Common Core State Standards

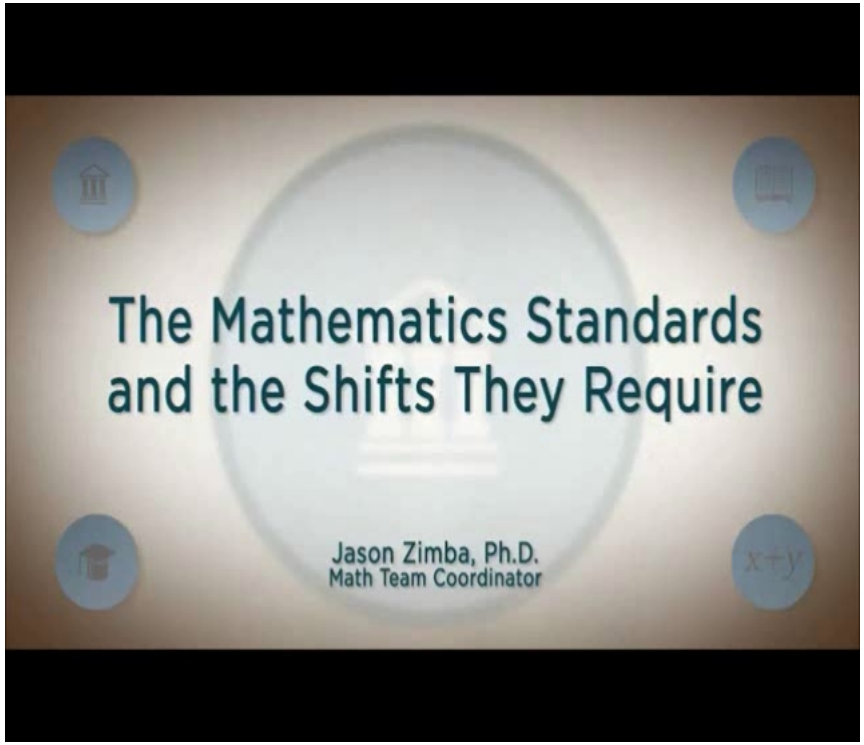
Focus on Math
Training Module II

View Common

Core Math Video – Elementary/Middle School

The CCSS Requires Three Shifts in Mathematics

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.*



Shift #1: 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 on what is emphasized in the standards, so that students gain strong foundations.

Focus

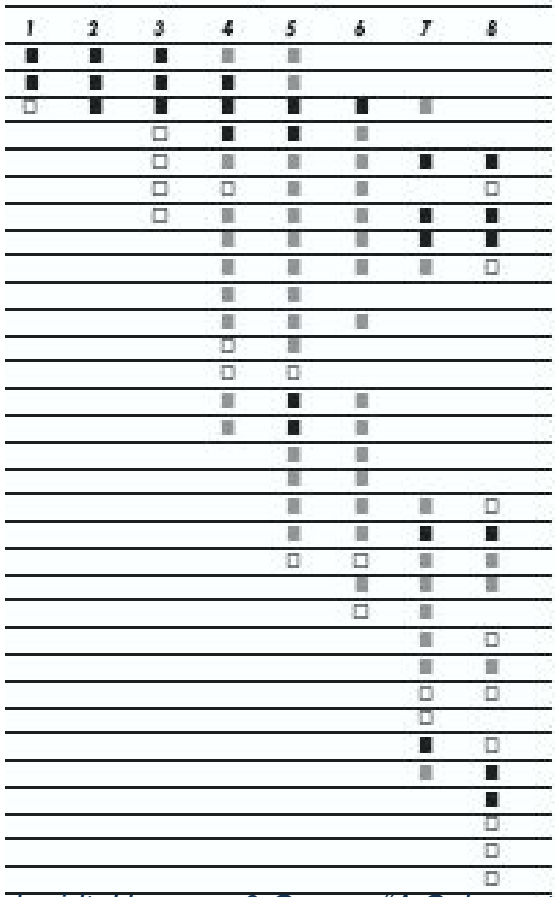
- Move away from **"mile wide, inch deep"** curricula identified in TIMSS.
- Learn from international comparisons.
- Teach less, learn more.

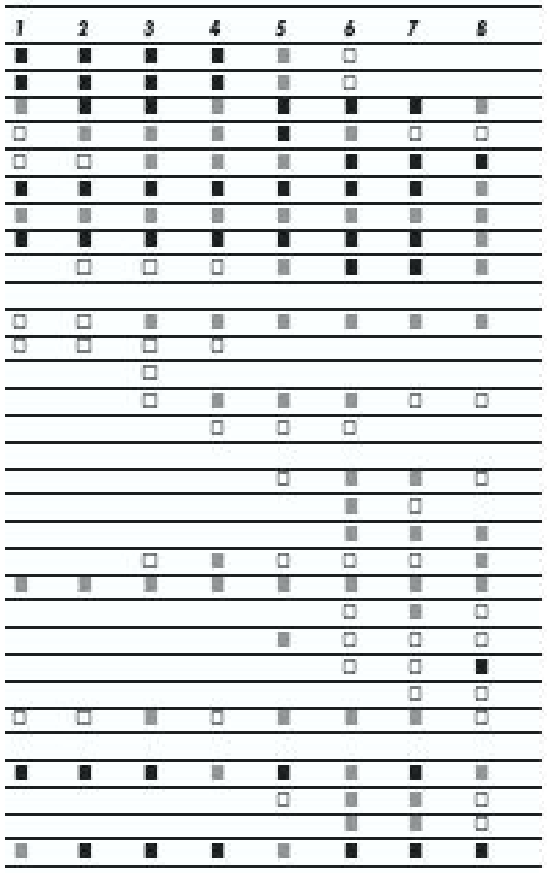
+ “Less topic coverage can be associated with higher scores on those topics covered because students have more time to master the content that is taught.”

