


**Getting Started with the Common Core State Standards:  
First Steps for Mathematics Education Leaders**


Today's Webinar will begin shortly

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**National Council of Supervisors of Mathematics**

**Getting Started with the Common Core State Standards:  
First Steps for Mathematics Education Leaders**

[www.mathedleadership.org](http://www.mathedleadership.org)

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**Presenters**

Diane J. Briars, NCSM President  
Suzanne Mitchell, NCSM President-Elect

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*The critical first steps will be to help educators interpret and understand the CCSS and to support the development and implementation of comprehensive, coherent instruction and assessment systems... we plan to work with our local, state, and national affiliates to feature the CCSS in our professional development opportunities, including annual and regional conferences, academies, and seminars...*

NCSM Joint Public Statement with NCTM, AMTE and ASSM, June 2010

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## Today's Goals

- Provide an overview of the Common Core State Standards for Mathematics
- Consider how the CCSS-M are likely to effect your mathematics program.
- Identify productive starting points for beginning implementation of the CCSS-M.

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## What is NCSM?

International organization of and for mathematics education leaders:

Coaches and mentors	Publishers and authors
Curriculum leaders	Specialists and coordinators
Department chairs	State and provincial directors
District supervisors/leaders	Superintendents
Mathematics consultants	Teachers
Mathematics supervisors	Teacher educators
Principals	Teacher leaders
Professional developers	

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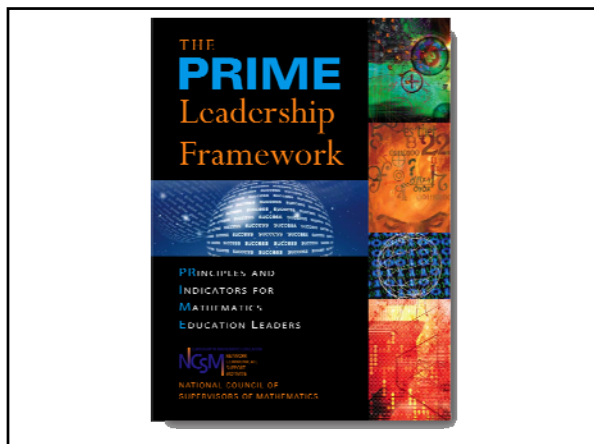
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**Four PRIME Leadership Principles  
Each Defined by Three Indicators**

Principle 1: *Equity Leadership*

Principle 2: *Teaching and Learning Leadership*

Principle 3: *Curriculum Leadership*

Principle 4: *Assessment Leadership*

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**The PRIME Leadership Framework  
and the CCSS**

- Provides a vision of what “ought to be” in school leadership PreK-12.
- Asks mathematics education leaders PreK-12 to **ensure** every adult focus his/her energy and efforts on the “right set of things” or vital teacher behaviors to support the mathematics achievement of all students.
- The CCSS provide a “National” perspective about those right things.

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## CCSS: A Major Challenge/Opportunity

- College and career readiness expectations
- Rigorous content and applications
- Stress conceptual understanding as well as procedural skills
- Organized around mathematical principles
- Focus and coherence
- Designed around research-based learning progressions whenever possible.

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## History

### NCTM

- *Curriculum and Evaluation Standards for School Mathematics* (1989)
- *Professional Standards for Teaching Mathematics* (1991)
- *Assessment Standards for School Mathematics* (1995)
- *Principles and Standards for School Mathematics* (2000)
- *Curriculum Focal Points* (2006)
- *High School Reasoning and Sense Making* (2009)

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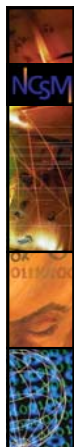
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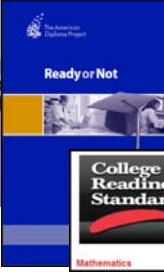
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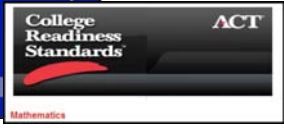


