Pre-Kindergarten-Grade 8 Crosswalk Introduction:
Comparing the 2011 Massachusetts Standards for Mathematics to the
2000/2004 Massachusetts Standards for Mathematics

On December 21, 2010, the Board of Elementary and Secondary Education adopted the 2011 *Massachusetts Curriculum Framework for Mathematics, Grades Pre-Kindergarten to 12: Incorporating the Common Core State Standards for Mathematics.*

The Pre-Kindergarten through Grade 8 Crosswalk is intended to assist districts and schools to align curriculum, instruction, and assessments to these new Massachusetts 2011 mathematics standards (MA 2011 standards). For each grade, the crosswalk presents the MA 2011 standards side-by-side with the 2000/2004 Massachusetts standards for mathematics (MA 2000/2004 standards). Each grade begins with a brief *How to Read this Crosswalk* note, followed by the grade level introduction, the eight Standards for Mathematical Practice, and then the crosswalk in table form.

Format of the PreK- 8 crosswalks
The first column of each crosswalk contains the MA 2011 mathematics standards, coded by grade level; domain; and number of standard (see Table 1 below for domain codes). The second column contains the related standard(s) from the MA 2000/2004 standards with their original codes. The last column provides informational comments, highlighting ways that the MA 2011 standards are different from the MA 2000/2004 standards.

Table 1: Codes for Grades and Domains

Grade	Domain	Code
Prekindergarten (PK)- Kindergarten (K)	Counting and Cardinality	CC
K – 5	Number and Operations in Base Ten	NBT
3 – 5	Number and Operations –	NF
5 – 8	The Number System	NS
PK – 5	Operations and Algebraic	OA
6 – 7	Ratios and Proportional	RP
6 – 8	Expressions and Equations	EE
8	Functions	F
PK – 5	Measurement and Data	MD
6 – 7	Statistics and Probability	SP
PK – 8	Geometry	G

Degree of Match
It is important to note that the standards in the crosswalk have varying degrees of correlation. An example of a match where the MA 2000/2004 standard contains elements of the matching MA 2011 standard is in grade 4:

(MA 2000/2004) 4.D.3. Construct, draw conclusions, and make predictions from various representations of data sets, including tables, bar graphs, pictographs, line graphs, line plots, and tallies.

only partially corresponds to:

(MA 2011) 4.MD.4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

The crosswalk may include a comment that helps clarify the key differences between matched standards. For example, the comment column in the example reads: "The MA 2011 standard requires solving data problems using addition and subtraction of data represented fractionally."

There is not a one-to-one correspondence between the MA 2011 standards and the MA 2000/2004 standards. In some cases several MA 2000/2004 standards are matched to one MA 2011 standard and vice-versa.

Unmatched Standards
For those MA 2011 standards that are not matched with any MA 2000/2004 standards the MA 2000/2004 column is empty and shaded green. There is a clarifying comment in the third column. that indicates if the MA 2011 standard is new at the grade level or new for MA standards.

There are two other categories of unmatched standards located at the end of each grade level crosswalk: (1) MA 2000/4 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (2) MA 2000/4 that do not match any MA 2011 standards.

We hope that you find these crosswalks useful. Please email any comments and questions to the Office of Math, Science, and Technology/Engineering at mathsciencetech@doe.mass.edu.

Modifications		
ESE staff are grateful to members of the field who recommended modifications to the original Pre-K-8 crosswalk posted in January 2011. We appreciate all comments and suggestions that make these crosswalks more useful.		
Grade	**Edit**	**Reason**
Grade 1	Added 2.M.1 (2000) to "MA 2000 Grade-Span 1/2 Standards Matched at Grade 2" section	Match in Grade 2 crosswalk for 2.M.1 (2000) with MA.2.MD.7a (2011) was not reflected in the Grade 1 crosswalk.
	Removed 2.G.4 (2000) and 2.D.4 (2000) from "MA 2000 Standards Matched at Other Grades" and added to "MA 2000 Grade-Span 1/2 Standards Not Matched to MA 2011" section.	Match between 2.G.4 (2000) and 8.G.4 (2011) and match between 2.D.4 (2000) and 7.SP.7 (2011) were not significant.
Grade 2	Removed 3.NF.2 (2011) match with 2.N.3 (2000) in "MA Grade-Span Standards Matched at Other Grades in MA 2011" section	2.N.3 (2000) is matched with 2.G.3 (2011) in the Grade 2 crosswalk.
	Amended match with 2.P.1 (2000): removed 4.OA.5 (2011) and replaced with 3.OA.9 (2011)	Reflects the same matching as in Grade 1.
Grade 4	Removed 4.D.5 (2000) from "MA 2000 Grade 3/4 Standards Matched at Other Grades in MA 2011" and added 4.D.5 (2000) to MA Grade 3/4 Standards Not Matched by MA 2011 Standards" section	Match between 4.D.5 (2000) and 7.SP.5 (2011) was not significant.
Grade 3	Coding 3.NBT.3a corrected to 3.NF.3a Coding 3.NBT.3b corrected to 3.NF.3b Coding 3.NBT.3c corrected to 3.NF.3c Coding 3.NBT.3d corrected to 3.NF.3d	Coding was incorrect on these standards; no changes were made to the standards themselves.
	2004 standard 3.N.2 added to "Matched at Other Grades" section	3.N.2 was omitted from original published crosswalk; now is correctly matched to 2.NBT.1
Grade 6	Comment for 6.NS.2 and 6.NS.3 amended; "(including negatives)" was removed	Students are introduced to rational numbers including negative rational numbers in grade 6, but are not expected to perform operations with negative rational numbers including integers, decimals, and fractions until grade 7.

How to read this crosswalk:

The first column of this **Pre-Kindergarten Crosswalk** presents the 2011 Massachusetts Curriculum Framework for Mathematics Pre-Kindergarten Standards. The second column presents related Learning Guidelines from the 2003 Guidelines for Preschool Learning Experiences and the third column presents the related (2000) MA Pre-Kindergarten/Kindergarten grade span standards. This crosswalk is designed as a tool for use to compare the three documents so that practitioners may become familiar with the new standards.

Pre-Kindergarten Introduction

In preschool or pre-kindergarten, activity time should focus on two critical areas: (1) developing an understanding of whole numbers to 10, including concepts of one-to one correspondence, counting, cardinality (the number of items in a set), and comparison; (2) recognizing two-dimensional shapes, describing spatial relationships, and sorting and classifying objects by one or more attributes. Relatively more learning time should be devoted to developing children's sense of number as quantity than to other mathematics topics.

(1) These young children begin counting and quantifying numbers up to 10. Children begin with oral counting and recognition of numerals and word names for numbers. Experience with counting naturally leads to quantification. Children count objects and learn that the sizes, shapes, positions, or purposes of objects do not affect the total number of objects in the group. One-to-one correspondence with its matching of elements between the sets, provides the foundation for the comparison of groups and the development of comparative language such as, more than, less than, and equal to.

(2) Young children explore shapes and the relationships among them. They identify the attributes of different shapes including the length, area, weight by using vocabulary such as: long, short, tall, small, heavy, light and big. They compare objects using comparative language such as: longer/shorter, same length, heavier/lighter. They explore and create 2- and 3-dimensional shapes by using various manipulative and play materials such as: popsicle sticks, blocks, pipe cleaners, and pattern blocks. They sort, categorize, and classify objects and identify basic 2-dimensional shapes using the appropriate language.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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

Massachusetts Pre-Kindergarten Standards (January 2011)	Guidelines for Preschool Learning Experiences (2003)	MA Pre-Kindergarten/Kindergarten Grade Span Standard (2000)
Counting and Cardinality		
Know number names and the count sequence.		
MA.PK.CC.1 Listen to and say the names of numbers in meaningful contexts.	1. Listen to and say the names of numbers in meaningful contexts. • Play games and listen to stories and poems that contain numbers and countin sequences.	**K.N.1** Count by ones to at least 20.
MA.PK.CC.2 Recognize and name written numerals 0 - 10.	1. Listen to and say the names of numbers in meaningful contexts. • Point to numbers displayed in the preschool setting (e.g., labels on objects, projects, activity areas; children's bus numbers, children's ages).	**K.N.1** Count by ones to at least 20.
Count to tell the number of objects.		
MA.PK.CC.3 Understand the relationship between numerals and quantities up to ten.	2. Connect many kinds/quantities of concrete objects and actions to numbers. • Use concrete objects to practice one-to-one correspondence (e.g., say the name of objects while placing an object in each space in an egg carton; distributing a musical instrument to each child in a group; putting pegs in each hole of a pegboard).	**K.N.2** Match quantities up to at least 10 with numerals and words.
Compare Numbers		
MA.PK.CC.4 Count many kinds of concrete objects and actions up to ten, using one-to-one correspondence, and accurately count as many as seven things in a scattered configuration.	4. Use concrete objects to solve simple addition and subtraction problems using comparative language (more than, fewer than, same number of). • Figure out how many blocks they have altogether when they join two sets or how many blocks are needed to make two towers the same size.	**K.N.4** Compare sets of up to at least 10 concrete objects using appropriate language (e.g., none, more than, fewer than, same number of, one more than) and order numbers. **K.N.7** Use objects and drawings to model and solve related addition and subtraction problems to ten.
MA.PK.CC.5 Use comparative language such as *more/less than, equal to*, to compare and describe collections of objects.	4. Use concrete objects to solve simple addition and subtraction problems using comparative language (more than, fewer than, same number of). • Distribute and compare objects in meaningful ways (e.g. which bucket has more rocks in it, how many napkins are needed for everyone at the table). • Figure out how many blocks they have altogether when they join two sets or how many blocks are needed to make two towers the same size.	**K.N.4** Compare sets of up to at least 10 concrete objects using appropriate language (e.g., none, more than, fewer than, same number of, one more than) and order numbers.

Massachusetts Pre-Kindergarten Standards (January 2011)	Guidelines for Preschool Learning Experiences (2003)	MA Pre-Kindergarten/Kindergarten Grade Span Standard (2000)
Operations and Algebraic Thinking **Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.**		
MA.PK.OA.1 Use concrete objects to model real world addition (putting together) and subtraction (taking away) problems up through five.	4. Use concrete objects to solve simple addition and subtraction problems using comparative language (more than, fewer than, the same number of). • Sing songs and do finger plays that involve adding and taking away (e.g., *Two Little Blackbirds*)	**K.N.7** Use objects and drawings to model and solve related addition and subtraction problems to ten.
Measurement and Data **Describe and compare measurable attributes**		
MA.PK.MD.1 Recognize the attributes of length, area, weight, and capacity of everyday objects using appropriate vocabulary (e.g., *long, short, tall, heavy, light, big, small, narrow, wide*).	7. Explore and describe a wide variety of concrete objects by their attributes. • Listen to and use words that describe the characteristics of objects (e.g., big, small, tall, short, narrow, thick, thin, deep, shallow, round, flat, straight, crooked, heavy, light).	**K.P.1** Identify the attributes of objects as a foundation for sorting and classifying, e.g., a red truck, a red block, and a red ball share the attribute of being red; a square block, a square cracker, and a square book share the attribute of being square
MA.PK.MD.2 Compare the attributes of length and weight for two objects, including l*onger/shorter/same length; heavier/lighter/same weight; holds more/less/holds the same amount*.	12. Listen to and use comparative words to describe the relationships of objects to one another. • Compare and describe objects according to a single attribute (e.g., which is bigger, smaller, taller, longer, shorter, same length, wider, narrower, thicker, thinner, deeper, shallower, lighter, heavier, holds less, or holds the same amount).	**K.M.1** Recognize and compare the attributes of length, volume/capacity, weight, area, and time using appropriate language, e.g., longer, taller, shorter, same length; heavier, lighter, same weight; holds more, holds less, holds the same amount.
Classify Objects and Count the Number of Objects in Each Category.		
MA.PK.MD.3 Sort, categorize, and classify objects by more than one attribute.	8. Sort, categorize, or classify objects by more than one attribute. • Sort parquetry blocks or string beads by size, shape color or texture (e.g., big circles/small circles; blue squares/blue circles; big yellow squares/small yellow squares).	**K.P.2** Sort and classify objects by color, shape, size, number, and other properties.
Work with money		
PK.MD.5 Recognize that certain objects are coins and that dollars and coins represent money.	6. Examine, manipulate, and become familiar with U.S. coins (penny, nickel, dime, quarter) in play activates. • Separate coins by color and size.	**K.N.6** Identify U.S. coins by name.

