

Diving Deeper: Implementing the 2011 Massachusetts Curriculum Framework for Mathematics

Massachusetts Readiness Centers
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Presenter Names

Massachusetts Department of
ELEMENTARY & SECONDARY
EDUCATION



Session Overview

- I. Background on the new math standards and the PARCC Content Framework
- II. ESE plans for transitioning to the new Curriculum Framework for Mathematics
- III. Planning and implementation of the new Curriculum Framework for Mathematics



I. Background

- ★ ESE strategic goals
- ★ Key shifts in the new standards
- ★ The PARCC Model Content Framework



Math Standards Implementation Supports ESE's Strategic Goals

- ★ Improve pre-k to grade 3 literacy performance
- ★ **Improve grades 5 to 8 mathematics performance**
- ★ **Increase college and career readiness**
- ★ **Improve educator effectiveness**
- ★ Turn around the lowest-performing school districts
- ★ Make effective use of data to improve instruction



The 2011 Mathematics Framework:

The new standards support improved curriculum and instruction due to increased:

- ★ **FOCUS**, via critical areas at each grade level
- ★ **COHERENCE**, through carefully developed connections within and across grades
- ★ **CLARITY**, with precisely worded standards that cannot be treated as a checklist
- ★ **RIGOR**, including a focus on College and Career Readiness and Standards for Mathematical Practice throughout Pre-K-12



PARCC Model Content Framework for Mathematics

- ★ Purpose: to “support implementation of the standards” and serve as a bridge to assessments (p. 4)
- ★ Address grades 3-8 and high school model courses
 - ★ Grade K-2 supplement to be released in the future

Available at www.parcconline.org



PARCC Content Framework format for grades 3-8

- ★ Ex. of key advances from previous grade
- ★ Fluency expectations and culminating standards
- ★ Ex. of major within-grade dependencies - point to standards that should precede others
- ★ Ex. of connections among standards, clusters, or domains
- ★ Ex. of opportunities for in-depth focus
- ★ Ex. of connections among content and practice standards
- ★ Content emphases by cluster - designate each cluster as major, supporting, or additional



PARCC Content Framework format for high school

★ General analysis

- ★ Ex. of opportunities for connections among standards, cluster, domains, or conceptual categories
- ★ Ex. of opportunities of connecting mathematical content and mathematical practices
- ★ Ex. Of content standards that apply to two or more high school courses

★ Course-specific analyses

- ★ Ex. of key advances from previous grades/courses
- ★ Fluency recommendations
- ★ Discussion of mathematical practices in relation to course content



Engaging with the PARCC Content Framework

- ★ Work in teams of 2-3 to analyze grade 3
- ★ Review individually (5 minutes)
- ★ Discuss with group (10 minutes)
 - ★ What did you learn about sequencing the content standards?
 - ★ What did you learn about connections between standards (including content and practice)?
 - ★ What did you learn about prioritizing standards?
- ★ Whole group discussion (10 minutes)



II. ESE plans for transitioning to the new Curriculum Framework for Mathematics

- ★ Timeline and implementation supports for the transition
- ★ Timeline for assessment transition
- ★ Partnership for Assessment of Readiness for College and Careers (PARCC) update



2011- 14 ESE Implementation Supports

SY 2011-2012
Partial
Implementation

SY 2012-2013
Near Full
Implementation

SY 2013-2014
Full Implementation

Annual Curriculum and Instruction Summit
Race to the Top Funding and Targeted Support
Regional and Online Presentations and Webinars
Professional Development and Networks

- Numeracy/literacy conference
- Make available free high quality resources (e.g., PARCC Content Framework)
- Additional online Exploration Activities

- Model curriculum units and performance assessments for piloting
- New standards for ELL and new science standards
- MA cadre of PARCC Educator Leaders
- New PD courses focused on math practices
- Curriculum alignment PD

- Teaching and Learning System with model curriculum units and performance assessments
- Other frameworks documents incorporate new standards
- Facilitate sharing of best practices



