A Closer Look at Focus

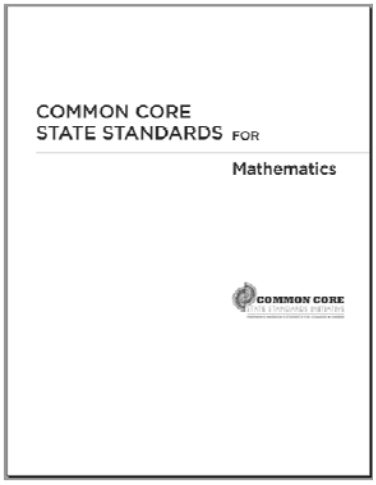
December 11, 2012

The Three Shifts in Mathematics

Focus strongly where the standards focus

Coherence: Think across grades and link to major topics within grades

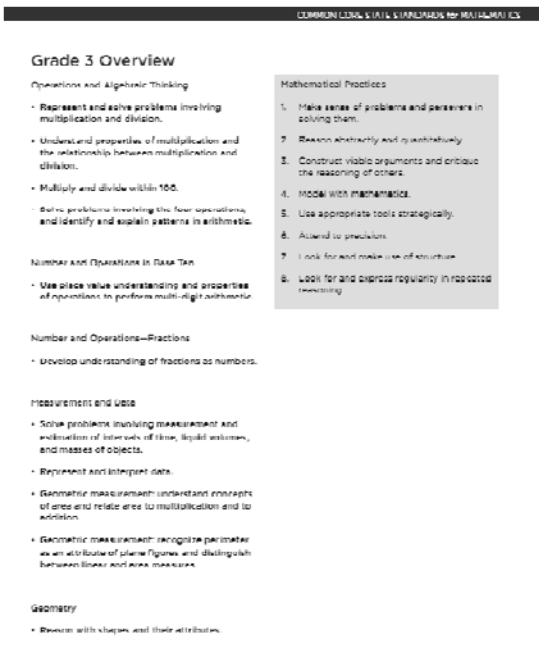
Rigor: Require conceptual understanding, fluency, and application



Focus on the Major Work of the Grade

Two levels of focus:

- What's in/What's out
- The shape of the content that is in



COMMON CORE STATE STANDARDS for MATHEMATICS

Grade 3 Overview

Operations and Algebraic Thinking

- **Represent and solve problems** involving multiplication and division.
- Understand properties of multiplication and the relationship between multiplication and division.
- Multiply and divide within 100.
- Solve problems involving the four operations, **and identify and explain patterns in arithmetic.**

Number and Operations in Base Ten

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

Number and Operations—Fractions

- Develop understanding of fractions as numbers.

Measurement and Data

- Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
- Represent and interpret data.
- Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
- Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

Geometry

- Reason with shapes and their attributes.

Mathematical Practices

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.

Content Emphases by Cluster--Grade 3*

Key: ■ Major Clusters; ◧ Supporting Clusters; □ Additional Clusters

Operations and Algebraic Thinking
- ■ Represent and solve problems involving multiplication and division.
- ■ Understand properties of multiplication and the relationship between multiplication and division.
- ■ Multiply and divide within 100.
- ■ Solve problems involving the four operations, and identify and explain patterns in arithmetic.

Number and Operations in Base Ten
- □ Use place value understanding and properties of operations to perform multi-digit arithmetic.

Number and Operations—Fractions
- ■ Develop understanding of fractions as numbers.

Measurement and Data
- ■ Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
- ◧ Represent and interpret data.
- ■ Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
- □ Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

Geometry
- ◧ Reason with shapes and their attributes.

Engaging with the K-8 Content

How would you summarize the major work of the grade band?

What would you have expected to be a part of the major work that is not?

Give an example of how you would approach something differently in your teaching if you thought of it as supporting the major work, instead of being a separate discrete topic.

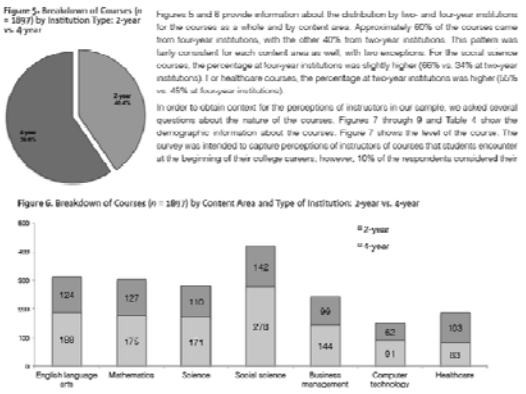
Focus in High School

How do we think about focus in high school?