Massachusetts Pre-Kindergarten Standards (January 2011)	Guidelines for Preschool Learning Experiences (2003)	MA Pre-Kindergarten/Kindergarten Grade Span Standard (2000)
Geometry		
Identify and describe shapes (squares, circles, triangles, rectangles).		
MA.PK.G.1 Identify relative position of objects in space, and use appropriate language (e.g., *beside, inside, next to, close to, above, below, apart*).	11. Explore and identify space, direction, movement, relative position, and size using body movement and concrete objects. • Illustrate position and relative distance among objects/locations using classroom materials or outdoor equipment (e.g., up, down, high, low, above, below, in front of, behind, beside, near, far next to, apart, together.)	**K.G.4** Identify positions of objects in space, and use appropriate language (e.g., beside, inside, next to, close to, above, below, apart) to describe and compare their relative positions.
MA.PK.G.2 Identify various two-dimensional shapes using appropriate language.	10. Investigate and identify materials of various shapes, using appropriate language. • Find examples of basic shapes such as circle, square, triangle, and rectangle in the environment (e.g., go on a "shape walk" indoors or outdoors to find examples of basic shapes in buildings, in the classroom, or in nature). • Feel and describe parquetry blocks, then try to identify them without looking.	**K.G.1** Name, describe, sort, and draw simple two-dimensional shapes. **K.G.2** Describe attributes of two-dimensional shapes, e.g., number of sides, number of corners.
Analyze, compare, create, and compose shapes.		
MA.PK.G.3 Create and represent three-dimensional shapes (ball/sphere, square box/cube, tube/cylinder) using various manipulative materials, such as popscicle sticks, blocks, pipe cleaners, pattern blocks, and so on.	10. Investigate and identify materials of various shapes, using appropriate language. • Create/represent shapes (e.g., using popsicle sticks, pipe cleaners, unit blocks).	**K.G.1** Name, describe, sort, and draw simple two-dimensional shapes.

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Kindergarten

How to read this crosswalk:

The first column of this **Kindergarten Crosswalk** presents the 2011 Massachusetts Curriculum Framework for Mathematics Standards for Kindergarten. The second column presents related standards from the Massachusetts 2000 Pre-Kindergarten/Kindergarten grade span. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2000 match, the second and third columns are shaded green. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one 2011 standard, and conversely, one MA 2000 standard could be matched to several 2011 standards. If there is no match for the MA 2011 standard at this grade level, then the remaining columns are shaded green, with approriate comments in the final column.

At the end of the Kindregarten crosswalk, MA 2000 Pre-Kindergarten/Kindergarten grade span standards that are unmatched by the MA 2011 Kindergarten standards are presented with the best MA 2011 match indicated in the first column.

Kindergarten Introduction

In Kindergarten, instructional time should focus on two critical areas: (1) representing, relating, and operating on whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

(1) Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in Kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

(2) Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Kindergarten

Massachusetts Kindergarten (January 2011)	Prekindergarten/Kindergarten (2000)	Comment
Counting and Cardinality		
Know Number Names and the Count Sequence		
K.CC.1 Count to 100 by ones and by tens.	**K.N.1** Count by ones to at least 20. **K.P.4** Count by fives and tens at least up to 50.	MA 2011 counts by 5s in grade 2
K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).		This standard is new in MA 2011
K.CC.3 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).	**K.N.2** Match quantities up to at least 10 with numerals and words. **K.N.1** Count by ones to at least 20.	MA 2011 writes numbers to 20, beginning with 0; MA 2000 does not require written numbers in K
Count to Tell the Number of Objects		
K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality. **K.CC.4a** 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. **K.CC.4b** Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	**K.N.2** Match quantities up to at least 10 with numerals and words.	
K.CC.4c Understand that each successive number name refers to a quantity that is one larger.		This standard is new in MA 2011
K.CC.5 Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.	**K.N.2** Match quantities up to at least 10 with numerals and words.	MA 2011 matches quantities to 20; MA 2000 matches quantities to 10
Compare Numbers		
K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. *(Footnote: Include groups with up to ten objects.)*	**K.N.4** Compare sets of up to at least 10 concrete objects using appropriate language (e.g., none, more than, fewer than, same number of, one more than) and order numbers.	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Kindergarten

Massachusetts Kindergarten (January 2011)	Prekindergarten/Kindergarten (2000)	Comment
K.CC.7 Compare two numbers between 1 and 10 presented as written numerals.		This standard is new in MA 2011
Operations and Algebraic Thinking		
Understand Addition as Putting Together and Adding to, and Understand Subtraction as Taking Apart and Taking From.		
K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings *(Footnote: drawings need not show details, but should show the mathematics in the problem)* , sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.	**K.N.7** Use objects and drawings to model and solve related addition and subtraction problems to ten.	MA 2011 includes sounds, motions, and verbal explanations
K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	**K.N.7** Use objects and drawings to model and solve related addition and subtraction problems to ten.	
K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).	**K.N.7** Use objects and drawings to model and solve related addition and subtraction problems to ten.	MA 2011 emphasizes decomposition of numbers
K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.		This standard is new in MA 2011
K.OA.5 Fluently add and subtract within 5.		This standard is new in MA 2011
Number and Operations in Base Ten		
Work with numbers 11-19 to gain foundations for place value.		
K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.		This standard is new in MA 2011

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Kindergarten

Massachusetts Kindergarten (January 2011)	Prekindergarten/Kindergarten (2000)	Comment
Measurement and Data **Describe and Compare Measurable Attributes.**		
K.MD.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	**K.M.1** Recognize and compare the attributes of length, volume/capacity, weight, area, and time using appropriate language, e.g., longer, taller, shorter, same length; heavier, lighter, same weight; holds more, holds less, holds the same amount.	MA 2011 focuses on measurable attributes such as length and weight
	K.G.2 Describe attributes of two-dimensional shapes, e.g., number of sides, number of corners.	
K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*	**K.P.1** Identify the attributes of objects as a foundation for sorting and classifying, e.g., a red truck, a red block, and a red ball share the attribute of being red; a square block, a square cracker, and a square book share the attribute of being square shaped.	
	K.M.1 Recognize and compare the attributes of length, volume/capacity, weight, area, and time using appropriate language, e.g., longer, taller, shorter, same length; heavier, lighter, same weight; holds more, holds less, holds the same amount.	
Classify Objects and Count the Number of Objects in Each Category.		
K.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (*Footnote: Limit category counts to be less than or equal to 10.*)	**K.P.2** Sort and classify objects by color, shape, size, number, and other properties.	MA 2011 focuses on categorizing and counting; MA 2000 includes drawing conclusions about data
	K.D.1 Collect, sort, organize, and draw conclusions about data using concrete objects, pictures, numbers, and graphs.	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Kindergarten

Massachusetts Kindergarten (January 2011)	Prekindergarten/Kindergarten (2000)	Comment
Geometry **Identify and Describe Shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders and spheres).**		MA 2011 specifies the shapes to identify in kindergarten.
K.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind,* and *next to* .	**K.G.4** Identify positions of objects in space, and use appropriate language (e.g., beside, inside, next to, close to, above, below, apart) to describe and compare their relative positions. **K.G.1** Name, describe, sort, and draw simple two-dimensional shapes. **K.N.3** Identify positions of objects in sequences (e.g., first, second) up to fifth.	MA 2011 does not specify ordinal numbers (e.g., first, second)
K.G.2 Correctly name shapes regardless of their orientations or overall size.	**K.G.1** Name, describe, sort, and draw simple two-dimensional shapes. **K.G.3** Name and compare three-dimensional shapes.	
K.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").		This standard is new in MA 2011
Analyze, Compare, Create, and Compose Shapes.		
K.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).	**K.G.1** Name, describe, sort, and draw simple two-dimensional shapes. **K.G.3** Name and compare three-dimensional shapes. **K.P.1** Identify the attributes of objects as a foundation for sorting and classifying, e.g., a red truck, a red block, and a red ball share the attribute of being red; a square block, a square cracker, and a square book share the attribute of being square.	MA 2011 includes orientations of shapes and the use of informal language
K.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	**K.G.1** Name, describe, sort, and draw simple two-dimensional shapes.	
K.G.6 Compose simple shapes to form larger shapes. *For example, "can you join these two triangles with full sides touching to make a rectangle?"*		This standard is new in MA 2011

MA 2000 grade span PK/K standards that do not match any MA 2011 Kindergarten standards		
MA 2011 Standard	**Prekindergarten/Kindergarten (2000)**	**Comment**
2.G.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.	**K.N.5** Understand the concept of whole and half	MA 2011 grade 2 standard
MA.1.MD.5 Identify the values of all U.S. coins; know their comparative values, e.g., a dime is of greater value than a nickel. find equivalent values, e.g., a nickel is equivalent to 5 pennies. Use appropriate notation (e.g., 69¢). Use the value of coins in the solution of problems.	**K.N.6** Identify U.S. coins for name.	MA 2011 grade 1standard see MA 2011 grade 2 standard 2.MD.8
3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**K.N.8** Estimate the number of objects in a group and verify results.	MA 2011 grade 3 standard
3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	**K.P.3** Identify, reproduce, describe, extend, and create color, rhythmic, shape, number, and letter, repeating patterns, with simple attributes, e.g. ABABAB ...	MA 2011 grade 3 standard
2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.	**K.M.2** Make and use estimates of measurements from everyday experiences.	MA 2011 grade 1 standard
1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.	**K.M.3** Use nonstandard units to measure length, area, weight, and capacity.	MA 2011 grade 1 standard

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 1

How to read this crosswalk:

The first column of this **Grade 1 Crosswalk** presents the 2011 Massachusetts Curriculum Framework for Mathematics standards for Grade 1. The second column presents related standards from the Massachusetts 2000 Grade-span 1/2. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2000 match, the second and third columns are shaded green. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one 2011 standard, and conversely, one MA 2000 standard could be matched to several 2011 standards. If there is no match for the MA 2011 standard at this grade level, then the remaining columns are shaded green, with approriate comments in the final column.

At the end of this Grade 1 Crosswalk, MA 2000 Grade-span 1/2 standards that are unmatched are presented in three categories. (1) MA 2000 Grade-span 1/2 standards that are matched only at Grade 2 are listed; (2) MA 2000 Grade-span 1/2 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (3) MA 2000 Grade-span 1/2 standards that do not match any MA 2011 standards.

Grade 1 Introduction

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 value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

(1) Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

(2) Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.

(3) Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement.

