the content in instruction and assessment.
- Make it a priority to begin implementation of all Standards for Mathematical Practice in K – 12 mathematics classes.
- Implement the Kindergarten Mathematics CCSS during the 2011 – 2012 school year

Common Core Tools…

http://commoncoretools.wordpress.com/tools/

- The Illustrative Mathematics Project
- Progressions for the Common Core
- Technical manual for the Common Core (Jason Zimba)
- Hyperlinked version of the mathematics standards
- K–8 Standards by domain: Counting and Cardinality, Operations and Algebraic Thinking, Number and Operations in Base Ten, Number and Operations—Fractions, Measurement and Data, Geometry, Ratio and Proportional Relationships, The Number System, Expressions and Equations, Statistics and Probability, Functions.

NCTM Resources—something old…

- *Principles and Standards for School Mathematics*
- N*avigations* Series
- *Curriculum Focal Points*
- *Illuminations*

NCTM Resources—something new…

- Mathematics Common Core Coalition (MC^3) mathccc.org
- *Making it Happen*
- *Principles and Standards for School Mathematics*
- N*avigations* Series
- *Curriculum Focal Points*
- *Illuminations*

Questions?

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