AN ADMINISTRATOR'S GUIDE TO IMPLEMENTING THE CCSS AND SUPPORTING MATHEMATICS EDUCATION

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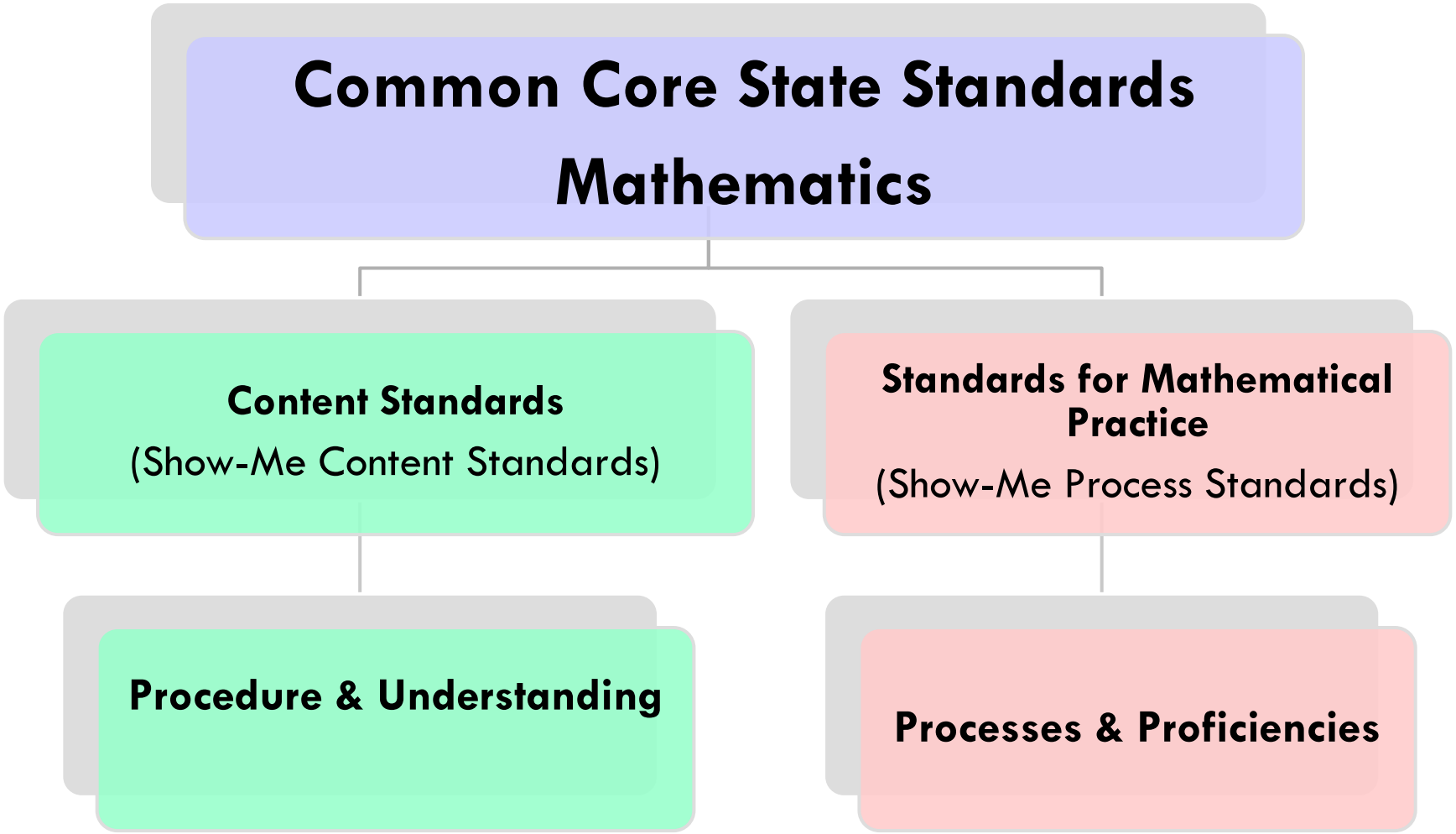
Missouri Department of Elementary and Secondary Education

Agenda

Mathematics Common Core State Standards

- *Priorities*
- *Practices~~processes & proficiencies*
- *Professional learning*