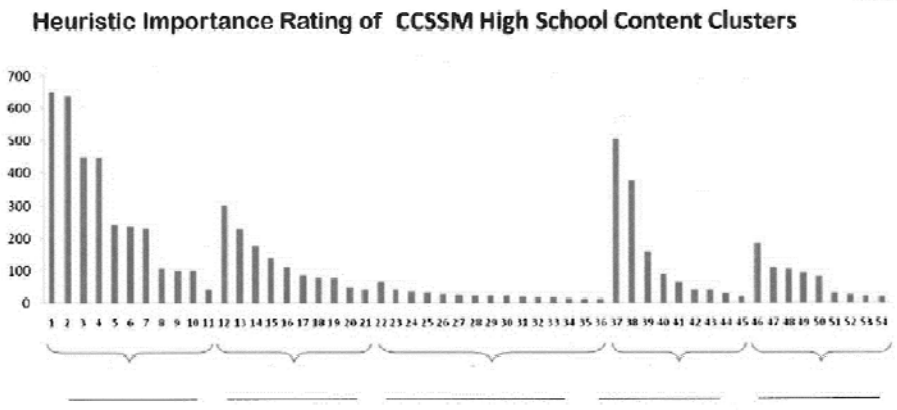
Consider the data on college and career readiness.

Conley et al., validity study of CCSS

- Just-released survey of over 1,800 postsecondary instructors
- Instructors rated each of the CCSSM content standards in high school as to applicability and importance for college-level work
- Range of courses and institutions

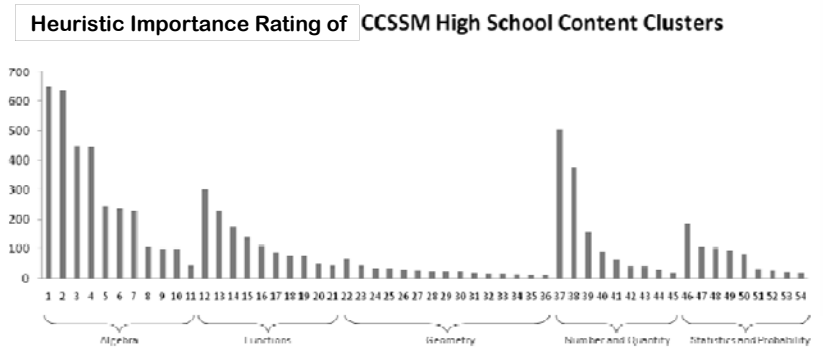


Not all content areas are equally important

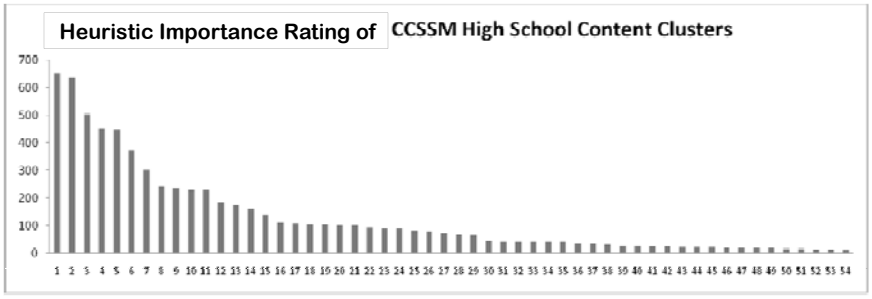


Fill in the spaces above with the following topics: Number & Quantity, Algebra, Functions, Geometry, Statistics & Probability

Not all content areas are equally important



Not many clusters are important



Bridging the gap: HS Emphases

The Standards for Mathematical Practice, viewed in connection with mathematical content.

Modeling and rich applications (see pp. 72, 73 in the standards), which can be integrated into mathematics curriculum, instruction, and assessment.