(4) Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 1

Massachusetts Grade 1 (January 2011)	Grade-span 1/2 (MA 2000)	Comment
Operations and Algebraic Thinking		
Represent and solve problems involving addition and subtraction.		
1.OA.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.N.7** Demonstrate an understanding of various meanings of addition and subtraction, e.g., addition as combination (plus, combined with, more); subtraction as comparison (how much less, how much more), equalizing (how many more are needed to make these equal), and separation (how much remaining).	MA 2011 focuses on addition and subtraction within 20 and requires using a symbol for an unknown number in an equation
1.OA.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.	**2.N.12** Estimate, calculate, and solve problems involving addition and subtraction of two-digit numbers. Describe differences between estimates and actual calculations. **2.P.6** Write number sentences using +, –, <, = , and/or > to represent mathematical relationships in everyday situations.	MA 2011 requires addition of 3 whole numbers whose sum is less than or equal to 20.
Understand and apply properties of operations and the relationship between addition and subtraction.		
1.OA.3 Apply properties of operations as strategies to add and subtract. *(Footnote: Students need not use formal terms for these properties.) Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*		This standard is new in MA 2011
1.OA.4 Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*	**2.N.7** Demonstrate an understanding of various meanings of addition and subtraction, e.g., addition as combination (plus, combined with, more); subtraction as comparison (how much less, how much more), equalizing (how many more are needed to make these equal), and separation (how much remaining).	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 1

Massachusetts Grade 1 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
Add and subtract within 20.		
1.OA.5 Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).	**2.N.7** Demonstrate an understanding of various meanings of addition and subtraction, e.g., addition as combination (plus, combined with, more); subtraction as comparison (how much less, how much more), equalizing (how many more are needed to make these equal), and separation (how much remaining). **2.N.12** Estimate, calculate, and solve problems involving addition and subtraction of two-digit numbers. Describe differences between estimates and actual calculations.	MA 2011 relates counting to addition/subtraction; MA 2000 included estimation and the difference between estimates and actual calculations
1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use mental strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	**2.N.9** Know addition facts (addends to ten) and related subtraction facts, and use them to solve problems. **2.N.8** Understand and use the inverse relationship between addition and subtraction (e.g., 8 + 6 = 14 is equivalent to 14 – 6 = 8 and is also equivalent to 14 – 8 = 6) to solve problems and check solutions.	MA 2011 requires addition and subtraction within 20 with fluency within 10 and identifies multiple strategies; MA 2011 requires automaticity of number facts in Grade 2
Work with addition and subtraction equations.		
1.OA.7 Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*		This standard is new in MA 2011
1.OA.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = __ – 3, 6 + 6 = __.*	**2.P.5** Construct and solve open sentences that have variables, e.g., □ + 7 = 10.	
MA.1.OA.9 Write and solve number sentences from problem situations that express relationships involving addition and subtraction within 20.	**2.P.6** Write number sentences using +, –, <, = , and/or > to represent mathematical relationships in everyday situations.	MA 2011 additional standard: this standard expects students to write and solve equations in problem situations

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 1

Massachusetts Grade 1 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
Number and Operations in Base Ten		
Extend the counting sequence.		
1.NBT.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.	**2.N.1** Name and write (in numerals) whole numbers to 1000, identify the place values of the digits, and order the numbers.	MA 2011 requires counting to 120 starting at any number and representing a number of objects with a written numeral
Understand place value.		
1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: **1.NBT.2a** 10 can be thought of as a bundle of ten ones — called a "ten." **1.NBT.2b** The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. **1.NBT.2c** The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones)	**2.N.1** Name and write (in numerals) whole numbers to 1000, identify the place values of the digits, and order the numbers.	MA 2011 addresses place value with specific reference to numbers between 11 and 19
1.NBT.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	**2.N.4** Compare whole numbers using terms and symbols, e.g., less than, equal to, greater than (<, =, >).	
Use place value understanding and properties of operations to add and subtract.		
1.NBT.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	**2.N.12** Estimate, calculate, and solve problems involving addition and subtraction of two-digit numbers. Describe differences between estimates and actual calculations.	MA 2011 focuses on sense-making strategies (based on place value, properties of operations, and/or relationship between addition and subtraction) for addition and does not include estimation
1.NBT.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.		This standard is new in MA 2011

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 1

Massachusetts Grade 1 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
1.NBT.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	**2.N.12** Estimate, calculate, and solve problems involving addition and subtraction of two-digit numbers. Describe differences between estimates and actual calculations.	MA 2011 focuses on sense-making strategies (based on place value, properties of operations, and/or relationship between addition and subtraction) for subtraction by multiples of 10 and does not include estimation
Measurement and Data		
Measure lengths indirectly and by iterating length units.		
1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.	**2.M.3** Compare the length, weight, area, and volume of two or more objects by using direct comparison.	MA 2011 focuses on length
1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*	**2.M.5** Select and correctly use the appropriate measurement tools, e.g., ruler, balance scale, thermometer.	MA 2011 focuses on how to measure length and defines "length unit" as made up of shorter units; MA 2000 requires selection of appropriate measurement tools
Tell and write time.		
1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.	**2.M.2** Tell time at quarter-hour intervals on analog and digital clocks using a.m. and p.m.	MA 2011 does not include calendar intervals; See MA 2011 additional standard in Grade 2
Represent and interpret data.		
1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	**2.D.2** Organize, classify, represent, and interpret data using tallies, charts, tables, bar graphs, pictographs, and Venn diagrams; interpret the representations. **2.D.3** Formulate inferences (draw conclusions) and make educated guesses (conjectures) about a situation based on information gained from data.	MA 2011 specifies types of questions to ask and answer and does not require students to gather data

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 1

Massachusetts Grade 1 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
Work with money.		
MA.1.MD.5 Identify the values of all U.S. coins; know their comparative values, e.g., a dime is of greater value than a nickel. find equivalent values, e.g., a nickel is equivalent to 5 pennies. Use appropriate notation (e.g., 69¢). Use the value of coins in the solution of problems.	**2.N.6** Identify the value of all U.S. coins, and $1, $5, $10, and $20 bills. Find the value of a collection of coins and dollar bills and different ways to represent an amount of money up to $5. Use appropriate notation, e.g., 69¢, $1.35. **2.P.7** Describe functions related to trading, including coin trades and measurement trades, e.g., five pennies make on e nickel or four cups make one quart.	MA 2011 additional standard gives students experience with coins in Grade 1; MA 2011 works with money in Grade 2
Geometry **Reason with shapes and their attributes.**		
1.G.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); for a wide variety of shapes; build and draw shapes to possess defining attributes.	**2.G.2** Identify, describe, draw, and compare two-dimensional shapes, including both polygonal (up to six sides) and curved figures such as circles. **2.G.3** Recognize congruent shapes.	MA 2011 emphasizes distinction between defining and non-defining attributes
1.G.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. *(Footnote: Students do not need to learn formal names such as "right rectangular prism.")*	**2.G.6** Predict the results of putting shapes together and taking them apart.	
1.G.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves, fourths,* and *quarters* , and use the phrases *half of, fourth of* , and *quarter of* . Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	**2.N.3** Identify and represent common fractions (1/2, 1/3, 1/4) as parts of wholes, parts of groups, and numbers on the number line.	MA 2011 introduces the concept of half and quarter through concrete models and includes the decomposition of shapes
MA 2000 Grade-Span 1/2 Standards Matched at Grade 2		
The following Grade Span 1/2 standards are matched with MA 2011 Grade 2 standards: 2.N.5, 2.N.10, 2.N.11. 2.P.4, 2.G.1, 2.G.7, 2.D.1, 2.M.1, 2.M.3, 2.M.4, 2.M.6		

MA 2000 Grade-Span 1/2 Standards Matched at Other Grades in MA 2011		
MA January 2011 Standards	**Grade 1/2 Span (MA 2000)**	**Comment**
3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	**2.P.1** Identify, reproduce, describe, extend, and create simple rhythmic, shape, size, number, color, and letter repeating patterns.	Matched to MA 2011 Grade 3 standard
	2.P.2 Identify different patterns on the hundreds chart.	
	2.P.3 Describe and create addition and subtraction number patterns, e.g., 1, 4, 7, 10, … ; or 25, 23, 21, … .	
4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	**2.G.5** Identify symmetry in two-dimensional shapes.	Matched to MA 2011 Grade 4 standard
Grade Span 1/2 Standards Not Matched to MA 2011 Standards		
No MA 2011 match	**2.N.2** Identify and distinguish among multiple uses of numbers, including cardinal (to tell how many) and ordinal (to tell which one in an ordered list), and numbers as labels and as measurements.	
No MA 2011 match	**2.M.1** Identify parts of the day, (e.g., morning, afternoon, evening), days of the week, and months of the year. Identify dates using a calendar.	
No MA 2011 match	**2.G.4** Identify shapes that have been rotated (turned), reflected (flipped), translated (slid), and enlarged. Describe direction of translations, e.g., left, right, up, down.	
No MA 2011 match	**2.D.4** Decide which outcomes or experiments are most likely.	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 2

How to read this crosswalk:

The first column of this Grade 2 Crosswalk presents the 2011 Massachusetts Curriculum Framework for Mathematics standards for Grade 2. The second column presents related standards from the Massachusetts 2000 Grade-span 1/2. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2000 match, the second and third columns are shaded green, with appropriate comments in the third column. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of theMassachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one 2011 standard, and conversely, one MA 2000 standard could be matched to several 2011 standards.

At the end of this Grade 2 Crosswalk, MA 2000 Grade-span 1/2 standards that are unmatched at grade 2 are presented in three categories. (1) MA 2000 Grade-span 1/2 standards that are matched only at Grade 1 are listed; (2) MA 2000 Grade-span 1/2 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (3) MA 2000 Grade-span 1/2 standards that do not match any MA 2011 standards.

Grade 2 Introduction

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.

(1) Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

(2) Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

(3) Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.

(4) Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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

Massachusetts Grade 2 (January 2011)	Grade-span 1/2 (MA 2000)	Comment
Operations and Algebraic Thinking		
Represent and solve problems involving addition and subtraction.		
2.OA.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. *(Footnote: See Glossary,Table 1)*	**2.N.7** Demonstrate an understanding of various meanings of addition and subtraction, e.g., addition as combination (plus, combined with, more); subtraction as comparison (how much less, how much more), equalizing (how many more are needed to make these equal), and separation (how much remaining).	MA 2011 includes two-step word problems and focuses on moving students toward more abstract representations of addition and subtraction
	2.P.5 Construct and solve open sentences that have variables, e.g., c + 7 = 10.	
	2.P.6 Write number sentences using +, –, <, = , and/or > to represent mathematical relationships in everyday situations.	
Add and subtract within 20.		
2.OA.2 Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. *(Footnote: See 1.AO.6 for a list of mental strategies)*	**2.N.8** Understand and use the inverse relationship between addition and subtraction (e.g., 8 + 6 = 14 is equivalent to 14 – 6 = 8 and is also equivalent to 14 – 8 = 6) to solve problems and check solutions.	MA 2011 explicitly teaches mental math strategies
	2.N.9 Know addition facts (addends to ten) and related subtraction facts, and use them to solve problems.	
MA.2.OA.2a By the end of Grade 2, know from memory related subtraction facts of sums of two one-digit numbers.	**2.N.9** Know addition facts (addends to ten) and related subtraction facts, and use them to solve problems.	MA 2011 additional standard specifies knowing subtraction facts
Work with equal groups of objects to gain foundations for multiplication.		
2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	**2.N.5** Identify odd and even numbers and determine whether a set of objects has an odd or even number of elements.	MA 2011 includes concept of odd and even
	2.P.4 Skip count by twos, fives, and tens up to at least 50, starting at any number.	