College and Career Ready



2014 – 2015 Assessments Aligned to the CCSS in Mathematics

2011 – 2015 Assessment At-A-Glance

Mathematics Assessment Implementation		
School Year	**Grades 3 - 8**	**High School**
2011 – 2012 Aligned to v2.0 GLEs/CLEs	**MAP**	End-of-Course Algebra I, Geometry, Algebra II
2012 – 2013 Aligned to v2.0 GLEs/CLEs	**MAP**	End-of-Course Algebra I, Geometry, Algebra II
2013 – 2014 Aligned to v2.0 GLEs/CLEs→	**MAP**	End-of-Course Algebra I, Geometry, Algebra II
Aligned to CCSS →	**SBAC (Pilot/Field Test)**	**SBAC Grade 11 Summative (Pilot/Field Test)**
2014 – 2015 Aligned to CCSS	**SBAC Grades 3 – 8 Operational Assessment**	**SBAC Grade 11 Summative Operational Assessment & EOC Exams**

Begin at the beginning…

- Introduction
- Standards for Mathematical Practice K – 12
- Mathematics Content Standards K – 12
- Glossary
- Sample of Works Consulted

Priorities

Common Core State Standards

Mathematics

Content Standards

(Show-Me Content Standards)

Procedure & Understanding

Organization of the Standards

- **Standards**-define what students should know
- **Clusters** -groups of related standards.
- **Domains**-larger groups of related standards.

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

Use place value understanding and properties of operations to perform multi-digit arithmetic. ←Cluster heading

Standard→

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.

↓CLUSTER↑

CCSS Mathematics K - 8 Domains 8/2011

Domain	K	1	2	3	4	5	6	7	8
Counting and Cardinality	K.CC.1, 2, 3, 4a, 4b, 4c, 5, 6, 7								
Operations and Algebraic Thinking	K.OA.1, 2, 3, 4, 5	1.OA.1, 2, 3, 4, 5, 6, 7, 8	2.OA.1, 2, 3, 4	3.OA.1, 2, 3, 4, 5, 6, 7, 8, 9	4.OA.1, 2, 3, 4, 5	5.OA.1, 2, 3			
Numbers and Operations in Base Ten	K.NBT.1	1.NBT.1, 2a, 2b, 2c, 3, 4, 5, 6	2.NBT.1a, 1b, 2, 3, 4, 5, 6, 7, 8, 9	3.NBT.1, 2, 3	4.NBT.1, 2, 3, 4, 5, 6	5.NBT.1, 2, 3a, 3b, 4, 5, 6, 7			
Numbers and Operations - Fractions				3.NF.1, 2a, 2b, 3a, 3b, 3c, 3d	4.NF.1, 2, 3a, 3b, 3c, 3d, 4a, 4b, 4c, 5, 6, 7	5.NF.1, 2, 3, 4a, 4b, 5a, 4b, 5a, 5b, 6, 7a, 7b, 7c			
Measurement and Data	K.MD.1, 2, 3	1.MD.1, 2, 3, 4	2.MD.1, 2, 3, 4, 5, 6, 7, 8, 9, 10	3.MD.1,2, 3, 4, 5a, 5b, 6, 7a, 7b, 7c, 7d, 8	4.MD.1, 2, 3, 4, 5a, 5b, 6, 7	5.MD.1, 2, 3a, 3b, 4, 5a, 5b, 5c			
Geometry	K.G.1, 2, 3, 4, 5, 6	1.G.1, 2, 3	2.G.1, 2, 3	3.G.1, 2	4.G.1, 2, 3	5.G1, 2, 3, 4	6.G.1, 2, 3, 4	7.G1, 2, 3, 4, 5, 6	8.G.1a, 1b, 1c, 2, 3, 4, 5, 6, 7, 8, 9
Ratios and Proportional Relationships	Computations			Fractions			6.RP.1, 2, 3a, 3b, 3c, 3d	7.RP.1, 2a, 2b, 2c, 2d, 3	
The Number System							6.NS.1, 2, 3, 4, 5, 6a, 6b, 6c, 7a, 7b, 7c, 7d, 8	7.NS.1a, 1b, 1c, 1d, 2a, 2b, 2c, 2d, 3	8.NS.1, 2,
Expressions and Equations							6.EE1, 2a, 2b, 2c, 3, 4, 5, 6, 7, 8, 9	7.EE.1, 2, 3, 4a, 4b	8.EE.1, 2, 3, 4, 5 ,6, 7a, 7b, 8a, 8b, 8c
Statistics and Probability							6.SP.1, 2, 3, 4, 5a, 5b, 5c, 5d	7.SP.1, 2, 3, 4, 5, 6, 7a, 7b, 8a, 8b, 8c	8.SP.1, 2, 3, 4
Functions		Solving Systems of Equations							8.F.1, 2, 3, 4, 5

Focus on….Doing **MORE** of Less

NCTM Curriculum Focal Points

Mathematics K – 8 instructional time should focus on these critical areas in:

Grade 2

(1) extending understanding of base ten notation;

(2) building fluency with addition and subtraction;

One of the characteristics of the most effective schools is their willingness to declare that some things are more important than others; they are willing to abandon some less important content so as to be able to have enough time dedicated to those areas that are valued most.