Mathematics Model Curriculum Units

Currently in Development

Grade/Course	Domain	Standards*
1	Number and Operations in Base Ten	1.NBT.2-3
2	Number and Operations in Base Ten	2.NBT.7,9
3	Number and Operations - Fractions	3.NF.1-3
4	Number and Operations - Fractions	4.NF.1-2
5	Number and Operations - Fractions	5.NF.1-2
6	Ratio and Proportional Relationships	6.RP.1-3
7	Ratio and Proportional Relationships	7.RP.1-3
8	Expressions and Equations	8.EE.5-6, 8.G.6-8
Algebra I	Reasoning with Equations and Inequalities	A.REI.1,3
Geometry	Congruence	G.CO.1-6
Algebra II	Creating Equations	A.CED.1-3

*Math practice standards to be added



Connecting Curriculum Framework Implementation with Educator Evaluation

- ★ All educators are evaluated on curriculum, instruction, and assessment practices
- ★ Educators also set individual and team goals that align with district and school plans
 - ★ Professional goals could relate to changing instructional practices and developing/implementing curriculum units
 - ★ Student learning goals could pertain to new content (e.g., ELA informational text, math visual models)

More information at <http://www.doe.mass.edu/eeval/>



Grade 3-8 Assessment Transition from 2000/2004 MA Mathematics Curriculum Framework to 2011 MA Mathematics Curriculum Framework

School Year:	2010 – 2011	2011 – 2012	2012 – 2013	2013-2014
What will be assessed:	Standards from the MA 2000/2004 Framework will be assessed. (No change from the 2010 MCAS)	Standards from the MA 2000/2004 Framework will be assessed. There will be a focus on the 2000/2004 standards that connect to the 2011 MA Math Framework.	Standards from the MA 2011 Math Framework will be assessed. There will be a focus on the 2011 standards that connect to the 2000/2004 MA Math Framework	Standards from the MA 2011 Framework will be assessed.

The format of the Math MCAS tests will remain the same
(Multiple – choice, short – answer and open – response questions).

2012 – 2013: *Near* full implementation of the 2011 MA Framework in schools and districts

2013 – 2014: Full implementation of the 2011 MA Framework in schools and districts

*Note: In 2011 and 2012, the grade 10 MCAS mathematics test will assess students on the MA 2000/2004 math framework. The transition plan for the grade 10 MCAS mathematics test is under development and will be released as soon as it is completed.

More information at <http://www.doe.mass.edu/mcas/transition/>



Example of Assessable Standards List: 2012

**2000/2004 Mathematics Framework
Grade 3 Standards
Assessable on 2012
MCAS Test**

Note: all aspects of these standards are assessable in 2012

3.N.2
*3.N.3
*3.N.4
*3.N.6
*3.N.7
*3.N.8
*3.N.9
*3.N.10
*3.N.11
*3.N.12
*3.P.1
*3.P.3
*3.P.4
*3.G.1
*3.G.2
3.G.3
*3.G.7
*3.M.1
*3.M.3
*3.M.4
*3.M.5
*3.D.2
*3.D.3

*** Denotes standards from the 2000/2004 MA Mathematics framework that connect to the 2011 MA Mathematics framework.**

Note: connected standards were identified using the Math standards crosswalk document.



Example of Assessable Standards List: 2013

2011 Mathematics Framework Grade 3 Standards Assessable on 2013 MCAS Test

Note: all aspects of these standards are assessable in 2013

*3.OA.1
*3.OA.2
*3.OA.3
*3.OA.4
*3.OA.5
*3.OA.6
*3.OA.7
3.OA.8
*3.OA.9
*3.NBT.1
*3.NBT.2
*3.NBT.3
*3.NF.1
*3.NF.2
*3.NF.3
*3.MD.1
3.MD.2
*3.MD.3
3.MD.4
*3.MD.5
*3.MD.6
3.MD.7
*3.MD.8
*3.G.1
*3.G.2

*** Denotes standards from the 2011 MA Mathematics framework that connect to the 2000/2004 MA Mathematics framework.**

Note: connected standards were identified using the Math standards crosswalk document.



Grade 10 Assessment Transition

School Year	2011-12	2012-13	2013-14	2014-15
What will be assessed	Standards from the MA 2000/2004 Mathematics Curriculum Framework will be assessed.	Standards from the MA 2011 Mathematics Curriculum Framework will be assessed. Only content in the 2011 standards that matches content in the 2000/2004 grade 9-10 standards will be assessed. List of standards assessable in 2013 and 2014 MCAS (coming soon).		Standards from the MA 2011 Mathematics Curriculum Framework will be assessed. Details on content to be assessed in 2014-15 to follow.

