2011 ASCD Annual Conference

# From Assessments to Instructional Decisions: K–6 Mathematics

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**Math Solutions**

# Connections . . .

- Common Core
- Formative Assessment (MSMRI)
- Teacher Effectiveness
- Professional Development
- Classroom Teaching &  Learning
- Technology

# ELA Common Core

As a natural outgrowth of meeting the charge to define college and career readiness, the Standards also lay out a vision of what it means to be a literate person in the twenty-first century. Indeed, the skills and understandings students are expected to demonstrate have wide applicability outside the classroom or workplace. Students who meet the Standards readily undertake the close, attentive reading that is at the heart of understanding and enjoying complex works of literature. They habitually perform the critical reading necessary to pick carefully through the staggering amount of information available today in print and digitally. They actively seek the wide, deep, and thoughtful engagement with high-quality literary and informational texts that builds knowledge, enlarges experience, and broadens worldviews. They reflexively demonstrate the cogent reasoning and use of evidence that is essential to both private deliberation and responsible citizenship in a democratic republic. In short, students who meet the Standards develop the skills in reading, writing, speaking, and listening that are the foundation for any creative and purposeful expression in language.

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# From ELA to Math

As a natural outgrowth of meeting the charge to define college and career readiness, the Standards also lay out a vision of what it means to be a mathematically literate person in the twenty-first century. Indeed, the skills and understandings students are expected to demonstrate have wide applicability outside the classroom or workplace. Students who meet the Standards readily undertake the close, attentive mathematical reasoning that is at the heart of understanding and enjoying complex problems. They habitually perform the critical mathematical reasoning necessary to pick carefully through the staggering amount of information available today in print and digitally. They actively seek the wide, deep, and thoughtful engagement with high-quality mathematical information that builds knowledge, enlarges experience, and broadens worldviews. They reflexively demonstrate the cogent reasoning and use of evidence that is essential to both private deliberation and responsible citizenship in a democratic republic. In short, students who meet the Standards develop the skills in reading, writing, speaking, listening, and mathematical reasoning that are the foundation for any creative and purposeful mathematical expression.

# Common Core

## Standards for Mathematical Practice

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.

# Common Core

## Standards for Mathematical Content

- Understanding
- Procedures

"Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to . . . deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices."

# MSMRI

# Middle School Math Reasoning Inventory

Funded by the Bill & Melinda Gates Foundation

# Middle School Math Reasoning Inventory (MSMRI)

## Interviews to assess numerical understanding and skills

Web-based formative/ diagnostic assessment to provide teachers information and insights into the numerical understanding and skills of their incoming middle school students

