Implementing the Common Core State Standards for Mathematics:
The CCSS Curriculum Materials Analysis Tools

Today's Webinar will begin shortly

Please download the CCSS Curriculum Materials Analysis Tools at:
http://www.mathedleadership.org/ccss/materials.html

There TWO ways to hear the audio portion of this webinar:

Streaming audio through your computer's speakers

Via Telephone:
US/Canada: 877-668-4490
Meeting ID: 668 475 753

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National Council of Supervisors of Mathematics

Implementing the Common Core State Standards for Mathematics:

The CCSS Curriculum Materials Analysis Tools

www.mathedleadership.org

Presenters

Suzanne Mitchell, NCSM President

Diane Briars, NCSM Past President

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Today's Goals

- **Familiarize you with the *CCSS Curriculum Materials Analysis Tools***
- **Provide suggestions about professional development that is needed to enable reviewers to use the tools effectively.**

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Financial Support for the Curriculum Analysis Tools

- **Brookhill Foundation (Kathy Stumpf)**
- **Texas Instruments (through CCSSO)**

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CCSS Curriculum Materials Analysis Tools

- **Key question: To what extent will these materials support faithful implementation of CCSS?**
- **Provide assistance in collecting useful information focused on salient issues related to the CCSS, to ensure consistency across reviewers, and promote discussions about mathematics curriculum materials.**

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Development Team

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Kathleen Cramer, Mathematics Educator, University of Minnesota

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Michael Mays, Mathematician, West Virginia University

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Development Team, cont.

Valerie Mills, Supervisor, Mathematics Education, Oakland Schools, MI

Fabio Milner, Mathematician, Arizona State University

Suzanne Mitchell, Mathematics Educator/Administrator, Executive Director of the Arkansas Science, Technology, Engineering and Mathematics (STEM) Coalition

Thomas Post, Mathematics Educator, University of Minnesota

Robert Ronau, Mathematics Educator, University of Louisville, KY

Donna Simpson Leak, Superintendent, Rich Township High School District 227, IL

Marilyn Strutchens, Mathematics Educator, Auburn University, AL

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Tool Development Process

- **Development Team formed in October 2010**
- **First version of tools developed in November 2010**
- **Initial drafts of tools piloted with groups of elementary middle, and high school teachers in December 2010**
- **Tools revised based on these pilots**
- **Tools reviewed by postsecondary mathematics educators, mathematicians, and public school administrators nationally in January 2011**
- **Tools revised based on input from these reviewers to obtain final versions in April 2011**

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Analysis Tool Components

User's Guide

Tool 1: Content Analysis

Tool 2: Mathematical Practices Analysis

Tool 3: Overarching Considerations

- **Equity**
- **Assessment**
- **Technology**

Professional Development Facilitator Guide

PowerPoint Slides

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User's Guide

Offers specific suggestions about:

- **How to use the three tools to analyze curriculum materials with respect to the CCSS**
- **How to prepare reviewers to use tools effectively**

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User's Guide

Structure:

- **Using Tool 1**
- **Using Tool 2**
- **Using Tool 3**
- **Reaching a Conclusion**

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Prepare Reviewers to Use the Tools Effectively

Provide professional development so that reviewers are:

Tool 1: Familiar with CCSS Standards for Mathematical Content

- **Content Domains**
- **"Key Advances" in those domains**

Tool 2: Familiar with CCSS Standards for Mathematical Practice

- **Examples within grade bands**
- **Tasks that promote use of practices.**

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Prepare Reviewers to Use the Tools Effectively

- **Organize reviewers into grade level teams in order to analyze content progressions within and across grades;**
- **Use the tools in order, Tool 1, Tool 2 to Tool 3, because Tool 2 and Tool 3 use information collected during the completion of Tool 1;**
- **Provide adequate time for reviewers to conduct a thorough and in-depth reviews; and**
- **Gather teams together to discuss transitions among grade levels and to use their combined evidence to make and justify recommendations.**

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What to Analyze

Tools 1 & 2:

- **Primary source materials that describe student learning experiences**
  - **Teacher's edition**
  - **Student edition**

Tool 3:

- **Other 'integral" components--computer software, implementation guides**

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What to Analyze

- **There is no need to review all instructional materials using all three tools.**
- **Consider applying Tool 1 first, then using Tools 2 and 3 to review materials that are still of interest.**