Lezotte, L. W. (1991). Correlates of effective schools: The first and second generation. Okemos, MI: Effective School Products.

COMMON CORE STATE STANDARDS FOR

Mathematics

Critical Areas of Instruction

COMMON CORE STATE STANDARDS INITIATIVE

Kindergarten

In Kindergarten, instructional time should focus on two critical areas:

1. representing and comparing whole numbers, initially with sets of objects; and
2. describing shapes and space.

More learning time in Kindergarten should be devoted to number than to other topics.

Grade 1

In Grade 1, instructional time should focus on four critical areas:

1. developing understanding of addition, subtraction, and strategies for addition and subtraction within 20;
2. developing understanding of whole number relationships and place valued, including grouping in tens and ones;
3. developing understanding of linear measurement and measuring lengths as iterating unites of length; and
4. reasoning about attributes of, and composing and decomposing geometric shapes.

Grade 2

In Grade 2, instructional time should focus on four critical areas:

1. extending understanding of base ten notation;
2. building fluency with addition and subtraction;
3. using standard units of measure; and
4. describing and analyzing shapes.

Grade 3

In Grade 3, instructional time should focus on four critical areas:

1. developing understanding of multiplication and division and strategies for multiplication and division with 100;
2. developing understanding of fractions, especially unit fractions (fractions with numerator 1);
3. developing understanding of the structure of rectangular arrays and of area; and
4. describing and analyzing two-dimensional shapes.

Grade 4

In Grade 4, instructional time should focus on three critical areas:

1. developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends;
2. developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; and
3. understanding that geometric figures can be analyzed and classified based on their properties; such as having parallel sides, perpendicular sides, particular angle measurements, and symmetry.

Grade 5

In Grade 5, instructional time should focus on three critical areas:

1. developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions);
2. extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and
3. developing understanding of volume.

Grade 6

In Grade 6, instructional time should focus on four critical areas:

1. connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems
2. completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers;
3. writing, interpreting, and using expressions and equations; and
4. developing understanding of statistical thinking.

Grade 7

In Grade 7, instructional time should focus on four critical areas:

1. developing understanding of and applying proportional relationships;
2. developing understanding of operations with rational numbers and working with expressions and linear equations;
3. solving problems involving scale drawings and informal geometric constructions, and working with two-and three-dimensional shapes to solve problems involving area, surface area, and volume; and
4. drawing inferences about populations based on samples.

Grade 8

In Grade 8, instructional time should focus on three critical areas:

1. formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations;
2. grasping the concept of a function and using functions to describe quantitative relationships; and
3. analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Doing MORE of less

- Providing more time for teaching to include high cognitive demand lessons that emphasize the mathematical practice standards
- Providing more time for students to think about and engage with mathematical ideas

First Steps: Priorities, Practices, & Professional Learning

- What content is currently included in our curriculum that is also included at the same grade/course in the CCSS?
- Are students learning the content?
  - How do they perform on assessments?
    - What attributes to high performance?
    - What could improve performance?
      - More emphasis/time on the content?
      - Inclusion of the mathematical practice standards?
        - What do they look like in the classroom?
      - Professional learning opportunities for teachers?

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Missouri CCSS Implementation Activities & Resources

http://www.dese.mo.gov/divimprove/curriculum/common-core-math.htm

Presentations and Videos

Regional Meeting Information

	Handouts		Videos
General Session	View	Print	(42 minutes)

Mathematics

	Handouts		Videos
Math K - 4	View	Print	Unavailable
Math 5 – 8	View	Print	(38 minutes)
Math 9 – 12	View	Print	(52 minutes)

Identify the current GLEs/CLEs that align at the same grade or course level to the CCSS.

