Common Core State Standards for Mathematics: *Rigor*

Grade 8 Overview

Essential Questions

- How and why were the Common Core State Standards developed and by whom?
- What are the 3 shifts in math instruction in the CCSS?
- Why the need for Focus?
- How is Focus reflected in the classroom?
- What are the next steps in implementing Focus?

Overview of the Common Core State Standards

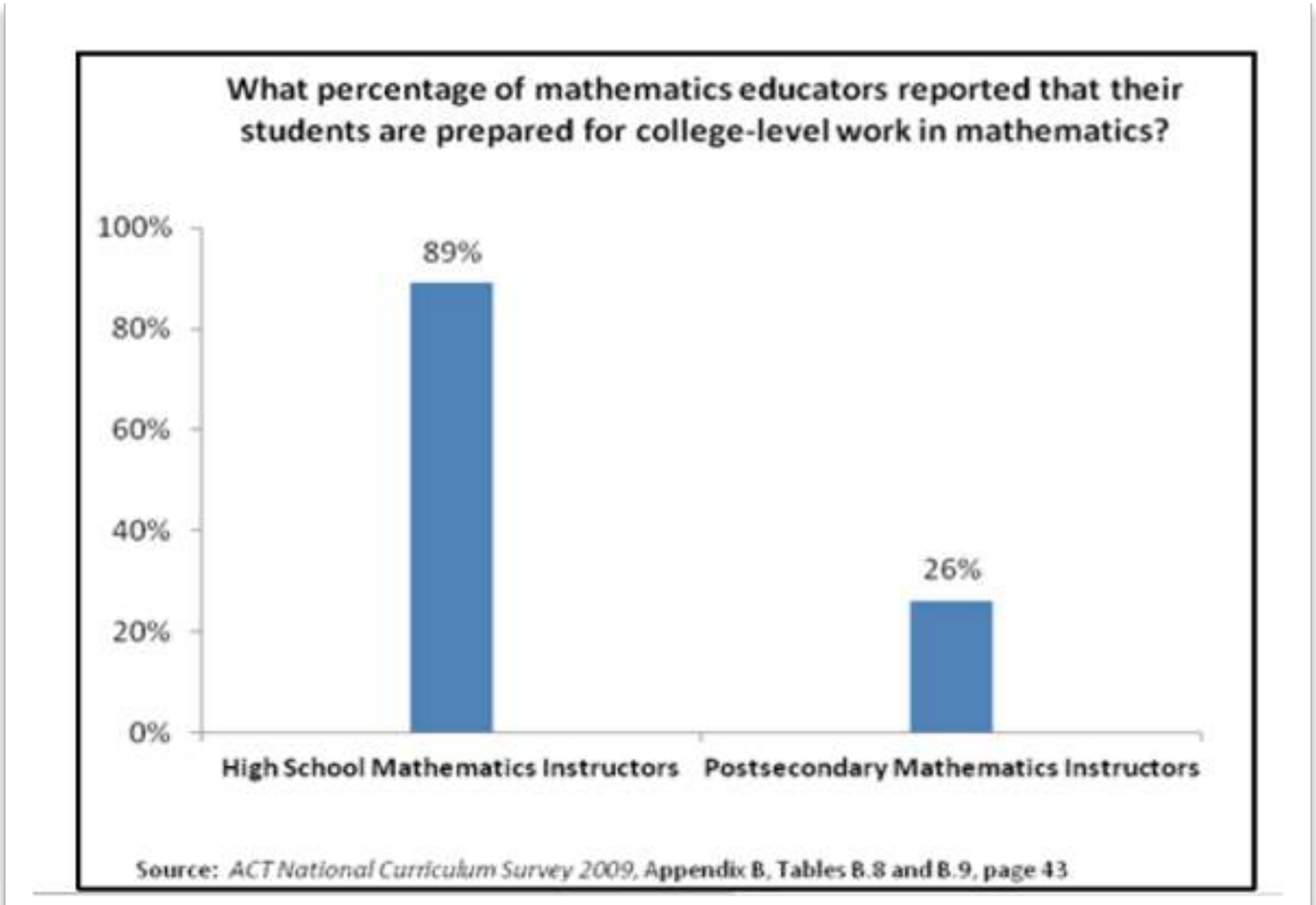
Rationale for CCSS

- Declining US competitiveness with other developed countries
- NAEP performance that is largely flat over the past 40 years in 8th grade
- Slight improvement on NAEP performance at the 4th grade level
- Slight decline on NAEP performance at the high school level
- High rates of college remediation

Background of CCSS

- Initiated by the National Governor's Association (NGA) and Council of Chief State School Officers (CCSSO) with the following design principles:
  - Result in College and Career Readiness
  - Based on solid research and practice evidence
  - Fewer, higher (greater DOK), and clearer standards

College Math Professors Feel HS students Today are Not Prepared for College Math



What The Disconnect Means for Students

- Nationwide, many students in two-year and four-year colleges need remediation in math.
- Remedial classes lower the odds of finishing the degree or program.
- Need to set the agenda in high school math to prepare more students for postsecondary education and training.

The Common Core State Standards Require Three Instructional Shifts in Mathematics

- **Focus:** Focus strongly where the standards focus.
- **Coherence:** Think across grades and link to major topics.
- **Rigor:** In major topics, pursue conceptual understanding, procedural skill and fluency, and application.

Shift 3: Rigor

To help students meet the Standards, educators will need to pursue, with equal intensity, three aspects of ***Rigor*** in the major work of each grade: conceptual understanding, procedural skill and fluency, and applications.

http://www.engageny.org/resource/common-core-video-clips-nti-david-coleman-jason-zimba-and-john-b-king

QuickTime and a
decompressor
are needed to see this picture.