This slide is a draft based on information as of February, 2012. For up-to-date information please visit <http://www.doe.mass.edu/mcas/transition/>.



PARCC Update

- Next-generation K–12 assessment system in ELA/literacy and mathematics
- Aligned to the Common Core State Standards (CCSS)
- Developed by a consortium of 24 states
- MA is one of 18 Governing Board states
- Assessments in math and ELA/literacy planned for implementation in Massachusetts in 2014–15, if as good or better than MCAS

More information at <http://www.parcconline.org/about-parcc>



PARCC Update

- ★ More than an assessment: a suite of tools to support teaching and learning—content frameworks, model instructional units, sample assessment tasks, professional development modules
- ★ Focus on measuring whether students are on track for college and careers readiness
- ★ Will leverage use of technology



PARCC Item Development Procurement

- ★ December 30, 2011: a solicitation for contractors, called an “Invitation to Negotiate,” released
 - ★ Available on the PARCC website
 - ★ Contains information on both math and ELA/literacy
 - ★ Proposals due from contractors in February, 2012
- ★ Early 2012 – Hardware specifications released
- ★ SY2012-13 – First year of pilot testing
- ★ SY2013-14 – Second year of pilot testing
- ★ SY2014-15 – First year of PARCC testing
- ★ Summer 2015 – Performance levels set, including college and career readiness



PARCC Item Development

Procurement cont.

- ★ Diagnostic assessments – available to teachers for use throughout the year[#]
- ★ Mid-year assessments – performance based and focused on difficult-to-assess standards[#]
- ★ Performance-based assessment – close to end of school year, contributes to summative score
- ★ End-of-year assessment – computer-based, includes innovative and machine-scorable items
 - ★ End-of-Course assessments for high school math

Optional – states decide whether to include these assessments and if they are optional or required for districts



III. Planning and Implementation

- ★ Curriculum and curriculum mapping
- ★ Resources to support other transition activities
 - ★ Implementation planning
 - ★ E.g., Common Core Implementation Workbook
www.achieve.org/ImplementingCommonCore
 - ★ Building awareness and teacher knowledge
 - ★ E.g., MA ESE Exploration Activities

Resource list available at

<http://www.doe.mass.edu/candi/commoncore/mathresources.html>



Group discussion

★ Please discuss in groups of 2-4:

★ How do you define curriculum?

★ What are the elements of a good curriculum map?



District curriculum

Working definition:

District curriculum is a set of learning experiences designed for students to achieve the standards, including:

- ★ Content and skills
- ★ Resources and materials
- ★ Assessments
- ★ Sequence of learning



District curriculum map

- ★ A district curriculum map is a broad overview of the curriculum across a grade or course and may include:
 - ★ Content and skills – standards in each unit
 - ★ Resources and materials – core curriculum materials and supplementary resources
 - ★ Assessments – interim, end-of-year, etc.
 - ★ Sequence of learning – units sequenced in a timeline



District curriculum map – math-specific considerations

- ★ Units typically take 2-6 weeks
- ★ **During transition to the new standards, curriculum gaps are addressed**
- ★ Some standards may appear in several units (either revisited or broken out into discrete parts)
- ★ Districts may sequence materials differently than publisher



Developing a Curriculum Map

Suggested process:

1. Assemble an **inclusive team** of teachers, curriculum leaders, etc.
2. Provide time for team to do **background work** to learn about the standards
3. **Compare** new standards to existing curriculum (map, units, materials, etc.) and **identify gaps**
4. Decide upon **elements and format** of curriculum map
5. Create **draft** curriculum map
6. Develop, adapt, and acquire curriculum **materials and assessments** as needed
7. Provide **PD** for teachers and administrators
8. Collect data on curriculum implementation and **revise** map

Key resources: MA Curriculum Framework for Mathematics, PARCC Model Content Framework, current curriculum maps and materials, ESE Crosswalks