Grade-Span Commonalities

Mathematics

PDF Letter Size (8.5 x 11)	Word Legal Size (11 X 14)
Math K - 2	Math K - 2
Math 3 - 5	Math 3 - 5
Math 6 – 8	Math 6 – 8
Math HS	Math HS

Mathematics Commonalities

MATHEMATICS COMMONALITIES

Common Core State Standards Aligned at the Same Grade or Course Level as in the v2.0 GLEs/CLEs

DRAFT

Ratios and Proportional Relationships (RP) – Grades 6-8			
CCSS Standards Cluster	**Grade 6**	**Grade 7**	**Grade 8**
Understand ratio concepts and use ratio reasoning to solve problems.	N3E6, A3A6, M2E6		
Analyze proportional relationships and use them to solve real-world and mathematical problems.		N3E7, A1D7, A2A7, A3A7	

The Number System (NS) – Grades 6-8			
CCSS Standards Cluster	**Grade 6**	**Grade 7**	**Grade 8**
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	N2B6, N3C6, G4B6		
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.		N1A7, N1B7, N2B7, N2C7, N3C7, A2B7	
Know that there are numbers that are not rational, and approximate them by rational numbers			N1B8
Compute fluently with multi-digit numbers and find common factors and multiples.	N3C6, A2B6		
Apply and extend previous understandings of numbers to the system of rational numbers.	G3A6		

CCSS Grades K – 8 Domain and Cluster Alignments to v2.0 GLEs/CLEs

Domain	K			1			2		
	Below Grade Level	At Grade Level	Above Grade Level	Below Grade Level	At Grade Level	Above Grade Level	Below Grade Level	At Grade Level	Above Grade Level
Counting and Cardinality		**N1AK** **N1DK** **N3BK**	N1A1 N1D1						
		N3BK **A3AK**							
			N1A1						
Operations and Algebraic Thinking		**N1CK** **A3AK**	N2A1		**N2A1** **A2A1** **A3A1**			**N3C2** **A3A2**	
								N3B2	
					N1C1 **A2B1**		N1D1	**A3A2**	N1D3 N2A3

Missouri CCSS Implementation Activities & Resources

- A comprehensive listing of all CCSS for mathematics and their alignment to the GLEs/CLEs in grades K – 8, Algebra I, Geometry, and Algebra II.

- These are useful in identifying content to be addressed in each grade or course in updating curriculum and preparing students for assessments aligned to the CCSS.

CCSS and GLEs/CLEs Crosswalk Alignment Analysis

Mathematics

PDF Letter Size (8.5 x 11)	Word Legal Size (11 X 14)
Kindergarten	Kindergarten
Grade 1	Grade 1
Grade 2	Grade 2
Grade 3	Grade 3
Grade 4	Grade 4
Grade 5	Grade 5
Grade 6	Grade 6
Grade 7	Grade 7
Grade 8	Grade 8
Algebra I	Algebra I
Algebra II	Algebra II
Geometry	Geometry

CCSS/v2.0 GLEs Alignment Analysis

Domain	CCSS Cluster/Standards	Missouri v2.0 GLE	CCSS Alignment to v2.0 GLE/CLE
Counting and Cardinality (CC)	**K.CC4a** When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.	**N1AK** ***rote count to 100*** and recognize numbers up to 31	Partial alignment to bold, italicized portion of GLE
		N1D1 ***skip count*** by 2s, 5s and ***10s***	Partial alignment to bold, italicized portion of GLE

In development…Identifying non-aligned CCSS mathematics content

Domain	CCSS Cluster/Standards	Missouri v2.0 GLE	CCSS Alignment to v2.0 GLE/CLE
Counting and Cardinality (CC)	**K.CC2** **Count forward beginning from a given number within the known sequence (instead of having to begin at 1).**		No complete or partial alignment to any GLE/CLE
	K.CC3 Write numbers from 0 to 20. **Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).**	**N1A1** *read, ***write***, and compare ***whole numbers less than 100***	Partial alignment to bold, italicized portion of Grade 1 GLE
		N3BK ****connect number words*** (orally) ***and quantities they represent***	Partial alignment to bold, italicized portion of GLE

Practices

Common Core State Standards Mathematics

Standards for Mathematical Practice

(Show-Me Process Standards)

Processes & Proficiencies

What Makes a Difference

1. The quality of teachers and teaching.
2. Access to challenging curriculum, which ultimately determines a greater quotient of students' achievement than their initial ability levels; and
3. Schools and classes organized so that students are well known and well supported.

Darling-Hammond, L. (2006) 2006 DeWitt Wallace-Reader's Digest Distinguished Lecture – Securing the right to learn. Policy and practice for powerful teaching and learning. Educational Researcher, 35(7), 13 – 24.

Conceptually Engaging Tasks = Cognitively Demanding Tasks

High cognitive demand lessons provide opportunities for students:

- to explain, describe, justify, compare, or assess;
- To make decisions and choices
- To plan and formulate questions
- To exhibit creativity; and
- To work with more than one representation in a meaningful way.