Massachusetts Grade 2 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	**2.G.7** Relate geometric ideas to numbers, e.g., seeing rows in an array as a model of repeated addition.	MA 2011 includes expressing repeated addition as an equation and limits size of arrays to 5x5
Number and Operations in Base Ten		
Understand place value.		
2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: **2.NBT.1a** 100 can be thought of as a bundle of ten tens — called a "hundred." **2.NBT.1b** The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	**2.N.1** Name and write (in numerals) whole numbers to 1000, identify the place values of the digits, and order the numbers.	
2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.	**2.P.4** Skip count by twos, fives, and tens up to at least 50, starting at any number.	MA 2011 requires counting within 1000
2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	**2.N.1** Name and write (in numerals) whole numbers to 1000, identify the place values of the digits, and order the numbers.	
2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	**2.N.4** Compare whole numbers using terms and symbols, e.g., less than, equal to, greater than (<, =, >). **2.P.6** Write number sentences using +, –, <, = , and/or > to represent mathematical relationships in everyday situations.	MA 2011 limits comparisons to three-digit numbers

Massachusetts Grade 2 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
Use place value understanding and properties of operations to add and subtract.		
2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	**2.N.8** Understand and use the inverse relationship between addition and subtraction (e.g., 8 + 6 = 14 is equivalent to 14 – 6 = 8 and is also equivalent to 14 – 8 = 6) to solve problems and check solutions. **2.N.10** Demonstrate the ability to add and subtract three-digit numbers accurately and efficiently.	
2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.	**2.N.10** Demonstrate the ability to add and subtract three-digit numbers accurately and efficiently. **2.N.11** Demonstrate in the classroom an understanding of and the ability to use the conventional algorithms for addition (two 3-digit numbers and three 2-digit numbers) and subtraction (two 3-digit numbers). **2.N.12** Estimate, calculate, and solve problems involving addition and subtraction of two-digit numbers. Describe differences between estimates and actual calculations.	MA 2011 expects addition of up to four 2-digit numbers.
2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	**2.N.7** Demonstrate an understanding of various meanings of addition and subtraction, e.g., addition as combination (plus, combined with, more); subtraction as comparison (how much less, how much more), equalizing (how many more are needed to make these e **2.N.8** Understand and use the inverse relationship between addition and subtraction (e.g., 8 + 6 = 14 is equivalent to 14 – 6 = 8 and is also equivalent to 14 – 8 = 6) to solve problems and check solutions. **2.N.10** Demonstrate the ability to add and subtract three-digit numbers accurately and efficiently.	MA 2011 stresses the importance of using concrete models, drawings, and strategies based on place value to perform and understand addition or subtraction

Massachusetts Grade 2 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
2.NBT.8 Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.		This standard is new in MA 2011
2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. *(Footnote: Explanations may be supported by drawings or objects.)*	**2.N.7** Demonstrate an understanding of various meanings of addition and subtraction, e.g., addition as combination (plus, combined with, more); subtraction as comparison (how much less, how much more), equalizing (how many more are needed to make these equal), and separation (how much remaining).	MA 2011 focuses on why strategies work for addition and subtraction
Measurement and Data		
Measure and estimate lengths in standard units.		
2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	**2.M.5** Select and correctly use the appropriate measurement tools, e.g., ruler, balance scale, thermometer.	MA 2011 focuses on measuring length
2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	**2.M.4** Measure and compare common objects using metric and English units of length measurement, e.g., centimeter, inch.	
2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.	**2.M.6** Make and use estimates of measurement, including time, volume, weight and area.	
2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	**2.M.5** Select and correctly use the appropriate measurement tools, e.g., ruler, balance scale, thermometer.	MA 2011 requires expression of length difference in units
	2.M.4 Measure and compare common objects using metric and English units of length measurement, e.g., centimeter, inch.	
	2.M.3 Compare the length, weight, area, and volume of two or more objects by using direct comparison.	
Relate addition and subtraction to length.		
2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.	**2.M.4** Measure and compare common objects using metric and English units of length measurement, e.g., centimeter, inch.	MA 2011 includes word problems involving length
	2.M.3 Compare the length, weight, area, and volume of two or more objects by using direct comparison.	

Massachusetts Grade 2 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, … , and represent whole-number sums and differences within 100 on a number line diagram.		This standard is new in MA 2011
Work with time and money.		
2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	**2.M.2** Tell time at quarter-hour intervals on analog and digital clocks using a.m. and p.m.	MA 2011 tells time to nearest 5 minutes
MA.2.MD.7a Know the relationships of time, including seconds in a minute; minutes in an hour; hours in a day; days in a week, month, or year; weeks in month or a year.	**2.M.1** Identify parts of the day (e.g., morning, afternoon, evening), days of the week, and months of the year. Identify dates using a calendar.	MA 2011 additional standard requires knowing conversions related to time
2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*	**2.N.6** Identify the value of all U.S. coins, and $1, $5, $10, and $20 bills. Find the value of a collection of coins and dollar bills and different ways to represent an amount of money up to $5. Use appropriate notation, e.g., 69¢, $1.35. **2.P.7** Describe functions related to trading, including coin trades and measurement trades, e.g., five pennies make one nickel or four cups make one quart.	
Represent and interpret data.		
2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.		This standard is new in MA 2011
2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. *(Footnote: See Glossary, Table 1)*	**2.D.1** Use interviews, surveys, and observations to gather data about themselves and their surroundings. **2.D.2** Organize, classify, represent, and interpret data using tallies, charts, tables, bar graphs, pictographs, and Venn diagrams; interpret the representations.	MA 2011 focuses on picture and bar graphs

Massachusetts Grade 2 (January 2011)	Grade 1/2 Span (MA 2000)	Comment
Geometry		
Reason with shapes and their attributes.		
2.G.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. *(Footnote: Sizes are compared directly or visually, not compared by measuring.)*	**2.G.1** Describe attributes and parts of two- and three-dimensional shapes, e.g., length of sides, and number of corners, edges, faces, and sides.	
	2.G.2 Identify, describe, draw, and compare two-dimensional shapes, including both polygonal (up to six sides) and curved figures such as circles.	
2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	**2.G.7** Relate geometric ideas to numbers, e.g., seeing rows in an array as a model of repeated addition.	
2.G.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.	**2.G.6** Predict the results of putting shapes together and taking them apart.	MA 2011 focuses on quarters, thirds and halves in concrete models
	2.N.3 Identify and represent common fractions (1/2, 1/3, 1/4) as parts of wholes, parts of groups, and numbers on the number line.	
MA 2000 Grade-Span 1/2 Standards Matched at MA 2011 Grade 1		
The following Grade Span 1/2 standards are matched with MA 2011 Grade 1 standards: 2.G.6, 2.D.3		

MA 2000 Grade-Span 1/2 Standards Matched at Other Grades in MA 2011		
MA January 2011 Standards	**Grade 1/2 Span (MA 2000)**	**Comment**
3.OA.9 Solve problems involving the four operations, and identify and explain patterns in arithmetic. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	**2.P.1** Identify, reproduce, describe, extend, and create simple rhythmic, shape, size, number, color, and letter repeating patterns.	Matched to MA 2011Grade 4 standard
	2.P.2 Identify different patterns on the hundreds chart.	Matched to MA 2011Grade 3 standard
	2.P.3 Describe and create addition and subtraction number patterns, e.g., 1, 4, 7, 10…; or 25, 23, 21….	

MA 2000 Grade-span 1/2 Standards Matched at Other Grades in MA 2011		
MA January 2011 Standards	**Grade 1/2 Span (MA 2000)**	**Comment**
4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	**2.G.5** Identify symmetry in two-dimensional shapes.	Matched to MA 2011Grade 4 standard
7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	**2.D.4** Decide which outcomes of experiments are most likely.	Matched to MA 2011Grade 7 standard
MA 2000 Grade-span 1/2 Standards Not Matched by MA 2011 Standards		
No MA 2011 match	**2.N.2** Identify and distinguish among multiple uses of numbers, including cardinal (to tell how many) and ordinal (to tell which one in an ordered list), and numbers as labels and as measurements.	
No close MA 2011 match	**2.G.4** Identify shapes that have been rotated (turned), reflected (flipped), translated (slid), and enlarged. Describe direction of translations, e.g., left, right, up, down.	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 3

How to read this crosswalk:

The first column of this Grade 3 Crosswalk presents the 2011 Massachusetts Curriculum Framework for Mathematics Standards for Grade 3. The second column presents related standards from the Massachusetts 2004 Grade 3 mathematics standards. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2004 match, the second and third columns are shaded green, with appropriate comments in the third column. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one MA 2011 standard, and conversely, one MA 2000 standard could be matched to several MA 2011 standards.

At the end of the Grade 3 crosswalk, MA 2004 Grade 3 standards that are unmatched at grade 3 are presented in two ways: (1) MA 2004 Grade 3 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (2) MA 2004 Grade 3 standards that do not match any MA 2011 standards.

Grade 3 Introduction

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 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.

(1) Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.

(2) Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

(3) Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

(4) Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 3

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
Operations and Algebraic Thinking **Represent and solve problems involving multiplication and division.**		
3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6.	MA 2011 interprets products through the relationship between objects in groups
3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6.	MA 2011 interprets division as partitioning
3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. *(Footnote: See Glossary, Table 2.)*	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6. **3.N.8** Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems, including those involving money. *This standard intentionally the same as 4.N.10*	
3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = __ ÷ 3, 6 × 6 = ?.*	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6. **3.N.9** Know multiplication facts through 10 x 10 and related division facts, e.g., 9 x 8 = 72 and 72 ÷ 9 = 8. Use these facts to solve related problems, e.g., 3 x 5 is related to 3 x 50. **3.P.3** Determine the value of a variable (through 10) in simple equations involving addition, or subtraction, or multiplication, e.g., 2 + □ = 9; 5 x s = 35.	

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
Understand properties of multiplication and the relationship between multiplication and division.		
3.OA.5 Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15 then 15 × 2 = 30, or by 5 × 2 = 10 then 3 × 10 = 30. (Associative property of multiplication.) K*nowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. *(Distributive property.) (Footnote: Students need not use formal terms for these properties.)*	**3.N.7** Use the commutative (order) and identity properties of addition and multiplication on whole numbers in computations and problem situations, e.g., 5 x 7 x 2 = 5 x 2 x 7 = 10 x 7. e.g., 3 + 4 + 7 = 3 + 7 + 4 = 10 + 4.	MA 2011 includes associative and distributive properties
3.OA.6 Understand division as an unknown-factor problem. *For example, divide 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6.	MA 2011 approaches division as unknown factor problems
	3.N.9 Know multiplication facts through 10 x 10 and related division facts, e.g., 9 x 8 = 72 and 72 ÷ 9 = 8. Use these facts to solve related problems, e.g., 3 x 5 is related to 3 x 50.	
Multiply and divide within 100.		
3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of one-digit numbers.	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6.	
	3.N.9 Know multiplication facts through 10 x 10 and related division facts, e.g., 9 x 8 = 72 and 72 ÷ 9 = 8. Use these facts to solve related problems, e.g., 3 x 5 is related to 3 x 50.	
	3.N.10 Add and subtract (up to four-digit numbers) and multiply (up to two-digit numbers by a one-digit number) accurately and efficiently.	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 3