## History

College Board  
Standards for  
College Success™

Mathematics and Statistics  
Adapted for Integrated Curricula



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## Common Core State Standards

- National Governors Association (NGA)
- Council of Chief State School Officers (CCSSO)
- Standards for College and Career Readiness for Mathematics and English/LA
  - Achieve
  - College Board
  - ACT

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## Common Core State Standards

- Mathematics Standards
  - Lead writers: Phil Daro, Bill McCallum, Jason Zimba,
  - Writing teams
  - Review teams
- Two rounds of public review and feedback
- States have option to adopt
  - Verbatim
  - 85% of State Standards must be CCSS

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## CCSS in the States

■ Adopted  
■ Not Yet Adopted

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## What's different about CCSS?

- Accountability
- Accountability
- Accountability

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## What's different about CCSS?

*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 for states to work together to build on lessons learned from two decades of standards based reforms. It is time to recognize that standards are not just promises to our children, but promises we intend to keep.*

— CCSS (2010, p.5)

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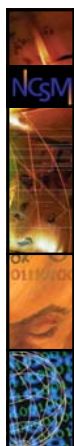
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## Assessment Consortia

- Partnership for the Assessment of Readiness for College and Careers (PARCC)  
<http://www.fldoe.org/parcc/>
- SMARTER Balanced Assessment Consortium  
<http://www.k12.wa.us/SMARTER/>

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## Common Core State Standards for Mathematics

- Introduction
  - Standards-Setting Criteria
  - Standards-Setting Considerations
- Application of CCSS for ELLs
- Application to Students with Disabilities
- Mathematics Standards
  - Standards for Mathematical Practice
  - Contents Standards: K-8; HS Domains
- Appendix A: Model Pathways for High School Courses

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**COMMON CORE STATE STANDARDS FOR**

**Mathematics**

Expanded Version\*



\*Contains the Overall Standards, Introduction, Standards-Setting Criteria, Standards-Setting Considerations, Application of the Standards for English Language Learners (ELL) and Students with Disabilities, and the Mathematics Standards.

Expanded CCSS and Model Pathways available at  
[www.mathedleadership.org/](http://www.mathedleadership.org/)

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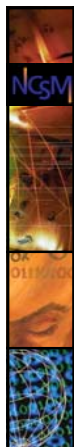
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## Implementing CCSS

- Challenge:
  - CCSS assessments not available for several years (2014-2015 deadline)
- Where not to start--
  - Aligning CCSS standards grade-by-grade with existing mathematics standards.

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## Implementing CCSS: Where to Start?

- Standards for Mathematical Practice
- Standards progressions: Domains and clusters
- Conceptual understanding
- Research-Informed C-T-L-A Actions
- Collaboration around English/Language Arts Standards

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## Standards for Mathematical Practice

“The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education.”  
(CCSS, 2010)



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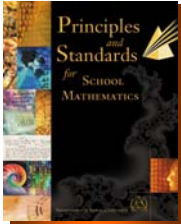
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## Underlying Frameworks

### National Council of Teachers of Mathematics

**5 Process Standards**

- Problem Solving
- Reasoning and Proof
- Communication
- Connections
- Representations



NCTM (2000). *Principles and Standards for School Mathematics*. Reston, VA: Author.

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## Underlying Frameworks

### Strands of Mathematical Proficiency

- Strategic Competence
- Adaptive Reasoning
- Productive Disposition
- Procedural Fluency
- Conceptual Understanding



NRC (2001). *Adding It Up*. Washington, D.C.: National Academies Press.

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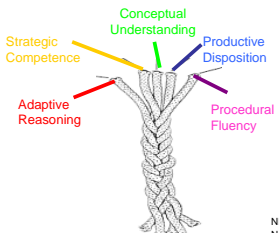

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## Underlying Frameworks

### Strands of Mathematical Proficiency

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## 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.