Sample Curriculum Map (Lowell) Year Overview

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
3	<p>Review</p> <p>2.NBT.3 Read and write numbers through 1000, in numeral, word, and expanded form. (Extend beyond 1000, based on student understanding.)</p> <p>3.OA.8 one- and two-step all +/- structures, any unknown</p> <p>3.NBT.1 Use place value to round whole numbers to the nearest 10 or 100.</p> <p>3.NBT.2 Fluently add and subtract within 1000</p>	<p>3.OA.1 product = number of groups x size of groups</p> <p>3.OA.2 quotient as set size or number of sets</p> <p>3.OA.3 multiply and divide (equal groups, arrays, measurements) within 100, shown with drawings and equations</p> <p>3.OA.5 commutative and associative properties</p> <p>3.OA.9 Identify patterns in addition tables, connect to repeated addition</p>	<p>3.OA.5 distributive property</p> <p>3.M.5 Recognize area as an attribute of 2-D shapes</p> <p>3.M.6 Measure area by counting square units</p> <p>3.M.7 Connect area to addition and multiplication</p>	<p>3.OA.4 Solve for variables, all operations</p> <p>3.OA.6 division as unknown factor, inverse operations</p> <p>3.OA.8 assess reasonableness of answers, all 4 operations</p> <p>3.NBT.2 Fluently add and subtract within 1000, using and explaining algorithms</p> <p>3.MD.1 Tell time to the nearest minute.</p>	<p>3.G.2 Partition shapes into parts with equal areas and represent as a fraction.</p> <p>3.NF.1 Connect fraction notation to division and multiplication through understanding denominator and numerator.</p> <p>3.NF.2 Represent fractions on number lines.</p> <p>3.NF.3 Recognize and compare fractions through visual models and number lines.</p>	<p>3.MD.1 Solve problems involving elapsed time.</p> <p>3.MD.2 Measure and estimate liquid volume and mass, use to solve problems using the four operations.</p> <p>3.MD.3 Draw scaled picture graphs and bar graphs; answer comparison questions about the data.</p> <p>3.MD.4 Generate measurement data and display on a line plot marked with fractional intervals of whole, halves, and fourths.</p>	<p>3.OA.7 Know all multiplication and division facts by memory</p> <p>3.OA.8 equations with variables, all 4 operations</p> <p>3.OA.9 Identify patterns in multiplication tables, connect to distributive property</p> <p>3.NBT.3 Multiply one digit whole numbers by multiples of 10.</p>	<p>3.G.1 Describe and analyze groups and subgroups of 2-D shapes.</p> <p>3.M.8 Distinguish between area and perimeter, solve problems regarding perimeter of polygons.</p>		



Sample Curriculum Map (Lowell)

Year Overview **Zoom**

	Sept	Oct.	Nov.	Dec.
3	<p>Review</p> <p>2.NBT.3 Read and write numbers through 1000, in numeral, word, and expanded form. (Extend beyond 1000, based on student understanding.)</p> <p>3.OA.8 one- and two-step all +/- structures, any unknown</p> <p>3.NBT.1 Use place value to round whole numbers to the nearest 10 or 100.</p> <p>3.NBT.2 Fluently add and subtract within 1000</p>	<p>3.OA.1 product = number of groups x size of groups</p> <p>3.OA.2 quotient as <u>set size</u> or number of sets</p> <p>3.OA.3 multiply and divide (equal groups, arrays, measurements) within 100, shown with drawings and equations</p> <p>3.OA.5 commutative and associative properties</p> <p>3.OA.9 Identify patterns in addition tables, connect to repeated addition</p>	<p>3.OA.5 distributive property</p> <p>3.MD.5 Recognize area as an attribute of 2-D shapes</p> <p>3.MD.6 Measure area by counting square units</p> <p>3.MD.7 Connect area to addition and multiplication</p>	



Sample Curriculum Map (Lowell)