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
Solve problems involving the four operations, and identify and explain patterns in arithmetic.		
3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *[Footnote: This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).]*	**3.N.11** Round whole numbers through 1,000 to the nearest 10, 100, and 1,000.	MA 2011 specifies two-step word problems and their representation using equations, and includes Order of Operations
	3.N.12 Understand and use the strategies of rounding and regrouping to estimate quantities, measures, and the results of whole-number computations (addition, subtraction, and multiplication) up to two-digit whole numbers and amounts of money to $100, and to judge the reasonableness of the answer.	
	3.P.3 Determine the value of a variable (through 10) in simple equations involving addition or subtraction, or multiplication, e.g., 2 + o = 9; 5 x ▽ = 35.	
3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	**3.N.7** Use the commutative (order) and identity properties of addition and multiplication on whole numbers in computations and problem situations, e.g., 5 x 7 x 2 = 5 x 2 x 7 = 10 x 7. e.g., 3 + 4 + 7 = 3 + 7 + 4 = 10 + 4.	MA 2011 requires explanation of patterns using properties of operations
	3.P.1 Create, describe, extend, and explain symbolic (geometric) patterns and addition and subtraction patterns, e.g., 2, 6, 10, …; and 50, 45, 40….	
Number and Operations in Base Ten		
Use place value understanding and properties of operations to perform multi-digit arithmetic. *(Footnote: A range of algorithms may be used.)*		
3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.	**3.N.1** Exhibit an understanding of the values of the digits in the base ten number system by reading, modeling, writing, comparing, and ordering whole numbers through 9,999.	
	3.N.11 Round whole numbers through 1,000 to the nearest 10, 100, and 1,000.	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 3

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
3.NBT.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. *(Footnote: A range of algorithms may be used.)*	**3.N.10** Add and subtract (up to four-digit numbers) and multiply (up to two-digit numbers by a one-digit number) accurately and efficiently.	MA 2011 includes a range of algorithms for addition and subtraction
3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. *(Footnote: A range of algorithms may be used.)*	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6.	
	3.N.9 Know multiplication facts through 10 x 10 and related division facts, e.g., 9 x 8 = 72 and 72 ÷ 9 = 8. Use these facts to solve related problems, e.g., 3 x 5 is related to 3 x 50.	
Number and Operations - Fractions *(Footnote: Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*		
Develop understanding of fractions as numbers.		
3.NF.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.	**3.N.3** Identify, and represent, and compare fractions (between 0 and 1 with denominators through 10) as parts of unit wholes and parts of groups. Model and represent mixed numbers (with denominator 2, 3, or 4) as a whole numbers and as fractions, e.g., $1^2/_3$, $3^1/_2$.	MA 2011 focuses on unit fractions
3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. **3.NF.2a** Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. **3.NF.2b** Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	**3.N.4** Locate on the number line and compare fractions between 0 and 1 with denominators 2, 3, or 4 (e.g., ⅔).	MA 2011 also includes denominators of 6 and 8

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 3

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
3.NF.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. **3.NF.3a** Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. **3.NF.3b** Recognize and generate simple equivalent fractions (e.g., $^1/_2 = {}^2/_4$, $^4/_6 = {}^2/_3$). Explain why the fractions are equivalent, e.g., by using a visual fraction model. **3.NF.3c** Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = $^3/_1$; recognize that $^6/_1 = 6$; locate $^4/_4$ and 1 at the same point of a number line diagram.* **3.NF.3d** Compare two fractions with the same numerator or the same denominator, by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	**3.N.3** Identify, and represent, and compare fractions (between 0 and 1 with denominators through 10) as parts of unit wholes and parts of groups. Model and represent mixed numbers (with denominator 2, 3, or 4) as a whole numbers and as fractions, e.g., 12/3, 31/2. **3.N.4** Locate on the number line and compare fractions between 0 and 1 with denominators 2, 3, or 4 (e.g., ⅔). **3.P.2** Determine which symbol (<, >, or =) is appropriate for a given number sentence, e.g., 7 x 8 .?. 49 + 6. **3.P.4** Write number sentences using +, -, x, /, <, = and/or > to represent mathematical relationships.	MA 2011 introduces equivalence of fractions and reasoning about relative size
Measurement and Data **Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.**		
3.MD.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	**3.M.3** Identify time to the minute on analog and digital clocks using a.m. and p.m. Compute elapsed time, using a clock for times less than one hour (i.e., minutes since.) and using a calendar (e.g., days since).	

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). *(Footnote: Excludes compound units such as cm^3 and finding the geometric volume of a container.)* Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. *(Footnote: Excludes multiplicative comparison problems (problems involving notions of "times as much." See Glossary, Table 2).)*	**3.M.1** Demonstrate an understanding of the attributes length, area and weight and select the appropriate type of unit for measuring each attribute using both the U.S. Customary (English) and metric systems.	MA 2011 does not specify using US Customary units in this standard; refers to inches in 3.MD.4
	3.M.5 Identify and use appropriate metric and U.S. Customary (English) units and tools (e.g., ruler, scale, thermometer, clock) to estimate, measure, and solve problems involving length, area, weight, temperature, and time.	
Represent and interpret data.		
3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*	**3.D.1** Collect and organize data using observations, measurements, surveys, or experiments, and identify appropriate ways to display the data. *This standard is intentionally the same as 4.D.1*	MA 2011 limits representations to scaled picture graphs and scaled bar graphs
	3.D.3 Construct and draw conclusions from representations of data sets in the forms of tables, line plots, pictographs, tallies, and bar graphs.	
3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	**3.M.5** Identify and use appropriate metric and U.S. Customary (English) units and tools (e.g., ruler, scale, thermometer, clock) to estimate, measure, and solve problems involving length, area, weight, temperature, and time.	MA 2011 specifies using rulers marked in halves and fourths of an inch
	3.D.1 Collect and organize data using observations, measurements, surveys, or experiments, and identify appropriate ways to display the data. *This standard is intentionally the same as 4.D.1*	MA 2011 specifies using horizontal scales in whole, halves and quarters
	3.D.2 Match representations of a data set in the forms of tables, line plots, pictographs, tallies, or bar graphs with the actual data set.	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 3

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
Geometric measurement: understand concepts of area and relate area to multiplication and to addition.		
3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement. **3.MD.5a** A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. **3.MD.5b** A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of *n* square units.	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6. **3.M.1** Demonstrate an understanding of the attributes length, area and weight and select the appropriate type of unit for measuring each attribute using both the U.S. Customary (English) and metric systems. **3.M.4** Estimate and find area and perimeter of a rectangle, using diagrams and grids, or by measuring.	MA 2011 explicitly requires teaching of square units
3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6. **3.M.1** Demonstrate an understanding of the attributes length, area and weight and select the appropriate type of unit for measuring each attribute using both the U.S. Customary (English) and metric systems. **3.M.4** Estimate and find area and perimeter of a rectangle, using diagrams and grids, or by measuring.	
CC.3.MD.7 Relate area to the operations of multiplication and addition. **3.MD.7a** Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. **3.MD.7b** Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.	**3.N.6** Select, use, and explain various meanings and models of multiplication (through 10 x 10). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent 5 x 6 and 30 ÷ 6. **3.M.4** Estimate and find area and perimeter of a rectangle, using diagrams and grids, or by measuring.	

Massachusetts Grade 3 (January 2011)	Grade 3 (MA 2004)	Comment
3.MD.7c Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning. **3.MD.7d** Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	**3.G.7** Predict and explain the results of taking apart and combining two-dimensional shapes	MA 2011 specifies demonstrating the distributive property using area models and recognizing area as additive
Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.		
3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different area or with the same area and different perimeter.	**3.M.4** Estimate and find area and perimeter of a rectangle, using diagrams and grids, or by measuring.	MA 2011 emphasizes connection between area and perimeter and includes all polygons
Geometry **Reason with shapes and their attributes.**		
3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	**3.G.1** Compare and analyze attributes and other features, (e.g., number of sides, corners, diagonals, and lines of symmetry) of two-dimensional geometric shapes. **3.G.2** Describe, model, draw, compare, and classify two-dimensional shapes, e.g., circles, triangles, and quadrilaterals. Identify and describe simple three-dimensional shapes, e.g., cubes, spheres, and pyramids.	MA 2011 includes nested categories
3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part is 1/4 of the area of the shape.*	**3.G.7** Predict and explain the results of taking apart and combining two-dimensional shapes.	

MA 2004 Grade 3 Standards Matched at Other Grades in MA 2011		
MA January 2011 Standards	**Grade 3 (MA 2004)**	**Comment**
2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:	**3.N.2** Represent, order, and compare numbers through 9,999. Represent numbers using expanded notation (e.g., 853 = 8x100 + 5x10 + 3), and written out in words (e.g., eight hundred fifty-three).	Matched to MA 2011 Grade 2 standard
2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	**3.N.5** Recognize classes to which a number may belong (odd numbers, even numbers, and multiples of numbers through 10). Identify the numbers in those classes, (e.g., the class of multiples of 7 between 1 and 29 consists of 7, 14, 21, 28.	Matched to MA 2011 Grade 2 standard
4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:	**3.G.3** Identify angles as right angles, less than a right angle, and greater than a right angle.	Matched to MA 2011 Grade 4 standard
4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**3.G.4** Identify and draw parallel lines, perpendicular lines, and other intersecting lines.	Matched to MA 2011 Grade 4 standard
5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	**3.G.5** Using ordered pairs of whole numbers and/or letters, locate and identify points on a grid.	Matched to MA 2011 Grade 5 standard
4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	**3.G.6** Identify and draw lines of symmetry in two-dimensional shapes.	Matched to MA 2011 Grade 4 standard

4.MD.1 Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example: Know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1,12), (2,24), (3,36), ….	**3.M.2** Carry out simple unit conversions within a system of measurement, e.g., hours to minutes, cents to dollars, yards to feet or inches, etc. *This standard is intentionally the same as 4.M.2*	Matched to MA 2011 Grade 4 standard

MA 2000 Grade 3 Standards Not Matched by MA 2011 Standards		
No match in MA 2011	**3.D.4** List and count the number of possible combinations of objects from two sets, e.g., how many different outfits can one make from a set of two sweaters and a set of three skirts?	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 4

How to read this crosswalk:

The first column of this Grade 4 Crosswalk presents the 2011 Massachusetts Curriculum Framework for Mathematics standards for Grade 4. The second column presents related standards from the Massachusetts 2000 Grade-span 3/4. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2000 match, the second and third columns are shaded green, with appropriate comments in the third column. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one MA 2011 standard, and conversely, one MA 2000 standard could be matched to several MA 2011 standards.

At the end of the Grade 4 crosswalk, MA 2000 Grade-span 3/4 standards that are unmatched are presented in two ways: (1) MA 2000 Grade-span 3/4 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (2) MA 2000 Grade-span 3/4 standards that do not match any MA 2011 standards.

Grade 4 Introduction

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; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

(1) Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

(2) Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

(3) Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
Operations and Algebraic Thinking **Use the four operations with whole numbers to solve problems.**		
4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	**4.N.8** Select, use, and explain various meanings and models of multiplication and division of whole numbers. Understand and use the inverse relationship between the two operations.	MA 2011 interprets multiplication as a comparison and explicitly requires representing verbal statements as equations
4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. *(Footnote: See Glossary, Table 2.)*	**4.N.8** Select, use, and explain various meanings and models of multiplication and division of whole numbers. Understand and use the inverse relationship between the two operations.	
	4.N.10 Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems, including those involving money. *This standard is the same as 3.N.8.*	
	4.P.2 Use symbol and letter variables, (e.g., □ or x) to represent unknowns or quantities that vary in expressions and in equations or inequalities (mathematical sentences that use =, <, >).	
	4.P.3 Determine values of variables in simple equations, e.g., 4106 – Δ = 37, 5 = m + 3, and □ – m = 3.	
	4.P.4 Use pictures, models, tables, charts, graphs, words, number sentences, and mathematical notations to interpret mathematical relationships.	