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## Standards for Mathematical Practice

When you read the practices, the first three words of each are . . .

*Mathematically Proficient Students...*

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## Standards for Mathematical Practice

- Describe the thinking processes, habits of mind and dispositions that students need to develop a deep, flexible, and enduring understanding of mathematics; in this sense they are also a means to an end.

**SP1. Make sense of problems**

“...they [students] analyze givens, constraints, relationships and goals. ....they monitor and evaluate their progress and change course if necessary. .... and they continually ask themselves “Does this make sense?””

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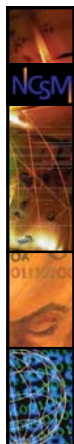
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## Standards for Mathematical Practice

AND....

- Describe mathematical content students need to learn.

**SP1. Make sense of problems**

“..... students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends.”

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Standards for [Student] Mathematical Practice

“Not all tasks are created equal, and *different tasks will provoke different levels and kinds of student thinking.*”

Stein, Smith, Henningsen, & Silver, 2000

“*The level and kind of thinking in which students engage determines what they will learn.*”

Hiebert, Carpenter, Fennema, Fuson, Wearne, Murray, Oliver, & Human, 1997

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Standards for Mathematical Practice in a Classroom

Represent the 3 DVD rental plans below using graphs, tables, and/or equations.

<b>Movie Buster</b> \$3 per movie rented	<b>Online Flix</b> \$12 per month plus \$1 per movie rented	<b>Mail Flix</b> \$18 per month regardless of the number of movies rented
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Do the three plans ever cost the same?

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Standards for Mathematical Practice in a Classroom

**SP 3. Construct viable arguments and critique the reasoning of others**

- Students make conjectures
- Students justify their conclusions and communicate them to others
- Students compare the effectiveness of two plausible arguments
- Students listen and respond to the arguments of others for sense making and clarity

**HS N-Q: Reason quantitatively and use units to solve problems**

- N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems;
- N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

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**Standards for Mathematical Practice  
in a Classroom**

*McDonald's Claim*



Wikipedia reports that 8% of all Americans eat at McDonalds every day.  
310 million Americans and 12,800 McDonalds...

Do you believe the Wikipedia report to be true?  
Create a mathematical argument to justify your position.

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**Standards for [Student] Mathematical  
Practice**

The 8 Standards for Mathematical Practice –  
place an emphasis on student demonstrations  
of learning...

Equity begins with an understanding of how  
the selection of tasks, the assessment of tasks,  
the student learning environment creates great  
inequity in our schools...

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**Implementation Issue**

Do *all* students have the opportunity to  
engage in mathematical tasks that  
promote students' attainment of the  
mathematical practices on a regular basis?

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## Leading with the Mathematics Practices

- Build upon/extend work on NCTM Processes and NRC Proficiencies
- Phase in implementation
- Consider relationships among the practices
- Analyze instructional tasks in terms of opportunities for students to regularly engage in practices.

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## Standards for Mathematical Content

<ul style="list-style-type: none"> <li>• Counting and Cardinality (K)</li> <li>• Operations and Algebraic Thinking (K-5)</li> <li>• Number and Operations in Base Ten (K-5)</li> <li>• Measurement and Data (K-5)</li> <li>• Geometry (K-HS)</li> <li>• Number and Operations — Fractions (3-5)</li> </ul>	<ul style="list-style-type: none"> <li>• Ratios and Proportional Relationships (6-7)</li> <li>• The Number System (6-8)</li> <li>• Expressions and Equations (6-8)</li> <li>• Statistics and Probability (6-HS)</li> <li>• Functions (8-HS)</li> <li>• Number and Quantity (HS)</li> <li>• Algebra (HS)</li> <li>• Modeling (HS)</li> </ul>
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## Grade Level Standards

**Number and Operations in Base Ten**      **3.NBT**

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

1. Use place value understanding to round whole numbers to the nearest 10 or 100.
2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
3. Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g.,  $9 \times 80$ ,  $5 \times 60$ ) using strategies based on place value and properties of operations.