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User Guide

Be sure to read the User Guide

Be sure reviewers get and read the User Guide

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Analysis Tool Components

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Content Analysis Tool

- **In-depth analysis of selected core content domains**
- **Examine content progressions across grades/courses**

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Purpose of Tool 1

- **Determine the extent to which the CCSS are addressed in the materials**
- **Determine the extent to which CCSS are sequenced appropriately in the materials**
- **Determine the extent to which the materials provide a balanced treatment of the CCSS in terms of conceptual development and procedural fluency**

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Tool 1 - Content

- Key mathematics domains for K-12
- Criteria for domain selection
  - Critical grade level/topic mathematics content
  - Reflected standards at each grade band/topic
  - Formed content progressions within and across content areas
  - Represented a shift from current curricula

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Tool 1 Content Domains

Grades K-2

- **Operations and Algebraic Thinking**
- **Number and Operations in Base 10**
- **Geometry**

Grades 3-5

- **Operations and Algebraic Thinking**
- **Number and Operations in Base 10**
- **Geometry**
- **Number and Operations - Fractions**

Tool 1 Content Domains

Grades 6 - 8

- Ratio and Proportional Relationships
- Expressions and Equations
- Statistics and Probability
- Geometry

Tool 1 Content Domains

Grades 9 - 12

- **Interpreting Functions**
- **Reasoning with Equations and Inequalities**
- **Similarity, Right Triangles and Trigonometry**
- **Geometric Measurement and Dimension**
- **Interpreting Categorical and Quantitative Data**

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CCSSM Curriculum Analysis Tool 1—Operations and Algebraic Thinking for Grades K-2

Name of Reviewer _____ **School/District** _____ **Date** _____

Name of Curriculum Materials _____ **Publication Date** _____ **Grade Level(s)** _____

Content Coverage Rubric (Cont):
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Acceptable (A)-Few gaps in the content, as described in the Standards, were found and these gaps may be easily filled.
High (H)-The content was fully formed as described in the standards.

Balance of Mathematical Understanding and Procedural Skills Rubric (Bal):
Not Found (N) -The content was not found.
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Acceptable (A)-The content was developed with a balance of mathematical understanding and procedural skills consistent with the Standards, but the connections between the two were not developed.
High (H) - The content was developed with a balance of mathematical understanding and procedural skills consistent with the Standards, and the connections between the two were developed.

CCSSM Grade K				CCSSM Grade 1				CCSSM Grade 2			
K.OA Operations and Algebraic Thinking	**Chap. Pages**	**Cont N-L-M-A-H**	**Bal N-L-M-A-H**	**1.OA Operations and Algebraic Thinking**	**Chap. Pages**	**Cont N-L-M-A-H**	**Bal N-L-M-A-H**	**2.OA Operations and Algebraic Thinking**	**Chap. Pages**	**Cont N-L-M-A-H**	**Bal N-L-M-A-H**
Understand addition as putting together and adding to, and subtraction as taking apart and taking from				**Represent and solve problems involving addition and subtraction**				**Represent and solve problems involving addition and subtraction**			
2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.				1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions e.g., by using objects, drawings, and equations with a symbol for the unknown number. *Common addition and subtraction situations. Adding To or Taking From situations with result unknown, change unknown, and start unknown. Put Together/ Take Apart with total unknown, added unknown or both addends unknown.* 2. Solve word problems that call				1.Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.1 Add and subtract within 20. *3*. Determine whether a group of objects (up to 20) has an odd or even number of members. Write an equation to express the total as a sum of equal			

CCSSM Curriculum Analysis Tool 1—Similarity, Right Triangles, and Trigonometry & Trigonometric Functions in Grades 9-12

Name of Reviewer _____ School/District _____ Date _____

Name of Curriculum Materials _____ Publication Date _____ Course(s) _____

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CCSSM Standards Grades 9-12	Chapter pages	Cont N-L-M-A-H	Bal N-L-M-A-H	Notes/Explanation
Similarity, Right Triangles, and Trigonometry (G-SRT)				
Understand similarity in terms of similarity transformations				
1. Verify experimentally the properties of dilations given by a center and a scale factor:				
a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.				
b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.				
2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.				
3. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding				

Content Analysis Tool Rubric

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Analyzing Gaps

Operations and Algebraic Thinking 1.OA

Represent and solve problems involving addition and subtraction.