Year Overview **Zoom**

	Sept	Oct.	Nov.	Dec
	<p>2.NBT.3 Read and write numbers through 1000, in numeral, word, and expanded form. (Extend beyond 1000, based on student understanding.)</p> <p>student understanding.)</p> <p>one- and two-step</p> <p>Second grade standard included during transition</p> <p>ers</p> <p>to the nearest 10 or 100.</p> <p>3.NBT.2 Fluently add and subtract within 1000</p>	<p>3.OA.1 product = number of groups x size of groups</p> <p>3.OA.2 quotient = set</p> <p>Portions of Standard</p> <p>division (equal groups, arrays, measurements) within 100, shown with drawings and equations</p> <p>3.OA.5 commutative and associative properties</p> <p>3.OA.9 Identify patterns in addition tables, connect to repeated addition</p>	<p>3.OA.5 distributive property</p> <p>3.MD.5 Recognize area as an attribute of shapes</p> <p>3.MD.6 Measure area by counting square units</p> <p>3.MD.7 Connect area to addition and multiplication</p> <p>Area taught in conjunction with multiplication</p>	



Sample Curriculum Map (Lowell)

September/Mid October

MA 2011 Code	MA 2011 Standard (with Focus Highlighted)	Resources	Key Vocabulary	Assessment	Pacing
2.NBT.3 3.NBT.1 3.NBT.2 3.OA.8 3.MD.1	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. Tell and write time to the minute and measure time intervals in minutes. Solve word problems... of time intervals... e.g., by representing the problem on a number line diagram.	Investigations Unit 1 Sessions 1.3, 1.4, 1.6, 1.8, 2.2, 2.3, 2.4, 2.6, 2.7, Investigations Unit 3 Sessions 1.1, 1.2, 1.6, 2.1, 2.2, 2.3, 2.4, (3.1), 3.2, 3.3, 3.4, 3.5, 3.7, 4.2, 4.3, 4.4, 4.5	Digit Sum Difference Equation Number line Landmark numbers Ones Tens Hundreds Thousands	District Pre & Post	These lessons should be completed by the middle of October.

LPS Teacher Notes:

2.NBT.3 Read and write numbers through 1000, in numeral, word, and expanded form. (Extend beyond 1000, based on student understanding.)

Unit 1 Session 1.5 Capture 5 game played as needed for place value knowledge.

Unit 1 Session 1.6 Collect \$2.00 necessary for 2011-2012. After 2012 use game for the maintenance of money skills.

Unit 1 Session 2.7 suggested for additional support for place value if needed.

Unit 3 Session 3.1 Activity 3 Introducing What Time Is It? begins to address 3.MD.1 This standard will need to be supplemented. See Tracking Time Representing Time on an Open Timeline article.

Sample materials for problem structures included – see Van De Walle Addition and Subtraction Structures.

CC Glossary Table 1 Problem Structures included

*Supplemental materials needed for 2-step addition/subtraction word problems.

Supplemental Material:

Addition Subtraction Problem Situations Here Van de Walle and table 1 CC

Tracking Time Open TimeLine NCTM Article

Draft Map 2011

Sample Curriculum Map (Lowell)

September/Mid October Zoom

MA 2011 Code	MA 2011 Standard (with Focus Highlighted)	Resources
2.NBT.3 3.NBT.1 3.NBT.2 3.OA.8	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.	Investigations Unit 1 Sessions 1.3, 1.4, 1.6, 1.8, 2.2, 2.3, 2.4, 2.6, 2.7,
3.MD.1	Tell and write time to the minute and measure time intervals in minutes. Solve word problems...of time intervals... e.g., by representing the problem on a number line diagram.	Investigations Unit 3 Sessions 1.1, 1.2, 1.6, 2.1, 2.2, 2.3, 2.4, (3.1), 3.2, 3.3, 3.4, 3.5, 3.7, 4.2, 4.3, 4.4, 4.5

Draft Map 2011



Resource: Common Core Implementation Workbook

- ★ “Implementing Common Core State Standards and Assessments: A Workbook for State and District Leaders” developed by Achieve and the Education Delivery Institute (EDI)
 - ★ Delivery methodology used by ESE for major projects including Grade 8 math and Grade 3 literacy
- ★ Focuses on process of developing an implementation plan