Shift 3: Rigor

• Conceptual Understanding: Students need a conceptual understanding of key concepts, such as place value and rations. Teachers support students' ability to access concepts from a number of perspectives so that students are able to see math as more than just a set of mnemonics or discrete procedures.

• Procedural Skill and Fluency: Students need to have speed and accuracy when performing calculations. Teachers should structure class/homework time for students to practice core functions such as single-digit multiplication so students have access to more complex concepts and procedures.

• Application: Students need to be able to use math flexibly for applications. Teachers should provide opportunities for students to apply math in context. Teachers in content areas outside of math, particularly science, ensure that students are using math to make meaning of and access content.

Jason Zimba on Rigor

QuickTime and a
decompressor
are needed to see this picture.

Fluency/Procedural Skill

Procedural fluency *refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently.*

Does procedural fluency involve memorizing multiplication tables and other facts? Sure, but it also involves thinking. Students must know *when*, as opposed to just *how*, to use a procedure. And they must not only be able to perform procedures accurately, but also flexibly and efficiently--again, think stamina

Function Rules

The function machine takes an input, does something to this input according to some rule and returns a unique output.

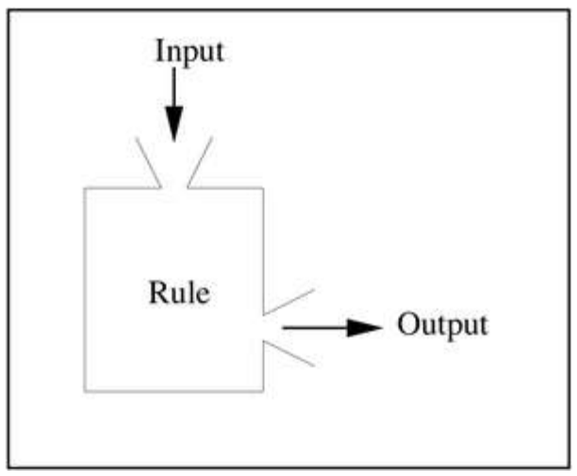
Given below are tables of input-output pairs for different function machines. Fill in the remaining table entries and describe each function rule in words.

1.Input values can be any English word.

2.Input values can be any real number.

3.Input values can be any whole number between 1 and 365.

input	cat	house	you
output	1	3	2



Conceptual Understanding

©BNP Design Studio * www.ClipartOf.com/1070978

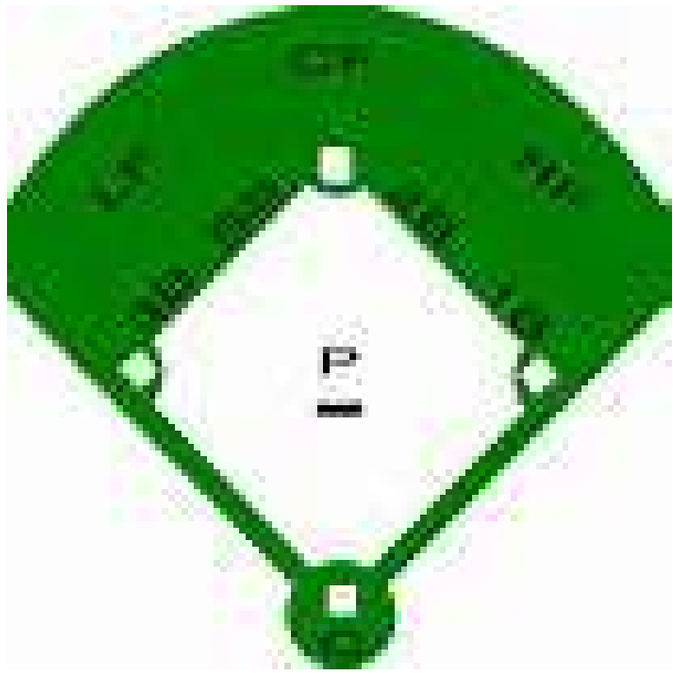
Solid Conceptual Understanding

- Teach more than "how to get the answer" and instead support students' ability to access concepts from a number of perspectives
- Students are able to see math as more than a set of mnemonics or discrete procedures
- **Conceptual understanding supports the other aspects of rigor (fluency and application)**

8.F Baseball Cards

- A student has had a collection of baseball cards for several years. Suppose that B , the number of cards in the collection, can be described as a function of t , which is time in years since the collection was started. Explain what each of the following equations would tell us about the number of cards in the collection over time.

- B=200+100t
- B=100+200t
- B=2000−100t
- B=100−200t



Application

- Students can use appropriate concepts and procedures for application even when not prompted to do so.

- Teachers provide opportunities at all grade levels for students to apply math concepts in”real world” situations, recognizing this means different things in K-5, 6-8, and HS.

- Teachers in content areas outside of math, particularly science, ensure that students are using grade-level-Appropriate math to make meaning of and access science content.

Group Discussion

Shift # 3: Rigor - Expect fluency, deep understanding, and application

In your groups, discuss ways to respond to one of the following comments:

“These standards expect we just teach rote memorization. Seems like a step backward to me.”

“I’m not going to spend time on fluency - it should just be a natural outcome of conceptual understanding.”

Engaging with the shift: Making a true statement

Rigor = _____ + _____ + _____

This shift requires a balance of three discrete components in math instruction. This is not a pedagogical option but is required by the standards. Using grade 3, find and copy the standards that specifically set expectations for each component.

Group Discussion

Math Shifts	What is this shift? Why this shift?	Opportunities	Challenges
1.Rigor: In major topics, pursue conceptual understanding, procedural skill and fluency, and application with equal intensity			