Silver, E. (2010). Examining what teacher do when they display best practice: Teaching mathematics for understanding. Journal of Mathematics Education at Teachers' College. 1(1), 1-6.

Some Features of Mathematical Practice of Effective Instruction – T^2

TASKS

Conceptual Engagement & Productive Struggle

TALK

Mathematical Discourse

Standards for Mathematical Practice

- Rest on important **PROCESSES** including:
  - Problem solving, reasoning and proof,
  - communication, representation, and connections.
- Rest on important mathematical **PROFICIENCIES** including:
  - Adaptive reasoning
  - Strategic competence
  - Conceptual understanding
  - Procedural fluency
  - Productive disposition

NCTM—
Principles and Standards for School Mathematics

National Research Council Report--
Adding it Up!

Standards for Mathematical Practice Rest On Important **Proficiencies**

National Research Council Report- *Adding it Up!*

- Adaptive Reasoning – capacity for logical thought, reflection, explanation, and justification
- Strategic Competence – ability to formulate, represent, and solve mathematical problems
- Conceptual Understanding – comprehension of mathematical concepts, operations, and relations
- Procedural Fluency – skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
- Productive Disposition – habitual inclination to see mathematics as sensible, useful and worthwhile, coupled with a belief in diligence and one's own efficacy.

Standards for Mathematical Content

Grade Level Overview Page

Grade 5 Overview

Operations and Algebraic Thinking

- Write and interpret numerical expressions.
- Analyze patterns and relationships.

Number and Operations in Base Ten

- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations—Fractions

- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

The Number System

- Gain familiarity with concepts of positive and negativ
integers

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.

Mathematical Practice Standards are included throughout K – 12. Implementation can begin immediately.

High-Demand Tasks Are Tasks That Emphasize…

The Standards for Mathematical Practice

1. Make sense of problems and persevere in problem solving. (3.1 – 3.7)	2. Reason abstractly and quantitatively. (1.7, 1.10, 3.5, 3.8)	3. Construct viable arguments and critique the reasoning of others. (1.7,1.8, 3.3, 3.5)	4. Model with mathematics. (1.6,1.8, 1.10,2.1 3.3 4.1)
5. Us appropriate tools strategically. (1.4, 1.10, 2.7)	6. Attend to precision. (1.7, 2.2, 2.3, 3.8)	7. Look for and make use of structure. (1.6, 1.7, 1.8, 2.3, 3.1, 3.6)	8. Look for and express regularity in repeated reasoning. (1.6, 3.5, 3.6, 3.7)

Common Core State Standards Initiative (CCSS). Common Core State Standards for Mathematics. Common Core State Standards (College and Career-Ready Standards and K – 12 Standards for English Language Arts and Math). Washington, D.C.: National Governor's Association Center for Best Practices and the Council of Chief State School Officers, 2010. https://www.corestandards.org .

*Missouri Show-Me Process Standards

Common Core State Standards: Standards for Mathematical Practice

1. Make sense of problems and persevere in problem solving. *Mathematically proficient students:* ✓ Explain the meaning of a problem and restate it in their words. ✓ Analyze given information to develop possible strategies for solving the problem. ✓ Identify and execute appropriate strategies to solve the problem. ✓ Evaluate progress toward the solution and make revisions if necessary. ✓ Check their answers using a different method, and continually ask "Does this make sense?" **(3.1 – 3.7)**	**2. Reason abstractly and quantitatively.** *Mathematically proficient students:* ✓ Make sense of quantities and their relationships in problem situations. ✓ Use varied representations and approaches when solving problems. ✓ Know and flexibly use different properties of operations and objects. ✓ Change perspectives, generate alternatives and consider different options. **(1.7, 1.10, 3.5, 3.8)**	**3. Construct viable arguments and critique the reasoning of others.** *Mathematically proficient students:* ✓ Understand and use prior learning in constructing arguments. ✓ Habitually ask "why" and seek an answer to that question. ✓ Question and problem-pose. ✓ Develop questioning strategies to generate information. ✓ Seek to understand alternative approaches suggested by others and. As a result, to adopt better approaches. ✓ Justify their conclusions, communicate them to others, and respond to the arguments of others. ✓ Compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. **(1.7,1.8, 3.3, 3.5)**	**4. Model with mathematics.** *Mathematically proficient students:* ✓ Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. ✓ Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. ✓ Identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. ✓ Analyze mathematical relationships to draw conclusions. **(1.6,1.8, 1.10,2.1 3.3 4.1)**
5. Use appropriate tools strategically. *Mathematically proficient students:* ✓ Use tools when solving a mathematical problem and to deepen their understanding of concepts (e.g., pencil and paper, physical models, geometric construction and measurement devices, graph paper, calculators, computer-based algebra or geometry systems.) ✓ Make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. They detect possible errors by strategically using estimation and other mathematical knowledge. **(1.4, 1.10, 2.7)**	**6. Attend to precision.** *Mathematically proficient students:* ✓ Communicate their understanding of mathematics to others. ✓ Use clear definitions and state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. ✓ Specify units of measure and use label parts of graphs and charts ✓ Strive for accuracy. **(1.7, 2.2, 2.3, 3.1, 3.8)**	**7. Look for and make use of structure.** *Mathematically proficient students:* ✓ Look for, develop, generalize and describe a pattern orally, symbolically, graphically and in written form. ✓ Apply and discuss properties. **(1.6, 1.7, 1.8, 2.3, 3.1, 3.6)**	**8. Look for and express regularity in repeated reasoning.** *Mathematically proficient students:* ✓ Look for mathematically sound shortcuts. ✓ Use repeated applications to generalize properties. **(1.6, 3.5, 3.6, 3.7)**