HS Content Emphases

Number and Quantity: Quantities:

- Reason quantitatively and use units to solve problems

Number and Quantity: The Real Number System:

- Extend the properties of exponents to rational exponents
- Use properties of rational and irrational numbers

Algebra: Seeing Structure in Expressions:

- Interpret the structure of expressions
- Write expressions in equivalent forms to solve problems

Algebra: Arithmetic with Polynomials and Rational Expressions:

- Perform arithmetic operations on polynomials

Algebra: Creating Equations:

- Create equations that describe numbers or relationships

HS Content Emphases

Algebra: Reasoning with Equations and Inequalities:

- Understand solving equations as a process of reasoning and explain the reasoning
- Solve equations and inequalities in one variable
- Represent and solve equations and inequalities graphically

Functions: Interpreting Functions:

- Understand the concept of a function and use function notation
- Analyze functions using different representations
- Interpret functions that arise in applications in terms of a context

Functions: Building Functions:

- Build a function that models a relationship between two quantities

Geometry: Congruence:

- Prove geometric theorems

Statistics and Probability: Interpreting Categorical and Quantitative Data:

- Summarize, represent, and interpret data on a single count or measurement variable

Analyzing and Evaluating Resources for Common Core Alignment – Part One

December 11, 2012

Overview of the K-8 Publishers' Criteria for Mathematics

These Standards are not intended to be new names for old ways of doing business. They are a call to take the next step. ... It is time to recognize that standards are not just promises to our children, but promises we intend to keep.

—CCSSM, p. 3

The Common Core State Standards were developed through a state-led initiative that drew on the expertise of teachers, researchers and content experts from across the country. The Standards define a staircase to college and career readiness, building on the best of previous state standards and evidence from international comparisons and domestic reports and recommendations. Most states have now adopted the Standards to replace previous expectations in english language arts/literacy and mathematics.

Standards by themselves cannot raise achievement. standards don't stay up late at night working on lesson plans, or stay after school making sure every student learns—it's teachers who do that. and standards don't implement themselves. education leaders from the state board to the building principal must make the standards a reality in schools. publishers too have a crucial role to play in providing the tools that teachers and students need to meet higher standards. This document, developed by the CCSSM writing team, aims to support faithful CCSSM implementation by providing criteria for materials aligned to the Common Core State Standards for Mathematics. States, districts, and publishers can use these criteria to develop, evaluate, or purchase aligned materials, or to supplement or modify existing materials to remedy weaknesses.

How should alignment be judged? traditionally, judging alignment has been approached as a crosswalking exercise. but crosswalking can result in large percentages of "aligned content" while obscuring the flaws that the materials in question often are all on the same or the spirit of the standards being implemented. these criteria are an attempt to sharpen the alignment question and make alignment and misalignment more clearly visible.

those criteria were developed from the perspective that publishers and purchasers are equally responsible for fixing the materials market. Publishers cannot deliver focus to buyers who only ever complain about what has been left out, yet never complain about what has crept in. More generally, publishers cannot invest in quality if the market doesn't demand it of them nor reward them for producing it.

The document is structured as follows:

I. Focus, Coherence, and Rigor in the Common Core State Standards for Mathematics
II. Criteria for Materials and Tools Aligned to the Standards
III. Appendix: "The Structure o the Standards"

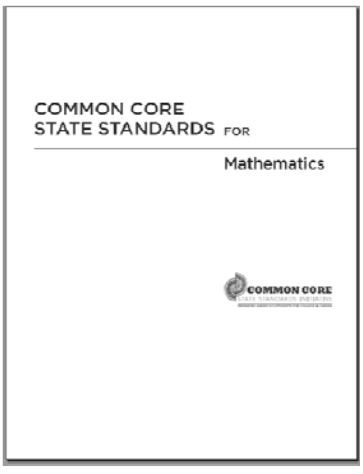
Available on www.corestandards.org/resources

Using the Criteria

- As guidance for publishers
- Informing purchases and adoptions, and/or
- Working with previously purchased materials
- Reviewing teacher-developed materials and guiding their development
- As a tool for professional development

"These standards are not intended to be new names for old ways of doing business. They are a call to take the next step."

–CCSSM, page 5



Some Old Ways of Doing Business (1 of 2)

- A different topic every day
- Every topic treated as equally important
- Elementary students dipping into advanced topics at the expense of mastering fundamentals
- Infinitesimal advance in each grade; endless review
- Incoherence and illogic – bizarre associations, or lacking a thread

Some Old Ways of Doing Business (2 of 2)

- Lack of rigor
  - Reliance on rote learning at expense of concepts
  - Aversion to repetitious practice
  - Severe restriction to stereotyped problems lending themselves to mnemonics or tricks

From....	To....
856 = ___ hundreds, ___ tens, ___ ones	1 hundredth = ___ tenths
x2 – 10x + 21 = 0	¾ c(c –1) = c

  - Lack of quality applied problems and real-world contexts
  - Lack of variety in what students produce
    - E.g., overwhelmingly only answers are produced, not arguments, diagrams, models, etc.