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**4.N.9** Select use, and explain the commutative, associative, and identity properties of operations on whole numbers in problem situations, e.g., 37 x 46 = 46 x 37, (5 x 7) x 2 = 5 x (7 x 2).	MA 2011 explicitly requires multistep word problems
	4.N.10 Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems, including those involving money. *This standard is the same as 3.N.8.*	
	4.N.13 Divide up to a three-digit whole number with a single-digit divisor (with or without remainders) accurately and efficiently. Interpret any remainders.	
	4.N.16 Round whole numbers through 100,000 to the nearest 10, 100, 1000, 10,000, and 100,000.	
	4.P.2 Use symbol and letter variables, (e.g., □ or x) to represent unknowns or quantities that vary in expressions and in equations or inequalities (mathematical sentences that use =, <, >).	
	4.P.3 Determine values of variables in simple equations, e.g., 4106 – Δ = 37, 5 = m + 3, and □ – m = 3.	
Gain familiarity with factors and multiples.		
4.OA.4 Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.	**4.N.7** Recognize classes to which a number may belong (in particular, odds, evens; factors or multiples of a given number; and squares) to which a number may belong, and identify the numbers in those classes. Use this concept in the solution of problems.	MA 2011 requires finding all factor pairs and includes prime and composite

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
Generate and analyze patterns.		
4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*	**4.P.1** Create, describe, extend, and explain symbolic (geometric) and numeric patterns, including multiplication patterns such as 3, 30, 300, 3000…	
Number and Operations in Base Ten *(Footnote: Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.)*		
Generalize place value understanding for multi-digit whole numbers.		
4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*	**4.N.1** Exhibit an understanding of the values of the digits in the base ten number system by reading, modeling, writing, and interpreting whole numbers to at least 100,000; demonstrating an understanding of the values of the digits; and comparing and ordering the numbers. **4.N.2** Represent, order, and compare large numbers (to at least 100,000) using various forms, including expanded notation, e.g., 853 = 8 x 100 + 5 x 10 + 3.	
4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	**4.N.1** Exhibit an understanding of the values of the digits in the base ten number system by reading, modeling, writing, and interpreting whole numbers to at least 100,000; demonstrating an understanding of the values of the digits; and comparing and ordering the numbers. **4.N.2** Represent, order, and compare large numbers (to at least 100,000) using various forms, including expanded notation, e.g., 853 = 8 x 100 + 5 x 10 + 3.	
4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.	**4.N.16** Round whole numbers through 100,000 to the nearest 10, 100, 1000, 10,000, and 100,000.	

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
Use place value understanding and properties of operations to perform multi-digit arithmetic.		
4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.	**4.N.12** Add and subtract (up to five-digit numbers) and multiply (up to three digits by two digits) accurately and efficiently.	
	4.N.14 Demonstrate in the classroom an understanding of and the ability to use the conventional algorithms for addition and subtraction (up to five-digit numbers), and multiplication for (up to three digits by two digits).	
4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	**4.N.8** Select, use, and explain various meanings and models of multiplication and division of whole numbers. Understand and use the inverse relationship between the two operations.	MA 2011 does not explicitly require the standard algorithm for multiplication
	4.N.12 Add and subtract (up to five-digit numbers) and multiply (up to three digits by two digits) accurately and efficiently.	
	4.N.14 Demonstrate in the classroom an understanding of and the ability to use the conventional algorithms for addition and subtraction (up to five-digit numbers), and multiplication for (up to three digits by two digits).	
MA.4.NBT.5a Know multiplication facts and related division facts through 12 x 12.	**4.N.11** Know multiplication facts through 12 x 12 and related division facts. Use these facts to solve related multiplication problems and compute related problems, e.g., 3 x 5 is related to 30 x 50, 300 x 5, and 30 x 500.	MA 2011 additional standard extends mastery of facts to 12 x 12

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 4

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	**4.N.8** Select, use, and explain various meanings and models of multiplication and division of whole numbers. Understand and use the inverse relationship between the two operations.	
	4.N.13 Divide up to a three-digit whole number with a single-digit divisor (with or without remainders) accurately and efficiently. Interpret any remainders.	
	4.N.15 Demonstrate in the classroom an understanding of and the ability to use the conventional algorithm for division of up to a three-digit whole number with a single-digit divisor (with or without remainders).	
Number and Operations - Fractions *(Footnote: Grade 4 expectations in this domains are alimtied to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100)* **Extend understanding of fraction equivalence and ordering.**		
4.NF.1 Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	**4.N.4** Select, use, and explain models to relate common fractions and mixed numbers ($^1/_2$, $^1/_3$, $^1/_4$, $^1/_5$, $^1/_6$, $^1/_8$, $^1/_{10}$, $^1/_{12}$, and $1^1/_2$), find equivalent fractions, mixed numbers, and decimals, and order fractions.	MA 2011 also includes denominators of 100
	4.N.5 Identify and generate equivalent forms of common decimals and fractions less than one whole (halves, quarters, fifths, and tenths).	
4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	**4.N.4** Select, use, and explain models to relate common fractions and mixed numbers ($^1/_2$, $^1/_3$, $^1/_4$, $^1/_5$, $^1/_6$, $^1/_8$, $^1/_{10}$, $^1/_{12}$, and $1^1/_2$), find equivalent fractions, mixed numbers, and decimals, and order fractions.	MA 2011 focuses on comparisons of fractions that refer to the same whole and on justifying conclusions
	4.N.5 Identify and generate equivalent forms of common decimals and fractions less than one whole (halves, quarters, fifths, and tenths).	

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.		
4.NF.3 Understand a fraction $^{a}/_{b}$ with a > 1 as a sum of fractions 1/b.	**4.N.4** Select, use, and explain models to relate common fractions and mixed numbers ($^{1}/_{2}$, $^{1}/_{3}$, $^{1}/_{4}$, $^{1}/_{5}$, $^{1}/_{6}$, $^{1}/_{8}$, $^{1}/_{10}$, $^{1}/_{12}$, and $1^{1}/_{2}$), find equivalent fractions, mixed numbers, and decimals, and order fractions.	MA 2011 adds and subtracts fractions with like denominators
4.NF.3a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	**4.N.5** Identify and generate equivalent forms of common decimals and fractions less than one whole (halves, quarters, fifths, and tenths).	
4.NF.3b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: $^{3}/_{8} = {}^{1}/_{8} + {}^{1}/_{8} + {}^{1}/_{8}$; $^{3}/_{8} = {}^{1}/_{8} + {}^{2}/_{8}$; $2\,{}^{1}/_{8} = 1 + 1 + {}^{1}/_{8} = {}^{8}/_{8} + {}^{8}/_{8} + {}^{1}/_{8}$.	**4.N.10** Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems, including those involving money. *This standard is the same as 3.N.8*	
4.NF.3c Add and subtract mixed numbers with like denominators, e.g. by replacing each mixed number with an equivalent fraction and/or by using properties of operations and the relationship between addition and subtraction.	**4.N.18** Use concrete objects and visual models to add and subtract common fractions.	
	4.P.4 Use pictures, models, tables, charts, graphs, words, number sentences, and mathematical notations to interpret mathematical relationships.	
4.NF.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.		This standard is new in MA 2011

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.		This standard is new at this grade level; see MA 2004 5.N.9
4.NF.4a Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent $^5/_4$ as the product $5 \times (^1/_4)$, recording the conclusion by the equation $^5/_4 = 5 \times (^1/_4)$.*		This standard is new in MA 2011
4.NF.4b Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express $3 \times (^2/_5)$ as $6 \times (^1/_5)$, recognizing this product as $^6/_5$. (In general, $n \times (^a/_b) = ^{(n \times a)}/_b$.)*		This standard is new in MA 2011
4.NF.4c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat $^3/_8$ of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*		This standard is new in MA 2011
Understand decimal notation for fractions, and compare decimal fractions.		
4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express $^3/_{10}$ as $^{30}/_{100}$ and add $^3/_{10} + ^4/_{100} = ^{34}/_{100}$. (Footnote: Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.)*	**4.N.5** Identify and generate equivalent forms of common decimals and fractions less than one whole (halves, quarters, fifths, and tenths).	MA 2011 specifies working with fractions with denominators 10 and 100
	4.N.6 Exhibit an understanding of the base ten number system by reading, naming, and writing decimals between 0 and 1 up to the hundredths place.	

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
4.NF.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as $^{62}/_{100}$; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*	**4.N.5** Identify and generate equivalent forms of common decimals and fractions less than one whole (halves, quarters, fifths, and tenths).	MA 2011 includes locating decimals on the number line and connecting decimals to metric system measurement
	4.N.6 Exhibit an understanding of the base ten number system by reading, naming, and writing decimals between 0 and 1 up to the hundredths place.	
4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	**4.N.5** Identify and generate equivalent forms of common decimals and fractions less than one whole (halves, quarters, fifths, and tenths).	MA 2011 requires comparison of decimals that refer to the same whole and justifying conclusions
	4.N.6 Exhibit an understanding of the base ten number system by reading, naming, and writing decimals between 0 and 1 up to the hundredths place.	
Measurement and Data **Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.**		
4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example: Know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ….*	**4.M.1** Demonstrate an understanding of such attributes as length, area, weight, and volume, and select the appropriate type of unit for measuring each attribute.	MA 2011 implies the use of US Customary units through the example
	4.M.2 Carry out simple unit conversions within a system of measurement, e.g., hours to minutes, cents to dollars, yards to feet or inches, etc. *This standard the same as 3.M.2*	
	4.M.5 Identify and use appropriate metric and English units and tools, (e.g., ruler, angle ruler, graduated cylinder, thermometer) to estimate, measure, and solve problems involving length, area, volume, weight, time, angle size, and temperature.	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 4

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	**4.N.10** Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems, including those involving money. *This standard is intentionally the same as 3.N.8.*	
	4.M.1 Demonstrate an understanding of such attributes as length, area, weight, and volume, and select the appropriate type of unit for measuring each attribute.	
	4.M.2 Carry out simple unit conversions within a system of measurement, e.g., hours to minutes, cents to dollars, yards to feet or inches, etc. *This standard the same as 3.M.2*	
continue on next page	**4.M.3** Identify time to the minute on analog and digital clocks using a.m. and p.m. Compute elapsed time using a clock, and using a calendar.	
from previous page	**4.M.5** Identify and use appropriate metric and English units and tools, (e.g., ruler, angle ruler, graduated cylinder, thermometer) to estimate, measure, and solve problems involving length, area, volume, weight, time, angle size, and temperature.	
	4.N.17 Select and use a variety of strategies to estimate quantities, measures, and the results of whole-number computations up to three-digit whole numbers and amounts of money to $1,000, and to judge the reasonableness of the answer.	
4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*	**4.M.4** Estimate and find area and perimeter of a rectangle, triangle, or irregular shape using diagrams, models, and grids or by measuring.	
	4.M.5 Identify and use appropriate metric and English units and tools, (e.g., ruler, angle ruler, graduated cylinder, thermometer) to estimate, measure, and solve problems involving length, area, volume, weight, time, angle size, and temperature.	

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
Represent and interpret data.		
4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit ($^1/_2$, $^1/_4$, $^1/_8$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*	**4.D.3** Construct, draw conclusions, and make predictions from various representations of data sets, including tables, bar graphs, pictographs, line graphs, line plots, and tallies.	MA 2011 requires solving data problems using addition and subtraction of data represented fractionally
Geometric measurement: understand concepts of angle and measure angles.		
4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: **4.MD.5a** An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. **4.MD.5b** An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.		This standard is new in MA 2011 This standard is new in MA 2011 This standard is new in MA 2011
4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.		This standard is new at this grade level; see MA 2004 5.M.2
4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.		This standard is new in MA 2011

Massachusetts Grade 4 (January 2011)	Grade-span 3/4 (MA 2000)	Comment
Geometry		
Draw and identify lines and angles, and classify shapes by properties of their lines and angles.		
4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**4.G.4** Identify angles as acute, right, or obtuse.	MA 2011 includes rays and line segments
	4.G.5 Describe and draw intersecting lines, parallel, and perpendicular lines.	
4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	**4.G.1** Compare and analyze attributes and other features, (e.g., number of sides, faces, corners, right angles, diagonals, and symmetry) of two- and three-dimensional geometric shapes.	MA 2011 focuses on two-dimensional figures
	4.G.2 Describe, model, draw, compare, and classify two- and three-dimensional shapes, e.g., circles, polygons —especially triangles and quadrilaterals— cubes, spheres, and pyramids.	
	4.G.4 Identify angles as acute, right, or obtuse.	
	4.G.5 Describe and draw intersecting lines, parallel, and perpendicular lines.	
4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	**4.G.8** Identify and describe line symmetry in two-dimensional shapes.	
	4.G.9 Predict and validate the results of partitioning, folding, and combining two- and three-dimensional shapes.	