1. **Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.**
2. **Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.**

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Content Analysis Tool Rubric

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Tool 1 - Content Summary Discussion

Focus: Teacher and student books only

Overall Impressions:

1. What are your overall impressions of the curriculum materials examined?

2. What are the strengths and weaknesses of the materials you examined?

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Tool 1 - Content Summary Discussion

Standards Alignment:

3. **Have you identified gaps within this domain? What are they? If so, can these gaps be realistically addressed through supplementation?**
4. **Within grade levels, do the curriculum materials provide sufficient experiences to support student learning within this standard?**
5. **Within this domain, is the treatment of the content across grade levels consistent with the progression within the Standards?**

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Tool 1 - Content Summary Discussion

Balance between Mathematical Understanding and Procedural Skills

6. **Do the curriculum materials support the development of students' mathematical understanding?**
7. **Do the curriculum materials support the development of students' proficiency with procedural skills?**
8. **Do the curriculum materials assist students in building connections between mathematical understanding and procedural skills?**
9. **To what extent do the curriculum materials provide a balanced focus on mathematical understanding and procedural skills?**
10. **Do student activities build on each other within and across grades in a logical way that supports mathematical understanding and procedural skills?**

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Analysis Tool Components

- **Content Analysis Tool**
- **Mathematical Practices Analysis Tool**
- **Overarching Considerations**
  - **Equity**
  - **Assessment**
  - **Technology**

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Tool 2 – Standards for Mathematical Practice

Purpose:

To determine the extent to which the materials <u>reflect and engage students</u> in the Mathematical Practices.

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Tool 2 – Mathematical Practices

- **Identifies the shaded cells in Tool 1 as likely content to assess the Practices. Developers felt these standards had the greatest potential to incorporate the Mathematical Practices.**
- **A particular example or task may fit under multiple Mathematical Practices and should be recorded in each.**

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Components of Tool 2

- **Extent to which Practices are a means for learning mathematical content.**
- **Extent to which content is learned through tasks that engage students in the Mathematical Practices**
- **Judgment about embeddedness of Practices in the materials evaluated**
- **Rationale and examples about each of the above bullets**

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Grouping the practice standards

1. Make sense of problems 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 and explaining

4. Model with mathematics

5. Use appropriate tools strategically

Modeling and using tools

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

Seeing structure and generalizing

CCSSM Curriculum Analysis Tool 1—Operations and Algebraic Thinking for Grades K-2

Name of Reviewer _____ **School/District** _____ **Date** _____

Name of Curriculum Materials _____ **Publication Date** _____ **Grade Level(s)** _____

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2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.				1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions e.g., by using objects, drawings, and equations with a symbol for the unknown number. *Common addition and subtraction situations. Adding To or Taking From situations with result unknown, change unknown, and start unknown. Put Together/ Take Apart with total unknown, added unknown or both addends unknown.* 2. Solve word problems that call				1.Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.1 Add and subtract within 20. *3*. Determine whether a group of objects (up to 20) has an odd or even number of members. Write an equation to express the total as a sum of equal			

CCSSM Curriculum Analysis Tool 1—Similarity, Right Triangles, and Trigonometry & Trigonometric Functions in Grades 9-12

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a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.				
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CCSSM Mathematical Practices Analysis Tool 2	Page 1

Name of Reviewer _____ School/District _____ Date _____

Name of Curriculum Materials _____ Publication Date _____ Grade Level(s) _____

Tool 1 Domain Considered _____

Opportunities to Engage in the Standards for Mathematical Practices Found Across the Content Standards

Overarching Habits of Mind	1. Make sense of problems and persevere in solving them.	6. Attend to precision.
Evidence of how the Standards for Mathematics Practice were addressed (with page numbers)		
Reasoning and Explaining	**2. Reason abstractly and quantitatively.**	**3. Construct viable arguments and critique the reasoning of others.**
Evidence of how the Standards for Mathematics Practice were addressed (with page numbers)		