First Steps: Priorities, Practices, & Professional Learning

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    - What attributes to high performance?
    - What could improve performance?
      - More emphasis/time on the content?
      - Inclusion of the mathematical practice standards?
        - What do they look like in the classroom?
      - Professional learning opportunities for teachers?

Elements of High Quality K – 12 Mathematics Classrooms

S = student learning **T** = teacher instruction	**Instruction and Learning Elements in K – 12 Mathematics Classrooms**	**MP** = Mathematical Practices **SP** = Show-Me Process Standards
T	A. Using questioning techniques to facilitate learning	**MP** = 3, 6 **SP** = 1.4, 1.7, 1.8, 2.2, 2.3, 3.3, 3.5, 3.8
S	B. Actively engaging in the learning process	**MP** = 1 **SP** = 3.1 – 3.7
T	C. Choosing "good" problems – ones that invite exploration of an important mathematical concept and allow the chance to solidify and extend knowledge	**MP** = 1, 4, 7, 8 **SP** = 1.6, 1.7, 1.8, 1.10,2.1, 2.3, 3.1 – 3.7,
S	D. Using existing mathematical knowledge to make sense of the task	**MP** = 1, 2, 3 **SP** = 1.7, 1.8, 1.10, 3.1 – 3.8
S	E. Making connections among mathematical concepts	**MP** = 2, 7, 8 **SP** = 1.6 - 1.8, 1.10, 2.3, 3.1, 3.5 – 3.8

Administrator's Guide: Interpreting the Common Core State Standards to Improve Mathematics Education **(NCTM, 2010)**

Standards for Mathematical Practice

Standard 1	*Standard 2*	*Standard 3*	*Standard 4*	*Standard 5*	*Standard 6*	*Standard 7*	*Standard 8*
Make sense of problems and persevere in problem solving.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