MA 2000 Grade 4 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade-span 3/4 (MA 2000)**	**Comment**
3.NF.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.	**4.N.3** Demonstrate an understanding of fractions as parts of unit a wholes, as parts of a collection, and as locations on the number line.	Matched to MA 2011 Grade 3 standard
7.RP.2 Recognize and represent proportional relationships between quantities.	**4.P.5** Solve problems involving proportional relationships, including unit pricing (e.g., four apples cost 80¢, so one apple costs 20¢) and map interpretation (e.g., one inch represents five miles, so two inches represent ten miles).	Matched to MA 2011 Grade 7 standard
6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.	**4.P.6** Determine how change in one variable relates to change in a second variable, e.g., input-output tables.	Matched to MA 2011 Grade 6 standard
5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	**4.G.6** Using ordered pairs of numbers and/or letters, graph, locate, identify points, and describe paths (first quadrant).	Matched to MA 2011 Grade 5 standard

MA 2000 Grade 4 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade-span 3/4 (MA 2000)**	**Comment**
8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	**4.G.7** Describe and apply techniques such as reflections (flips), rotations (turns), and translations (slides) for determining if two shapes are congruent.	Matched to MA 2011 Grade 8 standard
3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.	**4.D.1** Collect and organize data using observations, measurements, surveys, or experiments, and identify appropriate ways to display the data. *This standard the same as 3.D.1*	Matched to MA 2011 Grade 3 standard
7.SP.7 Investigate chance processes and develop, use, and evaluate probability models. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	**4.D.4** Represent the possible outcomes for a simple probability situation, e.g., the probability of drawing a red marble from a bag containing three red marbles and four green marbles	Matched to MA 2011 Grade 7 standard
7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	**4.D.6** Classify outcomes as certain, likely, unlikely, or impossible by designing and conducting experiments using concrete objects such as counters, number cubes, spinners, or coins.	Matched to MA 2011 Grade 7 standard
MA 2000 Grade 4 Standards Not Matched by MA 2011 Standards		
No match in MA 2011	**4.D.2** Match representations of a data set such as lists, tables, or graphs (including circle graphs) with the actual set of data.	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 5

How to read this crosswalk:

The first column of this Grade 5 Crosswalk presents the 2011 Massachusetts Curriculum Framework for Mathematics Standards for Grade 5. The second column presents related standards from the Massachusetts 2004 Grade 5 mathematics standards. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2004 match, the second and third columns are shaded green, with appropriate comments in the third column. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2004 Grade 5 standards may be matched to one MA 2011 Grade 5 standard, and conversely, one MA 2004 Grade 5 standard could be matched to several MA 2011 Grade 5 standards.

At the end of the Grade 5 crosswalk, MA 2004 Grade 5 standards that are unmatched at Grade 5 are presented in the second column with the best MA 2011 standard from another grade in the first column.

Grade 5 Introduction

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.

(1) Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

(2) Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

(3) Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 5

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
Operations and Algebraic Thinking		
Write and interpret numerical expressions.		
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	**5.N.10** Demonstrate an understanding of how parentheses affect expressions involving addition, subtraction, and multiplication, and use that understanding to solve problems, e.g., 3 x (4 + 2) = 3 x 6.	
5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*	**5.N.10** Demonstrate an understanding of how parentheses affect expressions involving addition, subtraction, and multiplication, and use that understanding to solve problems, e.g., 3 x (4 + 2) = 3 x 6. **5.P.3** Use the properties of equality to solve problems with whole numbers, e.g., if o + 7 = 13, then o = 13 – 7, therefore o = 6; if 3 x o = 15, then o = 15 ÷ 3, therefore o = 5.	
Analyze patterns and relationships.		
5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. F*or example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*	**5.P.1** Analyze and determine the rules for extending symbolic, arithmetic, and geometric patterns and progressions, e.g., ABBCCC; 1, 5, 9, 13…; 3, 9, 27… *This standard is intentionally the same as standard 6.P.1.* **5.G.4** Using ordered pairs of whole numbers (including zero), graph, locate, and identify points, and describe paths on the Cartesian coordinate plane.	MA 2011 requires generation of numerical patterns using two rules to form and graph ordered pairs, and requires informal explanation

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
Number and Operations in Base Ten		
Understand the place value system.		
5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	**5.N.2** Demonstrate an understanding of place value through millions and thousandths.	MA 2011 defines place value in terms of digit placement to the right (10 times as much) or to the left (1/10 as much)
	5.N.3 Represent and compare large (millions) and small (thousandths) positive numbers in various forms, such as expanded notation without exponents, e.g., 9724 = 9 x 1000 + 7 x 100 + 2 x 10 + 4.	
	5.N.7 Compare and order whole numbers, positive fractions, positive mixed numbers, positive decimals, and percents.	
5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.	**5.N.1** Demonstrate an understanding of (positive integer) powers of ten, e.g., 10^2, 10^5.	MA 2011 requires explanation of patterns formed by multiplying by multiples of 10
5.NBT.3 Read, write, and compare decimals to thousandths. **5.NBT.3a** Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). **5.NBT.3b** Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	**5.N.2** Demonstrate an understanding of place value through millions and thousandths.	MA 2011 requires using symbols to compare decimals
	5.N.3 Represent and compare large (millions) and small (thousandths) positive numbers in various forms, such as expanded notation without exponents, e.g., 9724 = 9 x 1000 + 7 x 100 + 2 x 10 + 4.	
	5.N.6 Find and position whole numbers, positive fractions, positive mixed numbers, and positive decimals on the number line.	
	5.N.7 Compare and order whole numbers, positive fractions, positive mixed numbers, positive decimals, and percents.	
5.NBT.4 Use place value understanding to round decimals to any place.		This standard is new at this grade level; see MA 2000 4.N.16 and 4.N.17

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 5

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
Perform operations with multi-digit whole numbers and with decimals to hundredths.		
5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.		This standard is new at this grade level; see MA 2000 4.N.14 Note: MA 2011 does not specify number of digits to multiply; MA 2000 specified 3 digits by 2 digits
5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	**5.N.9** Solve problems involving multiplication and division of whole numbers, and multiplication of positive fractions with whole numbers.	MA 2011 requires using strategies based on place value and modeling of division calculations with whole numbers
	5.N.12 Accurately and efficiently add and subtract whole numbers and positive decimals. Multiply and divide (using double-digit divisors) whole numbers. Multiply positive decimals with whole numbers.	
5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	**5.N.10** Demonstrate an understanding of how parentheses affect expressions involving addition, subtraction, and multiplication, and use that understanding to solve problems, e.g., 3 x (4 + 2) = 3 x 6.	MA 2011 stresses the importance of using concrete models, drawings, and strategies based on place value to perform operations with decimals and requires explanation of reasoning
	5.N.11 Demonstrate an understanding of the inverse relationship of addition and –subtraction, and use that understanding to simplify computation and solve problems. *This standard is intentionally the same as standard 6.N.12*	
	5.N.12 Accurately and efficiently add and subtract whole numbers and positive decimals. Multiply and divide (using double-digit divisors) whole numbers. Multiply positive decimals with whole numbers.	
	5.P.4 Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
Number and Operations - Fractions **Use equivalent fractions as a strategy to add and subtract fractions.**		
CC.5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example,* $^{2}/_{3} + {}^{5}/_{4} = {}^{8}/_{12} + {}^{15}/_{12} = {}^{23}/_{12.}$ *(In general,* $^{a}/_{b} + {}^{c}/_{d} = {}^{(ad+bc)}/_{bd}$*.)*	**5.N.5** Identify and determine common equivalent fractions (with denominators 2, 4, 5, 10) and mixed numbers (with denominators 2, 4, 5, 10), decimals, and percents (through one-hundred percent), e.g., ¾ = 0.75 = 75%.	MA 2011 requires addition and subtraction of fractions of any denominator
	5.N.13 Accurately and efficiently add and subtract positive fractions and mixed numbers with like denominators and with unlike denominators (2, 4, 5, 10 only); multiply positive fractions with whole numbers. Simplify fractions in cases when both the numerator and the denominator have 2, 3, 4, 5, or 10 as a common factor.	
5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result* $^{2}/_{5} + {}^{1}/_{2} = {}^{3}/_{7}$ *by observing that* $^{3}/_{7} < {}^{1}/_{2}$*.* **Continued on next page**	**5.N.4** Demonstrate an understanding of fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, and as locations on the number line. *This standard is intentionally the same as standard 6.N.4*	MA 2011 specifies use of benchmark fractions for mental estimates and solving word problems involving fractions
	5.N.5 Identify and determine common equivalent fractions (with denominators 2, 4, 5, 10) and mixed numbers (with denominators 2, 4, 5, 10), decimals, and percents (through one-hundred percent), e.g., ¾ = 0.75 = 75%.	
	5.N.13 Accurately and efficiently add and subtract positive fractions and mixed numbers with like denominators and with unlike denominators (2, 4, 5, 10 only); multiply positive fractions with whole numbers. Simplify fractions in cases when both the numerator and the denominator have 2, 3, 4, 5, or 10 as a common factor.	

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
Continued from previous page	**5.N.14** Estimate sums and differences of whole numbers, positive fractions, and positive decimals. Estimate products of whole numbers and products of positive decimals with whole numbers. Use a variety of strategies and judge the reasonableness of the answer.	
	5.P.4 Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables. *This standard is intentionally the same as standard 6.P.4*	
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.		
5.NF.3 Interpret a fraction as division of the numerator by the denominator ($^{a}/_{b}$ = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret $^{3}/_{4}$ as the result of dividing 3 by 4, noting that $^{3}/_{4}$ multiplied by 4 equals 3 and that when 3 wholes are shared equally among 4 people each person has a share of size $^{3}/_{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	**5.N.4** Demonstrate an understanding of fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, and as locations on the number line. *This standard is intentionally the same as standard 6.N.4*	MA 2011 interprets fractions as a division of numerator by denominator
	5.P.4 Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables. *This standard is intentionally the same as standard 6.P.4*	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 5

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.	**5.N.9** Solve problems involving multiplication and division of whole numbers, and multiplication of positive fractions with whole numbers.	
5.NF.4a Interpret the product $(^a/_b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. For example, use a visual fraction model to show $(^2/_3) \times 4 = {}^8/_3$, and create a story context for this equation. Do the same with $(^2/_3) \times (^4/_5) = {}^8/_{15}$. (In general, $(^a/_b) \times (^c/_d) = {}^{ac}/_{bd}$.)		This standard is new in MA 2011
5.NF.4b Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	**5.N.13** Accurately and efficiently add and subtract positive fractions and mixed numbers with like denominators and with unlike denominators (2, 4, 5, 10 only); multiply positive fractions with whole numbers. Simplify fractions in cases when both the numerator and the denominator have 2, 3, 4, 5, or 10 as a common factor.	
	5.M.1 Apply the concepts of perimeter and area to the solution of problems involving triangles and rectangles. Apply formulas where appropriate.	
5.NF.5 Interpret multiplication as scaling (resizing) by:	**5.N.8** Apply the number theory concepts of common factor, common multiple, and divisibility rules for 2, 3, 5, and 10 to the solution of problems. Demonstrate an understanding of the concepts of prime and composite numbers.	MA 2011 requires explanation of the results of multiplying by a fraction greater or less than one
5.NF.5a Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	**5.N.14** Estimate sums and differences of whole numbers, positive fractions, and positive decimals. Estimate products of whole numbers and products of positive decimals with whole numbers. Use a variety of strategies and judge the reasonableness of the answer.	MA 2011 interprets multiplication as scaling