Synthesis of Standards for Mathematical Practice	Page 3
(Mathematical Practices → Content) To what extent do the materials demand that students engage in the Standards for Mathematical Practice as the primary vehicle for learning the Content Standards?	
(Content → Mathematical Practices) To what extent do the materials provide opportunities for students to develop the Standards for Mathematical Practice as "habits of mind" (ways of thinking about mathematics that are rich, challenging, and useful) throughout the development of the Content Standards?	
To what extent do accompanying assessments of student learning (such as homework, observation checklists, portfolio recommendations, extended tasks, tests, and quizzes) provide evidence regarding students' proficiency with respect to the Standards for Mathematical Practice?	
What is the quality of the instructional support for students' development of the Standards for Mathematical Practice as habits of mind?	
Summative Assessment **(Low) – The Standards for Mathematical Practice are not addressed or are addressed superficially.** **(Marginal) The Standards for Mathematical Practice are addressed, but not consistently in a way that is embedded in the development of the Content Standards.** **(Acceptable) – Attention to the Standards for Mathematical Practice is embedded throughout the curriculum materials in ways that may help students to develop them as habits of mind.**	**Explanation for score**

Mathematical Practices Analysis Tool Rubric

Mathematical Practices → Content

- **To what extent do the materials demand that students engage in the Standards for Mathematical Practice as the primary vehicle for learning the Content Standards?**

Content → Mathematical Practices

- **To what extent do the materials provide opportunities for students to develop the Standards for Mathematical Practice as "habits of mind" (ways of thinking about mathematics that are rich, challenging, and useful) throughout the development of the Content Standards?**

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Mathematical Practices Analysis Tool Rubric

Assessment

- **To what extent do accompanying assessments of student learning (such as homework, observation checklists, portfolio recommendations, extended tasks, tests, and quizzes) provide evidence regarding students' proficiency with respect to the Standards for Mathematical Practice?**

Support

- **What is the quality of the instructional support for students' development of the Standards for Mathematical Practice as habits of mind?**

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Analysis Tool Components

- **Content Analysis Tool**
- **Mathematical Practices Analysis Tool**
- **Overarching Considerations**
  - **Equity**
  - **Assessment**
  - **Technology**
- Reviewers should consider **supporting** materials **in addition to** the teacher and student materials.

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Tool 3-Overarching Considerations

- **Not Found (NF) – The curriculum materials do not support this element.**
- **Low (L) – The curriculum materials contain limited support for this element, but the support is not embedded or consistently present within and across grades.**
- **Medium (M) – The curriculum materials contain support for this element, but it is not always embedded or consistently present within and across grades.**
- **High (H) – The curriculum materials contain embedded support for this element, so that it is consistently present within and across grades.**

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Overarching Concerns-Equity

To what extent do the materials:

1. **Provide teachers with strategies for meeting the needs of a range of learners?**
2. **Provide instructional support to help teachers sequence or scaffold lessons so that students move from what they know to what they do not know?**
3. **Provide opportunities for teachers to use a variety of grouping strategies?**
4. **Embed tasks with multiple entry-points that can be solved using a variety of solution strategies or representations?**
5. **Suggest accommodations and modifications for English language learners that will support their regular and active participation in learning mathematics?**

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Overarching Concern-Equity

To what extent do the materials:

6. **Provide opportunities to use reading, writing, and speaking in mathematics lessons.**
7. **Encourage teachers to draw upon home language and culture to facilitate learning?**
8. **Encourage teachers to draw on multiple resources such as objects, drawings, and graphs to facilitate learning?**
9. **Draw upon students' personal experiences to facilitate learning?**
10. **Provide opportunities for teacher and students to connect mathematics to other subject areas?**

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Overarching Concerns-Equity

To what extent do the materials:

11. **Provide both individual and collective opportunities for students to learn using mathematical tasks with a range of challenge?**
12. **Provide opportunities for advanced students to investigate mathematics content at greater depth?**
13. **Provide a balanced portrayal of various demographic and personal characteristics?**

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Overarching Concerns-Assessment

To what extent do the materials:

14. **Provide strategies for gathering information about students' prior knowledge and background?**
15. **Provide strategies for teachers to identify common student errors and misconceptions?**
16. **Assess students at a variety of knowledge levels (e.g., memorization, understanding, reasoning, problem solving)?**
17. **Encourage students to monitor their own progress?**
18. **Provide opportunities for ongoing review and practice with feedback related to learning concepts, and skills.**
19. **Provide support for a varied system of on-going formative and summative assessment (formal or informal observations, interviews, surveys, performance assessments, target problems)?**