Workbook available at www.parcconline.org



Implementation workbook format

- ★ “Organizing to Implement: The Basics” includes
 - ★ Establishing a transition leadership team
 - ★ Setting a budget for the transition
 - ★ Developing a written implementation plan
- ★ “Organizing to Implement: Get the Message Out” includes
 - ★ Conducting awareness sessions with teachers and administrators
 - ★ Developing a communication strategy with stakeholders
- ★ “Implementation Action I: Align” includes
 - ★ Examining instructional resources and high school course offerings
 - ★ Developing curriculum maps aligned to the new frameworks
- ★ “Implementation Action II: Train Educators” includes
 - ★ Providing teachers with strong courses on content and practices
 - ★ Adjusting/establishing job-embedded PD structures such as Professional Learning Communities (PLCs) and coaching



Sample Implementation Timeline

	2011	Spring 12	Summer 12	Fall 12	Spring 13
Establish leadership team	X				
Set budget	X				
Write and share implementation plan	X	X			
Communication strategy		X	X		
PD plan		X	X		
Broad awareness	X	X			
Teachers unpacking the standards		X	X	X	X



Adapted from Common Core Implementation Workbook

Sample Implementation Timeline cont.

	2011	Spring 12	Summer 12	Fall 12	Spring 13
Assemble curriculum mapping team	X	X			
Draft map ready			X		
Pilot draft, collect feedback				X	X
Review high school course offerings		X	X	X	
Review materials		X	X		
Coursework for teachers	X	X	X	X	X
Orient professional learning communities				X	X



Adapted from Common Core Implementation Workbook

Resources: Building Awareness

MA ESE Exploration Activities

- ★ **FOCUS** - Participants organize standards by Critical Areas and discuss connections in order to understand how the new standards provide greater focus at each grade level. (PK-12)
- ★ **COHERENCE** - Participants explore domains and cluster progressions to see how the new standards connect concepts within and across grades as the basis of a coherent curriculum. (PK-8)
- ★ **CLARITY** - Participants use the crosswalk documents to compare the standards in the former and new Framework and consider how the increased clarity of the new standards may impact teaching and learning. (PK-12)
- ★ **RIGOR** - Participants examine content standards to see how they connect with the Standards for Mathematical Practice and how in tandem they form the basis of a rigorous curriculum. (PK-12)

Powerpoints, facilitator notes, and handouts available at
<http://www.doe.mass.edu/candi/commoncore>



Resources: Building Awareness

Parents' Guides to Student Success

- ★ The National PTA worked with the writers of the Common Core State Standards to produce the **Parents' Guides to Student Success**
- ★ Grade level Guides for ELA/Literacy and math for grades K-8
- ★ Grades 9-12: English
- ★ Grade 9-12: Mathematics
- ★ Available in English and Spanish

Available at <http://www.pta.org/4446.htm>



Resources: Building Teacher Knowledge

ESE Professional Development

- ★ New courses focused on the Standards for Mathematical Practice:
 - ❖ Developing Mathematical Practices (DMP) for Number, Operations and Algebraic Reasoning: Grades K-5
 - ❖ DMP for Algebra: Grades 4-10
 - ❖ DMP for Geometry, Algebra II and Beyond: Grades 10-12

- ★ Professional Development Institutes
 - ❖ For example, *Teaching Advanced Mathematical Decision Making* aligned to the Advanced Quantitative Reasoning Model Course

- ★ Mathematical Learning Communities
 - ❖ Provide PD Curriculum Materials aligned to the new standards
 - ❖ Protocol for Looking at Student Work
 - ❖ Anonymous student work samples
 - ❖ Facilitator training available

See links on final slide



More information

- ★ The 2011 Frameworks and resources:
<http://www.doe.mass.edu/candi/commoncore>
- ★ Updates on assessment:
<http://www.doe.mass.edu/mcas/transition/>
<http://www.parcconline.org>
- ★ Resource to support transition to the 2011 Curriculum Framework for Mathematics:
<http://www.doe.mass.edu/candi/commoncore/mathresources.html>
- ★ Questions to mathsciencetech@doe.mass.edu



ESE Professional Development Information

- ★ Information about the Professional Development Institutes: <http://www.doe.mass.edu/candi/institutes/>
- ★ Course descriptions and fact sheets for many mathematics courses:
<http://www.doe.mass.edu/apa/sss/support/development.html?section=MATH>
- ★ Mathematical Learning Communities materials available for free download:
http://www.doe.mass.edu/omste/mlc/download_form.aspx



Questions?