S = student learning **T** = teacher instruction	**Instruction and Learning Elements in K – 12 Mathematics Classrooms**	**MP** = Mathematical Practices **SP** = Show-Me Process Standards
	A. Using questioning techniques to facilitate learning	**MP** = 3, 6 **SP** = 1.4, 1.7, 1.8, 2.2, 2.3, 3.3, 3.5, 3.8
	B. Actively engaging in the learning process	**MP** = 1 **SP** = 3.1 – 3.7
	C. Choosing "good" problems – ones that invite exploration of an important mathematical concept and allow the chance to solidify and extend knowledge	**MP** = 1, 4, 7, 8 **SP** = 1.6, 1.7, 1.8, 1.10,2.1, 2.3, 3.1 – 3.7,
	D. Using existing mathematical knowledge to make sense of the task	**MP** = 1, 2, 3 **SP** = 1.7, 1.8, 1.10, 3.1 – 3.8
	E. Making connections among mathematical concepts	**MP** = 2, 7, 8 **SP** = 1.6 - 1.8, 1.10, 2.3, 3.1, 3.5 – 3.8
	F. Assessing understanding by listening to discussions and asking for justification of responses	**MP** = 3, 6 **SP** = 1.7, 1.8, 2. 2, 2.3, 3.8
	G. Reasoning and making conjectures about the problem	**MP** = 1, 2 **SP** = 1.7, 1.10, 3.1 – 3.8
	H. Communicating mathematical thinking orally and in writing	**MP** = 3, 6 **SP** = 1.7, 1.8, 2.2, 2.3, 3.8
	I. Encouraging the exploration of multiple solutions	**MP** = 7, 8 **SP** = 1.6, 1.7, 1.8, 2.3, 3.1, 3.5 – 3.7
	J. Modeling appropriate mathematical language and a disposition for solving challenging mathematical problems	**MP** = 1, 3, 4, 6 **SP** = 1.6 – 1.8, 1.10, 2.1 – 2.3, 4.1
	K. Listening and reacting to others' thinking and solutions to problems	**MP** = 3 **SP** = 1.7, 1.8, 3.3, 3.5
	L. Using a variety of representations, such as pictures, tables, graphs, and words, for their mathematical thinking	**MP** = 4 **SP** = 1.6, 1.8, 1.10, 2.1, 3.3, 4.1
	M. Using mathematical and technological tools, such as physical materials, calculators, and computers, along with textbooks and other instructional materials	**MP** = 5 **SP** = 1.7, 2.2, 2.3, 3.8
	N. Challenging deep thinking about the problems solved and making connections with other ideas within mathematics	**MP** = 1, 2, 7, 8 **SP** = 1.6 – 1.8, 1.10, 2.3, 3.1 – 3.8
	O. Building new mathematical knowledge through problem solving	**MP** = 1 - 8 **SP** = 1.4, 1.6 – 1.8, 1.10, 2.1 – 2.3, 3.1 – 3.8, 4.1
	P. Creating a variety of opportunities, such as group work and class discussions, for students to communicate mathematically	**MP** = 3, 6 **SP** = 1.7, 1.8, 2. 2, 2.3, 3.8

Instruction and Learning Elements in K – 12 Mathematics Classrooms

Instruction
Teacher Strategies
C. Choosing "good" problems – ones that invite exploration of an important mathematical concept and allow students the chance to solidify and extend their knowledge
F. Assessing students' understanding by listening to discussions and asking students to justify their responses
A. Using questioning techniques to facilitate learning
I. Encouraging students to explore multiple solutions
N. Challenging students to think more deeply about the problems they are solving and to make connections with other ideas within mathematics
P. Creating a variety of opportunities, such as group work and class discussions, for students to communicate mathematically
J. Modeling appropriate mathematical language and a disposition for solving challenging mathematical problems

Learning
Student Activities
B. Actively engaging in the learning process
D. Using existing mathematical knowledge to make sense of the task
E. Making connections among mathematical concepts
G. Reasoning and making conjectures about the problem
H. Communicating their mathematical thinking orally and in writing
K. Listening and reacting to others' thinking and solutions to problems
L. Using a variety of representations, such as pictures, tables, graphs, and words, for their mathematical thinking
M. Using mathematical and technological tools, such as physical materials, calculators, and computers, along with textbooks and other instructional materials
O. Building new mathematical knowledge through problem solving

Administrator's Guide: Interpreting the Common Core State Standards to Improve Mathematics Education (NCTM, 2010)

First Steps: Priorities, Practices, & Professional Learning

- Identify 5 – 10 key lessons on topics that students didn't do well on last year
- Revise the lessons to include:
  - More than modeling a procedure/guided practice/homework
  - Quality questions
  - The mathematical practice standards

First Steps: Priorities, Practices, & Professional Learning

- What content is currently included in our curriculum that is also included at the same grade/course in the CCSS?
- Are students learning the content?
  - How do they perform on assessments?
    - What attributes to high performance?
    - What could improve performance?
      - More emphasis/time on the content?
      - Inclusion of the mathematical practice standards?
        - What do they look like in the classroom?
      - Professional learning opportunities for teachers?

Taking a closer look …

Domain	Suggested starting points for professional learning	Not to be confused as "priority standards."
K – 2: Counting and Cardinality **(MP2, 6)** & Number and Operations in Base Ten **(MP3, 8)**	-The relationship between number and quantity. -Understand place value.	K.CC4 1.NBT1, 1NBT2, 1.NBT4 2.NBT1, 2.NBT5, 2.NBT6, 2.NBT7, 2.NBT9
K – 5: Operations and Algebraic Thinking **(MP2, 3, 7, 8)**	-Each operation models a variety of situations. -Identify and apply generalizations about the behavior of operations.	K.OA1 1.OA1, 1.OA3, 1.OA4 2.OA1, NBT5 3.OA1, 3.OA2, 3.OA3, 3.OA5, 3.OA6, 3.OA9, 3.NBT2 4.OA1, 4.OA2, NBT5 5.NBT6

Gearing up for the Common Core State Standards in Mathematics: Five initial domains for in Grades K – 8. (2011).