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Overarching Concerns-Technology

To what extent do the materials:

20. Integrate technology such as interactive tools, virtual manipulatives/objects, and dynamic mathematics software in ways that engage students in the Mathematical Practices?
21. Include or reference technology that provides opportunities for teachers and/or students to communicate with each other (e.g. websites, discussion groups, webinars)?
22. Include opportunities to assess student mathematical understandings and knowledge of procedural skills using technology?
23. Include or reference technology that provides teachers additional tasks for students?
24. Include teacher guidance for the mindful use of embedded technology to support and enhance student learning?

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Analysis Tool Components

User's Guide

Tool 1: Content Analysis

Tool 2: Mathematical Practices Analysis

Tool 3: Overarching Considerations

- **Equity**
- **Assessment**
- **Technology**

Professional Development Facilitator Guide

PowerPoint Slides

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CCSS Mathematics Curriculum Analysis Tools

Can be found at:

http://www.mathedleadership.org/ccss/materials.html

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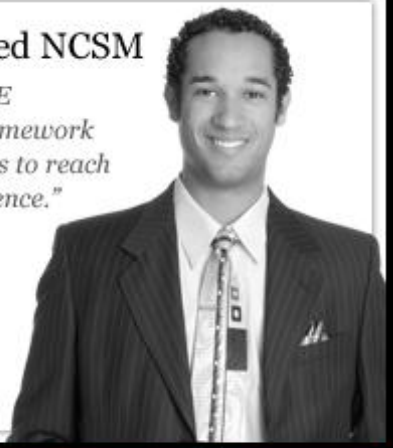

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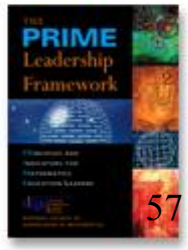

OTHER RESOURCES

Mathematics Assessment Project (MAP)
http://map.mathshell.org.uk/materials

Mathematics Assessment Project
Shell Center/MARS, University of Nottingham & UC Berkeley

Shell Centre for Mathematical Education

MARS Mathematics Assessment Resource Service

Home | MAP Overview | Lessons | Tasks | Tests | Standards | Instructions | Log In

Welcome to the Mathematics Assessment Project

On this page

- Goals
- Products
- What's on this site?
- Who can use the MAP materials?

Important note: *This site, and all the materials here are still in draft or "beta" form: if you find any errors please send feedback to map.feedback@mathshell.org - this includes the software driving this site, so please excuse any bugs and glitches.*

Goals

> *"And I'm calling on our nation's governors and state education chiefs to develop standards and assessments that don't simply measure whether students can fill in a bubble on a test, but whether they possess 21st Century skills like problem solving and critical thinking and entrepreneurship and creativity."*
>
> *President Obama, 1 March 2009.*

The project is working to design and develop well-engineered assessment tools to support US schools in implementing the Common Core State Standards for Mathematics (CCSS).

Funding is provided by the Bill and Melinda Gates Foundation through the University of California, Berkeley.

Products

Tools for formative and summative assessment that make knowledge and reasoning visible, and help teachers to guide students in how to improve, and monitor their progress. These tools comprise:

- **Lesson Units for Formative Assessment:** some focused on math concepts, others on non-routine problem solving – 20 per grade for Grades 7-12.
- **Professional Development Modules:** to help teachers with the new pedagogical challenges that formative assessment presents.
- **Summative Assessment Task Collection:** to illustrate the range of performance goals required by CCSS.
- **Prototype Summative Tests:** designed to help teachers and students monitor their progress, these tests provide a model for examinations that may replace or complement current US tests.

The team also contributes to some system capacity building activities within the wider collaboration that the Gates Foundation has assembled, including states and school systems across the US.