Criteria for Focus

1. Focus on Major Work	In any single grade, students and teachers using the materials as designed spend the large majority of their time, approximately three-quarters,[16] on the major work of each grade.
2. Focus In Early Grades	Materials do not assess any of the topics in Table 2 before the grade level indicated, or pattern problems in K–5 that do not support the focus on arithmetic, such as "find the next one" problems.
3. Focus and Coherence through Supporting Work	Supporting content (where present) does not detract from focus, but rather enhances focus and coherence simultaneously by engaging students in the major work of the grade.

Criteria for Rigor

4. Rigor and Balance Materials and tools reflect the balances in the Standards and help students meet the Standards' rigorous expectations, by (all of the following, in the case of comprehensive materials; at least one of the following for supplemental or targeted resources):	Developing students' conceptual understanding of key mathematical concepts, where called for in specific content standards or cluster headings. Giving attention throughout the year to individual standards that set an expectation of fluency.
	Allowing teachers and students using the materials as designed to spend sufficient time working with engaging applications, without losing focus on the major work of each grade.
Additional aspects of the Rigor and Balance criterion	(The three aspects of rigor—if all were checked above—are not always together, not always apart; digital tools are designed to support the rigor and balance criterion and promote depth and mastery.)

Criteria for Coherence

5. Consistent Progressions Materials are consistent with the progressions in the Standards, by (all of the following):	Basing content progressions on the grade-by-grade progressions in the Standards.
	Giving all students extensive work with grade-level problems.
	Relating grade level concepts explicitly to prior knowledge from earlier grades.
6. Coherent Connections Materials foster coherence through connections at a single grade, where appropriate and where required by the Standards, by (all of the following):	Including learning objectives that are visibly shaped by CCSSM cluster headings, with meaningful consequences for the associated problems and activities.
	Including problems and activities that serve to connect two or more clusters in a domain, or two or more domains in a grade, in cases where these connections are natural and important.

Criteria for the Mathematical Practices

7. Practice-Content Connections	Materials meaningfully connect content standards and practice standards.
8. Focus and Coherence via Practice Standards	Materials promote focus and coherence by connecting practice standards with content that is emphasized in the Standards.
9. Careful Attention to Each Practice Standard	Materials attend to the full meaning of each practice standard.
10. Emphasis on Mathematical Reasoning Materials support the Standards' emphasis on mathematical reasoning, by (all of the following):	Prompting students to construct viable arguments and critique the arguments of others concerning key grade-level mathematics that is detailed in the content standards (cf. MP.3).
	Engaging students in problem solving as a form of argument.
	Explicitly attending to the specialized language of mathematics.

Indicators of Quality (1 of 2)

- Problems are worth doing
- Variety in what students produce
- Variety in the pacing and grain size of content coverage
- Separate teacher materials that support and reward teacher study
- Use of manipulatives follows best practices
- Materials are carefully reviewed (freedom from mathematical errors, grade-level appropriateness, freedom from bias, freedom from construct-irrelevant language complexity)

Indicators of Quality (2 of 2)

- Visual design isn't distracting, chaotic, aimed at adult purchasers – serves only to support young students in engaging thoughtfully with the subject
- Support for English language learners is thoughtful and helps those learners to meet the same standards as all other students
- (For paper-based materials.) A textbook that is focused is short. For example, by design Japanese textbooks have less than one page per lesson. Elementary textbooks should be less than 200 pages, middle and secondary less than 500 pages

Additional Elements of Publishers' Criteria

- Overarching criteria for supporting special populations
- Criteria for science materials
- Indicators of quality

- Appendix: The Structure is the Standards
- Sample Rubric

K-8 Publishers' Criteria for Mathematics: Next Steps for Educators/Policy-makers

Use Cases	What States, Districts and Teachers Can Do
Informing purchases and adoptions	Ensure that instructional resource purchasing criteria and decisions are aligned to the Publishers' Criteria.
Working with previously purchased materials	Use the Publishers' Criteria to review existing materials and adjust to improve alignment (remove or supplement).
Reviewing teacher-developed materials and guiding their development	Use the Publishers' Criteria to support teachers in developing materials and ensure that teacher-developed resources are aligned.
As a tool for professional development	Share the Publishers' Criteria with teachers and use it to support teacher understanding of the standards.

*For additional resources for educators, go to **achievethecore.org**.*