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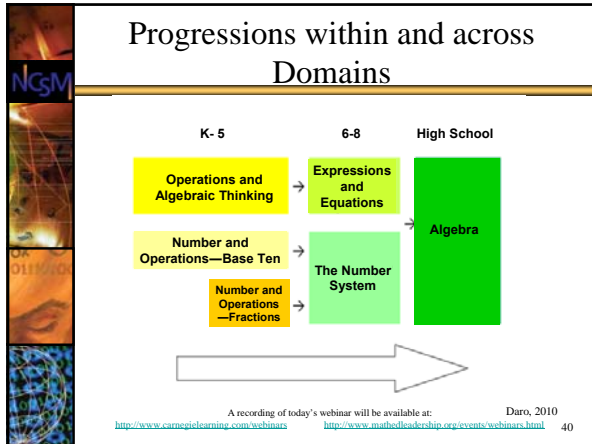
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	Operations and Algebraic Thinking	Numbers and Operations in Base Ten	Fractions
1	Understand and apply properties of operations and the relationship between addition and subtraction.	Use place value understanding and properties of operations to add and subtract.	
2		Use place value understanding and properties of operations to add and subtract.	
3	Understand properties of multiplication and the relationship between multiplication and division.	Use place value understanding and properties of operations to perform multi-digit arithmetic. <i>A range of algorithms may be used.</i>	
4		Use place value understanding and properties of operations to perform multi-digit arithmetic. <i>Fluently add and subtract multi-digit whole numbers using the standard algorithm.</i>	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
5		Perform operations with multi-digit whole numbers and with decimals to hundredths. <i>Fluently multiply multi-digit whole numbers using the standard algorithm.</i>	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

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- ## Key Advances
1. Properties of operations: Their role in arithmetic and algebra
  2. Mental math and “algebra” vs. algorithms
  3. Operations and the problems they solve
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### Common Addition and Subtraction Situations

	Result Unknown	Change Unknown	Start Unknown
<b>Add to</b>	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? $? + 3 = 5$
<b>Take from</b>	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$
<b>Put Together/ Take Apart<sup>2</sup></b>	<b>Total Unknown</b> Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	<b>Addend Unknown</b> Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5, 5 - 3 = ?$	<b>Both Addends Unknown<sup>1</sup></b> Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$

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### Common Addition and Subtraction Situations

	Difference Unknown	Bigger Unknown	Smaller Unknown
<b>Compare<sup>3</sup></b>	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? $2 + ? = 5, 5 - 2 = ?$	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? $2 + 3 = ?, 3 + 2 = ?$	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?, ? + 3 = 5$
	("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? $2 + ? = 5, 5 - 2 = ?$	(Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? $2 + 3 = ?, 3 + 2 = ?$	(Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?, ? + 3 = 5$

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## Key Advances

1. Properties of operations: Their role in arithmetic and algebra
2. Mental math and "algebra" vs. algorithms
3. Operations and the problems they solve
4. Units and unitizing
  - a. Unit fractions
  - b. Unit rates
5. Quantities-variables-functions-modeling
6. Number-expression-equation-function
7. Modeling
8. Practices

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## Common Core Standards: English Language Arts

- The standards title signals a significant shift: English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects
- Proponents say the standards present a vision of what it means to be a literate person in the twenty-first century.
- The standards emphasize shared responsibility for students' mathematical literacy development.