Mathematics Assessment Project (MAP) http://map.mathshell.org.uk/materials

- **20 ready-to-use Lesson Units for Formative Assessment for high school. cross referenced to CCSS content and practices standards. (Ultimately 20 per grade 7-12)**
- **Draft summative assessments, aimed at "College- and Career-Readiness," presented in two forms:**
  (1) a Task Collection with each task cross-referenced to the CCSS, and
  (2) a set of Prototype Test Forms showing how the tasks might be assembled into balanced assessments.
- **Professional development modules are under development**

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MAP Formative Assessment Lessons

- Assessment task, individual work (15 min)
- Teacher reviews work, creates questions to improve solutions
- (Whole group discussion)
- Partner or small group task to increase understanding, address misconceptions
- Debriefing discussion
- Revision of work on original assessment

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The Illustrative Mathematics Project
illustrativemathematics.org

- **Hyperlinked CCSS**
- **Developing a complete set of tasks for each standard**
  - **Range of difficulty**
  - **Simple illustrations of single standards to complex tasks spanning many standards.**
- **Provide a process for submitting, discussing, reviewing, and publishing tasks.**
- **Launch Team: Phil Daro, William McCallum (chair), Jason Zimba**

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Tools for the Common Core Standards
commoncoretools.wordpress.com

Tools for the Common Core Standards

News about tools that are being developed to support implementation of the Common Core State Standards

Home About Tools

Progression on Ratios and Proportional Reasoning

Posted on September 12, 2011 by Bill McCallum

Here is a draft of the Progression on Ratios and Proportional Reasoning. This one took a long time because there is a lot of conflicting and confusing language about ratios and proportional reasoning out in the field, and we struggled with decisions about the extent to which we should try to standardize the language. So comments on this draft would be especially appreciated.

Search

Recent Posts

- Progression on Ratios and Proportional Reasoning
- Videos about the standards
- Essay by Al Cuoco on choosing curriculum aligned to the practices
- Drafty draft of

Higher Order Thinking Tasks

www.insidemathematics.org

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NCSM Resources and Tools

- ***Great Tasks*** **for illustrating the CCSS content and practices standards.**
- **Webinars:**
  - ***Fall 2010 - Getting Started with the Common Core State Standards: First Steps for Mathematics Education Leaders***
  - ***February 2011 - Diving Deeper into the Common Core State Standards***

A recording of today's webinar will be available at:
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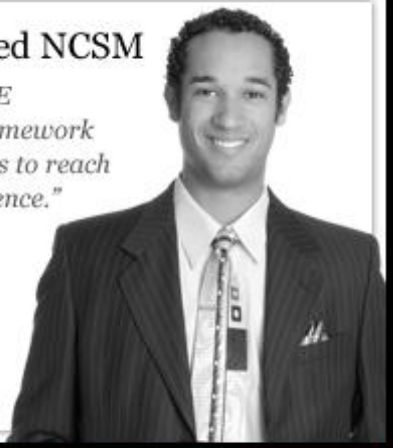

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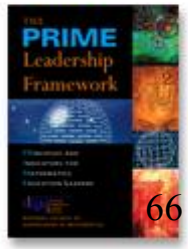
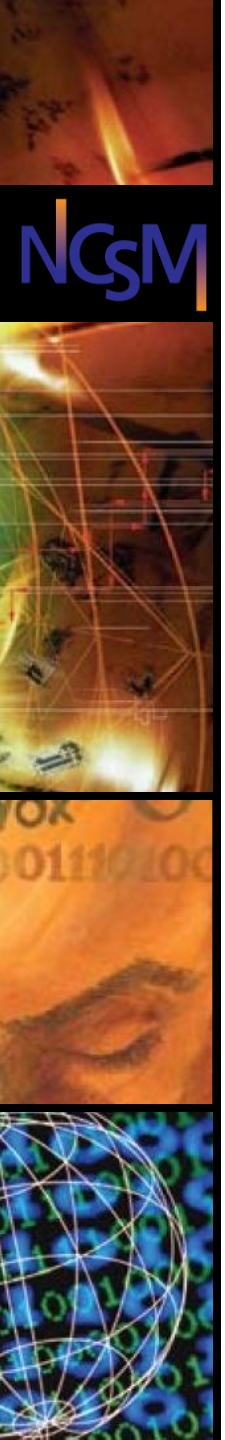


NCSM Professional Development Opportunities

- **NCSM Annual Conference**
  - **April 23-25, 2012, Philadelphia, PA**
- **NCTM Leadership Academy**
  - **June 25-27, 2012, Pittsburgh, PA**
  - **July 31-August 2, 2012, Sonoma, CA**



Thank You!

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