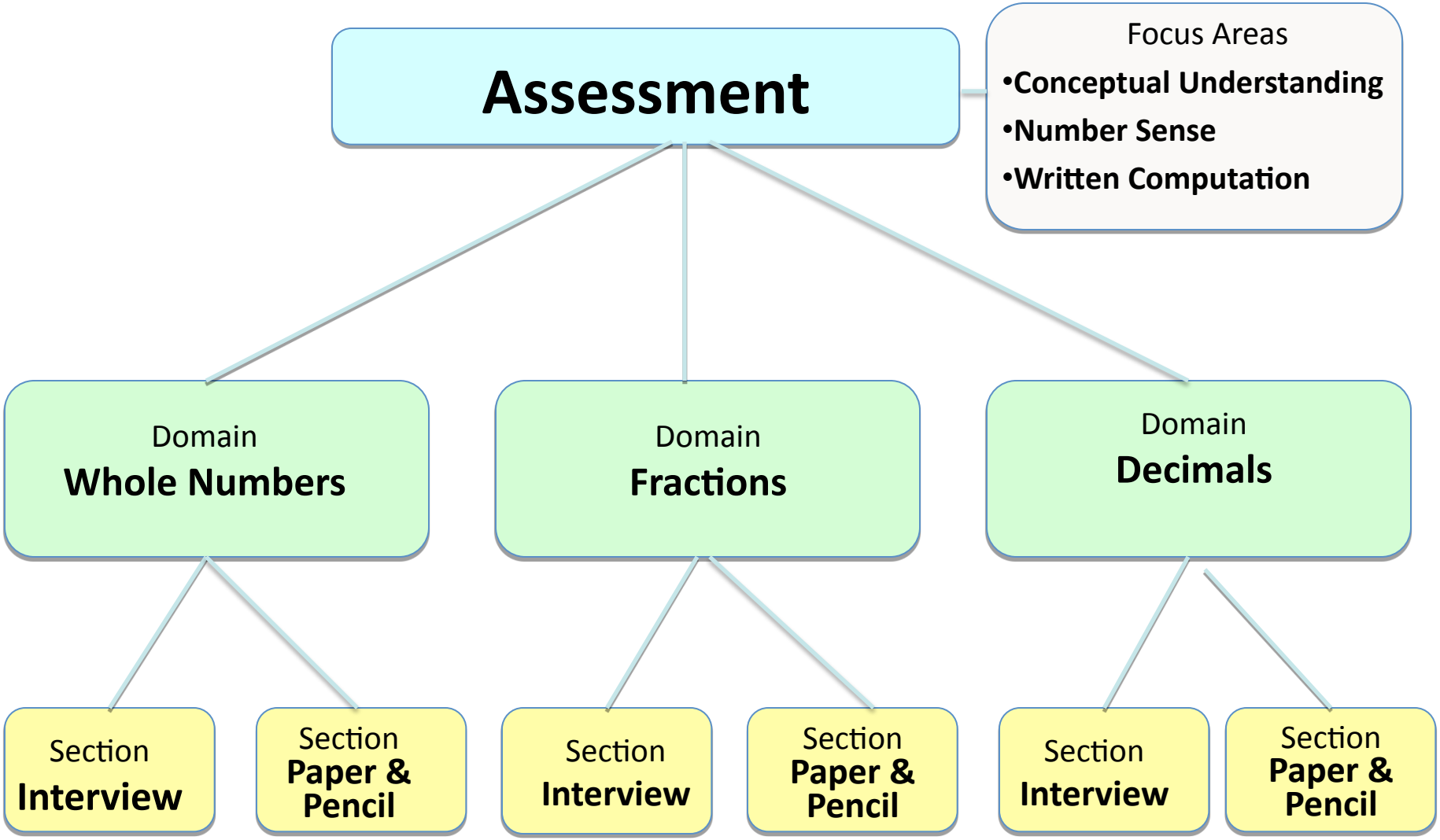
# Overview of ASSESSMENT

## Focus Areas

- **Conceptual Understanding**
- **Number Sense**
- **Written Computation**

# Number Sense

- understands relationships, properties, and procedures
- is able to explain and justify one's actions on numbers
- is able to use strategies appropriately and efficiently


Assessment
Focus Areas
•Conceptual Understanding
•Number Sense
•Written Computation
Domain
Whole Numbers
Domain
Fractions
Domain
Decimals
Section
Interview
Section
Paper &
Pencil
Section
Interview
Section
Paper &
Pencil
Section
Interview
Section
Paper &
Pencil

# Development Process

- Development by the author team
- Tryouts by “trusted” teachers
- Piloting by philosophically aligned teachers
- Field Testing by unknown teachers who may or may not be philosophically aligned
- Implementation (widespread scaling up, April 2012)

# Overview of MSMRI

- **Assessment tool**
- Formative/diagnostic
- Face-to-face interview
- Includes brief written survey
- Focuses on number
- Assesses standards for mathematical practice, understanding, and skills
- Web based
- Informs classroom instruction
- Identifies students who need intervention

# Which is greater—
# 3/5 or 1/2?

How did you decide?

# Response Choices—

## Which is greater, 3/5 or 1/2?

- ❑ Correct (3/5)
- ❑ Incorrect (1/2)
- ❑ Self corrected (3/5)
- ❑ Did not answer

# Strategy Choices

## Which is greater, 3/5 or 1/2?

- ❑ Converted to common denominators
- ❑ Converted to decimals or percents
- ❑ Explained that 3 is more than half of 5
- ❑ Described a visual or physical model
- ❑ Gave other reasonable explanation [record]
- ❑ Guessed, did not explain, or gave faulty explanation

# 1/2 + 2/3

Without using paper and pencil, decide if the answer to this is greater than 1 or less than 1.

Why do you think that?

# Response Choices—

## 1/2 + 2/3

- ❑ Correct (greater)
- ❑ Incorrect (less)
- ❑ Self corrected (greater)
- ❑ Did not answer

# Strategy Choices

## 1/2 + 2/3

- ❑ Converted to common denominators
- ❑ Explained that 2/3 is greater than 1/2 so answer must be greater than 1
- ❑ Converted to decimals or percents
- ❑ Described a visual or physical model
- ❑ Gave other reasonable explanation [record]
- ❑ Guessed, did not explain, or gave faulty explanation

# 5/6 + 12/13

Don’t figure out the exact answer. Without paper and pencil, decide which of these choices is closest to the answer.

½, 1, 2, 8

Why do you think that?

# Response Choices—

## 5/6 + 12/13

- ❑ Correct (2)
- ❑ Incorrect (1/2, 1, or 8))
- ❑ Self corrected (2)
- ❑ Did not answer

# Strategy Choices

## 5/6 + 12/13

- ❑ Rounded one or both fractions to 1, then added
- ❑ Compared to 1/2 (e.g., both are greater than 1/2 so the answer is greater than 1)
- ❑ Analyzed choices and chose one that seemed most reasonable
- ❑ Gave other reasonable explanation [record]
- ❑ Guessed, did not explain, or gave faulty explanation

# A Few Surprises

- Results from a class provides insights into teaching.
- Students assessed over time improve in both their understanding and ability to explain their reasoning.
- Incorrect answers can hide understanding and correct answers can be false indicators of understanding.

Math Solutions®

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