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## Key Premises for the English Language Arts Standards in the support of Mathematics

- All students must be able to comprehend texts of steadily increasing complexity as they progress through school.
- By the time students complete the core of their K-12 education, students must be able to read and comprehend independently and proficiently the kinds of complex texts, especially in mathematics, commonly found in college and careers.
- The ability to read complex text on the ACT has been shown to be an excellent predictor of success in reading-intensive courses in college

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## Key Premises

- Although the reading demands of college, workforce training programs, and citizenship have held steady or risen over the past fifty years, K-12 texts have become less demanding.
- Meanwhile, college texts, even in mathematics, have increased in complexity over the same period.
- Middle and high school students must be challenged to read and comprehend mathematical text.

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## Common Core Standards: English Language Arts

- Prefixes, suffixes and symbols
- Words with double meanings based on context
- Mathematical words used in everyday language

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## Mathematical Practices Support the Process Standard: Communication

- Make sense of problems (Organize and consolidate mathematical thinking through communication)
- Construct viable arguments and critique reasoning of others (Analyze and evaluate mathematical thinking of others)
- Reason abstractly and quantitatively (Communicate mathematical thinking coherently and clearly)
- Attend to precision (Use the language of mathematics to express mathematical ideas precisely)

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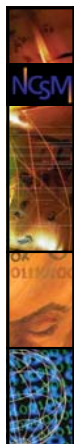
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## Content Learning and Content Literacy Learning

- Learning the content of mathematics is as much about learning to read, write, and talk about the content as it is learning the concepts, skills and facts.
- Teaching reading, writing, and thinking skills in mathematics is teaching mathematics
- Ideally, content and literacy processes are wound together in a tight, single braid of instruction. (Brozo 2010)

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## Common Core Standards: English Language Arts

- The focus for literacy in the service of content learning is defended on the grounds that building a foundation of knowledge in relevant prior knowledge and domain specific knowledge will give students the background to be better readers in mathematical and technical areas.

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## Forthcoming Resources and Tools NCSM

- Illustrating the Standards for Mathematical Practice* professional development materials.
- Tool for analyzing instructional materials in light of CCSS and related professional development activities.
  - Under development in collaboration with Bill Bush, University of Louisville, and CCSSO.
  - Target release date: Spring, 2011.

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## AMTE, ASSM, NCSM, NCTM Priority Activities

- Advancing the Vision of High Quality Mathematics Education: Supporting Implementation of CCSS.*
  - Toolkit
  - Regional meetings of leadership teams
- Appoint a Joint Committee of AMTE, ASSM, NCSM and NCTM to serve as an ongoing advisory group regarding CCSS.
- Convene a panel of professional development experts to develop a conceptual framework for teacher professional development systems to support CCSS at the school, district and state levels.

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## AMTE, ASSM, NCSM, NCTM Priority Activities

4. Convene an Assessment Working Group to coordinate the field's best guidance on assessment development and ensure that new student assessments address the priorities (e.g., mathematical practices) articulated in CCSS.
5. Develop and launch a research agenda focused on implementation of the CCSS that includes systematic study of the instantiation and implementation of the standards, monitors the impact on instruction and student learning and informs revisions of CCSS.

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## Forthcoming CCSS Companion Resources

- Technical Manual
  - Highlights structural features in the standards but not highly visible, e.g., how particular ideas connect and grow across grades.
- Standards Progressions documents
- Sample Tasks
  - Review board and vetting process

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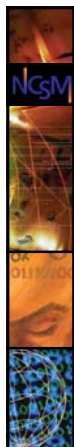
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## Getting Started with CCSS

Suggested First Implementation Steps:

- Mathematical practices
- Progressions within and among content clusters and domains
- “Key advances”
- Collaboration with literacy colleagues

Forthcoming resources

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## Reflection: Now What?

What actions will you take based on what we worked on today?

- What do you need to learn?
- Who will you work with?
- What do you need to integrate into your practice?
- Who will support you?

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## Thank you for joining us!

Additional questions? Contact:  
 Diane Briars: [djbmath@comcast.net](mailto:djbmath@comcast.net)  
 Suzanne Mitchell: [suzmitch@comcast.net](mailto:suzmitch@comcast.net)

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