– Ginsburg et al., 2005

The shape of math in A+ countries

Mathematics topics intended at each grade by at least two-thirds of A+ countries





Mathematics topics intended at each grade by at least two-thirds of 21 U.S. states

[1] *Schmidt, Houang, & Cogan, "A Coherent Curriculum: The Case of Mathematics." (2002).*

Shift #2: 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 on 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.

COMMON CORE STATE STANDARDS
CALIFORNIA

MATHEMATICS
Focus and Coherence

<table>
<tr><th>K</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>High School</th><th rowspan="8">MODELING: integrated throughout all units</th></tr>
<tr><td>Counting and Cardinality</td><td colspan="8"></td><td rowspan="3">Number and Quantity</td></tr>
<tr><td colspan="6">Number and Operations in Base Ten</td><td colspan="3">The Number System</td></tr>
<tr><td colspan="3"></td><td colspan="3">Number and Operations with Fractions</td><td colspan="2">Ratios and Proportional Relationships</td><td></td></tr>
<tr><td colspan="6" rowspan="2">Operations and Algebraic Thinking</td><td colspan="3">Expressions and Equations</td><td>Algebra</td></tr>
<tr><td colspan="2"></td><td>Functions</td><td>Functions</td></tr>
<tr><td colspan="9">Geometry</td><td>Geometry</td></tr>
<tr><td colspan="6">Measurement and Data</td><td colspan="3">Statistics and Probability</td><td>Statistics and Probability</td></tr>
</table>

Shift #3: Rigor: In Major Topics, Pursue Conceptual Understanding, Procedural Skill and Fluency, and Application

Ramp Up the Rigor: Math

Smarter Balanced Assessment Consortium

Assessment Claims

Concepts and Procedures	"Students can explain and **apply mathematical concepts** and carry out mathematical procedures with precision and fluency."
Problem Solving	"Students can **frame and solve a range of complex problems** in pure and applied mathematics."
Communicating Reasoning	"Students can clearly and precisely **construct viable arguments to support their own reasoning** and to **critique the reasoning of others**."
Data Analysis and Modeling	"Students can **analyze complex, real-world scenarios** and **use mathematical models** to interpret and solve problems."

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)

Depth of Thinking (Webb) + Type of Thinking (Revised Bloom)	DOK Level 1 Recall & Reproduction	DOK Level 2 Basic Skills & Concepts	DOK Level 3 Strategic Thinking & Reasoning	DOK Level 4 Extended Thinking
Remember	• Recall conversions, terms, facts			
Understand	• Evaluate an expression • Locate points on a grid or number on number line • Solve a one-step problem • Represent math relationships in words, pictures, or symbols	• Specify, explain relationships • Make basic inferences or logical predictions from data/observations • Use models /diagrams to explain concepts • Make and explain estimates	• Use concepts to solve non-routine problems • Use supporting evidence to justify conjectures, generalize, or connect ideas • Explain reasoning when more than one response is possible • Explain phenomena in terms of concepts	• Relate mathematical concepts to other content areas, other domains • Develop generalizations of the results obtained and the strategies used and apply them to new problem situations
Apply	• Follow simple procedures • Calculate, measure, apply a rule (e.g.,rounding) • Apply algorithm or formula • Solve linear equations • Make conversions	• Select a procedure and perform it • Solve routine problem applying multiple concepts or decision points • Retrieve information to solve a problem • Translate between representations	• Design investigation for a specific purpose or research question • Use reasoning, planning, and supporting evidence • Translate between problem & symbolic notation when not a direct translation	• Initiate, design, and conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results
Analyze	• Retrieve information from a table or graph to answer a question • Identify a pattern/trend	• Categorize data, figures • Organize, order data • Select appropriate graph and organize & display data • Interpret data from a simple graph • Extend a pattern	• Compare information within or across data sets or texts • Analyze and draw conclusions from data, citing evidence • Generalize a pattern • Interpret data from complex graph	• Analyze multiple sources of evidence or data sets

Evaluate			• Cite evidence and develop a logical argument • Compare/ contrast solution methods • Verify reasonableness	• Apply understanding in a novel way, provide argument or justification for the new application
Create	• Brainstorm ideas, concepts, problems, or perspectives related to a topic or concept	• Generate conjectures or hypotheses based on observations or prior knowledge and experience	• Develop an alternative solution • Synthesize information within one data set	• Synthesize information across multiple sources or data sets • Design a model to inform and solve a practical or abstract situation

Watch Mrs. Noonan – Exploring Math Practices

THE 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.

Focus on Math

The Common Core Standards for Mathematical Practice emphasizes conceptual thinking and mathematical reasoning across all grade levels. In other words, math worksheets and textbook exercises simply will not prepare our students for success.

Homework: Go to website www.inside mathematics.org

-View sample lessons for your grade level using the math practice standards

-Over the next few weeks during grade level collaboration, view this video entitled “From the Page to the Classroom: Implementing the Common Core State Standards Mathematics. It is broken down into 3-sections.