Taking a closer look …

Domain	Suggested starting points for professional learning	Not to be confused as "priority standards."
3 – 5: Number and Operations - Fractions **(MP2, 6, 7)**	Attention to meaning of fractions as numbers Attention to the whole Extending the meaning of operations to fractions	3.NF2 4.NF3 4.NF4a 3.NF3d 4.NF3d 5.NF4a, 5.NF7
6 – 7: Ratios and Proportional Relationships **(MP1, 2, 4, 5)**	Proportional relationships as a unifying principle. Modeling and applications	6.RP1- 3 7RP2a
8: Geometry **(MP3, 5, 7)**	Describing and defining rotations, reflections, and dilations Understanding congruence and similarity	8.G1-4

Gearing up for the Common Core State Standards in Mathematics: Five initial domains for in Grades K – 8. (2011).

Taking a closer look …

Domain	Suggested starting points for professional learning	Not to be confused as "priority standards."
8: Expressions and Equations **(MP2, 7, 8)**	Analyze and solve linear equations and pairs of simultaneous linear equations.	8.EE7-8
8: Functions **(MP2,4, 5, 7,8)**	Define, evaluate, and compare fractions. Use functions to model arithmetic relationships.	8.F1-4
High School: Mathematical Modeling **(MP1-8)**	The basic modeling cycle: problem, formulate, compute, interpret, validate, report.	Modeling is interpreted not as a collection of isolated topics but rather in relation to other standards.

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Gearing up for the Common Core State Standards in Mathematics: Five initial domains for in Grades K – 8. (2011).

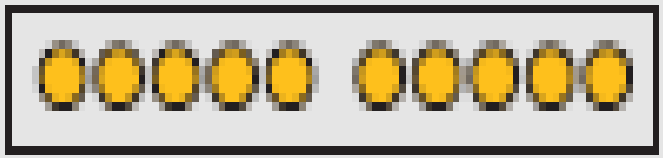
Progressions Drafts Currently Available at…

http://commoncoretools.wordpress.com/tools

Narrative documents describing the progression of a topic across a number of grade levels, informed both by research on children's cognitive development and by the logical structure of mathematics.

K – 5 Progressions in Number and Operations in Base Ten **K.NBT1**

5- and 10-frames



Children can place small objects into 10-frames to show the ten as two rows of five and the extra ones within the next 10-frame, or work with strips that show ten ones in a column.

Administrator's Guides & Resources

- *Administrator's Guide: Interpreting the Common Core State Standards to Improve Mathematics Education* (NCTM, 2010)
- *What Principals Need to Know About Teaching and Learning Mathematics* (Solution Tree & NAESP, 2012)
- *Common Core State Standards in a PLC at Work: Leader's Guide* (NCTM, in print)
- Common Core Look-fors App

http://splaysoft.com/CCL4s/Welcome.html

Recognizing Excellence

- The Presidential Award for Excellence in Mathematics Teaching is open for K – 6 mathematics and science teacher nominations.
- The award includes a Presidential Citation, a series of events in Washington, DC and a $10,000 cash award.
- Nominate outstanding K – 6 teachers for the 2012 award online at www.paemst.org through April 1.

Resources

- **DESE website resources**
  - http://www.dese.mo.gov/divimprove/curriculum/common-core-math.htm
    - Common Core State Standards, Commonalities, Alignment Analysis , etc.
- **National Council of Teachers of Mathematics Resources**
  - http://illuminations.nctm.org/
  - http://www.nctm.org/standards/content.aspx?id=24600
- **Common Core Tools**
  - http://commoncoretools.wordpress.com/tools/
    - The Illustrative Mathematics Project
    - Progressions for the Common Core

Resources

- **Khan Academy**
  - http://www.khanacademy.org/
- **Careers in Transportation Curriculum Project**
  - www.transportationcareers.org
- **Other States CCSS Examples**
  - http://www.azed.gov/standards-practices/mathematics-standards/
  - http://www.dpi.state.nc.us/acre/standards/common-core-tools/#unmath
- **American Statistical Association**
  - Education Resources http://amstat.org/education/index.cfm
  - Guidelines for Assessment and Instruction in Statistics Education (GAISE Report) http://amstat.org/education/gaise/index.cfm

Were your questions answered?

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Curriculum Listserv

http://dese.mo.gov/divimprove/curriculum/curriclistserv_subscribe.htm

or

Curriculum Home Page and scroll to the bottom and select Subscribe to Curriculum Listserv