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
5.NF.5b Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n×a) / (n×b) to the effect of multiplying a/b by 1.	**5.N.13** Accurately and efficiently add and subtract positive fractions and mixed numbers with like denominators and with unlike denominators (2, 4, 5, 10 only); multiply positive fractions with whole numbers. Simplify fractions in cases when both the numerator and the denominator have 2, 3, 4, 5 or 10 as a common factor.	
5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	**5.N.13** Accurately and efficiently add and subtract positive fractions and mixed numbers with like denominators and with unlike denominators (2, 4, 5, 10 only); multiply positive fractions with whole numbers. Simplify fractions in cases when both the numerator and the denominator have 2, 3, 4, 5, or 10 as a common factor. **5.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables. *This standard is intentionally the same as standard 6.P.4*	MA 2011 requires involving fractions in real world problems
5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. *(Footnote: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.)* **5.NF.7a** Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for $(^1/_3) \div 4$ and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(^1/_3) \div 4 = {}^1/_{12}$ because $(^1/_{12}) \times 4 = {}^1/_3$.*		This standard is new at this grade level; see MA 2000 6.N.14 This standard is new in MA 2011

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
5.NF.7b Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5) and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*		This standard is new at this grade level; see MA 2000 6.N.14
5.NF.7c Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*		This standard is new in MA 2011
The Number System		
Gain Familiarity with concepts of positive and negative integers.		
MA.5.NS.1 Use positive and negative integers to describe quantities such as temperature above/below zero, elevation above/below sea level, or credit/debit.		MA 2011 additional standard introduces the concept of negative in grade 5 to complement introduction of the coordinate plane
Measurement and Data		
Convert like measurement units within a given measurement system.		
5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step real world problems.	**5.M.3** Solve problems involving simple unit conversions within a system of measurement.	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 5

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
Represent and interpret data.		
5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit ($^1/_2$, $^1/_4$, $^1/_8$). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	**5.D.2** Construct and interpret line plots, line graphs, and bar graphs. Interpret and label circle graphs. **5.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables. *This standard is intentionally the same as standard 6.P.4*	MA 2011 requires fractional representation of data
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.		
5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.	**5.M.4** Find volumes and surface areas of rectangular prisms. *This standard is intentionally the same as standard 6.M.6*	MA 2011 addresses surface area in grade 6
5.MD.3a A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.		MA 2011 specifies use of "unit cube"
5.MD.3b A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.		
5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	**5.M.4** Find volumes and surface areas of rectangular prisms. *This standard is intentionally the same as standard 6.M.6*	

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. **5.MD5a** Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent three-fold whole-number products as volumes, e.g., to represent the associative property of multiplication. **5.MD.5b** Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. **5.MD.5c** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	**5.M.4** Find volumes and surface areas of rectangular prisms. *This standard is intentionally the same as standard 6.M.6*	MA 2011 emphasizes the relationship of volume with multiplication and addition

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 5

Massachusetts Grade 5 (January 2011)	Grade 5 (MA 2004)	Comment
Geometry		
Graph points on the coordinate plane to solve real world and mathematical problems.		
5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	**5.G.4** Using ordered pairs of whole numbers (including zero), graph, locate, and identify points, and describe paths on the Cartesian coordinate plane.	MA 2011 includes definition and requires understanding of the coordinate plane
5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	**5.P.6** Interpret graphs that represent the relationship between two variables in everyday situations. **5.G.4** Using ordered pairs of whole numbers (including zero), graph, locate, and identify points, and describe paths on the Cartesian coordinate plane.	MA 2011 requires interpretation of coordinate values of points in context
Classify two-dimensional figures into categories based on their properties.		
5.G.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*	**5.G.1** Identify, describe, and compare special types of triangles, (isosceles, equilateral, right) and quadrilaterals (square, rectangle, parallelogram, rhombus, trapezoid) e.g., recognize that all equilateral triangles are isosceles, but not all isosceles triangles are equilateral.	MA 2011 focuses on two-dimensional shapes
5.G.4 Classify two-dimensional figures in a hierarchy based on properties.	**5.G.1** Identify, describe, and compare special types of triangles, (isosceles, equilateral, right) and quadrilaterals (square, rectangle, parallelogram, rhombus, trapezoid) e.g., recognize that all equilateral triangles are isosceles, but not all isosceles triangles are equilateral.	

MA 2004 Grade 5 Standards Matched at other grades in MA 2011		
Massachusetts January 2011	**Grade 5 (MA 2004)**	**Comment**
6.EE.2 Apply and extend previous understandings of arithmetic to algebraic expressions. Write, read, and evaluate expressions in which letters stand for numbers.	**5.P.2** Replace variables with given values and evaluate/simplify, e.g., 2(m) + 3 when m = 4. *This standard is intentionally the same as standard 6.P.2.*	Matched to MA 2011 Grade 6 standard
7.RP.1 Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.	**5.P.5** Solve problems involving proportional relationships using concrete models, tables, and paper and pencil methods.	Matched to MA 2011 Grade 7 standard
6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	**5.G.2** Identify, describe, and compare special types of three-dimensional shapes (cubes, prisms, spheres, pyramids) based on their properties, such as edges and faces.	Matched to MA 2011 Grade 6 standard
4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**5.G.3** Identify relationships among points and lines, e.g., intersecting, parallel, perpendicular.	Matched to MA 2011 Grade 4 standard
8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software. Verify experimentally the properties of rotations, reflections, and translations:	**5.G.5** Describe and perform transformations on two-dimensional shapes, e.g., translations, rotations, and reflections.	Matched to MA 2011 Grade 8 standard
4.G.3 Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	**5.G.6** Identify and describe line symmetry in two-dimensional shapes, including shapes that have multiple lines of symmetry.	Matched to MA 2011 Grade 4 standard

MA 2004 Grade 5 Standards Matched at other grades in MA 2011		
Massachusetts January 2011	**Grade 5 (MA 2004)**	**Comment**
8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software. Verify experimentally the properties of rotations, reflections, and translations.	**5.G.7** Determine if two triangles or two quadrilaterals are congruent by measuring sides or a combination of sides and angles, as necessary; or by motions or series of motions, e.g., translations, rotations, and reflections.	Matched to MA 2011 Grade 8 standard
4.G.1 Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**5.M.2** Identify, measure, describe, classify, and draw various angles. Draw triangles given two sides and the angle between them, or given two angles and the side between them, e.g., draw a triangle with one right angle and two sides congruent.	Matched to MA 2011 Grade 4 standard
6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	**5.D.1** Given a set of data, find the median, mean, mode, maximum, minimum, and range, and apply to solutions of problems.	Matched to MA 2011 Grade 6 standard
7.SP.5 Investigate chance processes and develop, use, and evaluate probability models. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	**5.D.3** Predict the probability of outcomes of simple experiments (e.g., tossing a coin, rolling a number cube) and test the predictions.	Matched to MA 2011 Grade 7standard
MA 2000 Grade 5 Standards Not Matched by MA 2011 Standards		
No close match in MA 2011	**5.M.5.** Find the sum of the measures of the interior angles in triangles by measuring the angles, and without measuring the angles.	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 6

How to read this crosswalk:

The first column of this Grade 6 Crosswalk presents 2011 Massachusetts Curriculum Framework for Mathematics Standards for Grade 6. The second column presents related standards from the Massachusetts 2000 Grade-span 5/6. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2000 match, the second and third columns are shaded green, with appropriate comments in the third column. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one MA 2011 standard, and conversely, one MA 2000 standard could be matched to several MA 2011 standards.

At the end of the Grade 6 crosswalk, MA 2000 Grade-span 5/6 standards that are unmatched are presented in two ways: (1) MA 2000 Grade-span 5/6 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (2) MA 2000 Grade-span 5/6 standards that do not match any MA 2011 standards.

Grade 6 Introduction

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.

(1) Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.

(2) Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.

(3) Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.

(4) Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.

Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 6

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

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
Ratios and Proportional Reasoning		
Understand ratio concepts and use ratio reasoning to solve problems.		
6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*		This standard is new at this grade level; see MA 2004 7.N.2 and MA 2000 8.N.3
6.RP.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0 (b not equal to zero), and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger." (Footnote: Expectations for unit rates in this grade are limited to non-complex fractions.)*	**6.M.3** Solve problems involving proportional relationships and units of measurement, e.g., same system unit conversions, scale models, maps, and speed.	MA 2011 requires "use rate language"
6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.	**6.N.5** Identify and determine common equivalent fractions, mixed numbers, decimals, and percents.	
6.RP.3a Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	**6.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	
6.RP.3b Solve unit rate problems including those involving unit pricing and constant speed. For example, If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?	**6.P.6** Produce and interpret graphs that represent the relationship between two variables in everyday situations.	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 6

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.RP.3c Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole given a part and the percent.	**6.P.7** Identify and describe relationships between two variables with a constant rate of change. Contrast these with relationships where the rate of change is not constant.	MA 2011 specifies working with percents in word problems
6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	**6.M.3** Solve problems involving proportional relationships and units of measurement, e.g., same system unit conversions, scale models, maps, and speed.	
MA.6.RP.3e Solve problems that relate the mass of an object to its volume.		MA 2011 additional standard related to skills needed in science
The Number System		
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.		
CC.6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. [In general, (a/b) ÷ (c/d) = ad/bc.] How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	**6.N.9** Select and use appropriate operations to solve problems involving addition, subtraction, multiplication, division, and positive integer exponents with whole numbers, and with positive fractions, mixed numbers, decimals, and percents.	MA 2011 specifies use of fractions in word problems Note: MA 2011 includes mixed numbers when referring to fractions in grade 6
	6.N.14 Accurately and efficiently add, subtract, multiply, and divide positive fractions and mixed numbers. Simplify fractions.	
	6.P.4 Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	
Compute fluently with multi-digit numbers and find common factors and multiples.		
6.NS.2 Fluently divide multi-digit numbers using the standard algorithm.	**6.N.13** Accurately and efficiently add, subtract, multiply, and divide (with double-digit divisors) whole numbers and positive decimals.	MA 2011 requires division with all multi-digit numbers and specifies use of standard algorithm

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 6

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	**6.N.13** Accurately and efficiently add, subtract, multiply, and divide (with double-digit divisors) whole numbers and positive decimals.	MA 2011 requires operations with all multi-digit decimals and specifies use of standard algorithm
6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*	**6.N.8** Apply number theory concepts–including prime and composite numbers, prime factorization, greatest common factor, least common multiple, and divisibility rules for 2, 3, 4, 5, 6, 9, and 10–to the solution of problems.	
MA.6.NS.4a Apply number theory concepts, including prime factorization and relatively prime numbers, to the solution of problems.	**6.N.11** Apply the Order of Operations for expressions involving addition, subtraction, multiplication, and division with grouping symbols (+, –, x, ÷).	MA 2011 additional standard specifies prime factorization and relatively prime
Apply and extend previous understandings of numbers to the system of rational numbers.		
6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, debits/credits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	**6.N.6** Find and position integers, fractions, mixed numbers, and decimals (both positive and negative) on the number line.	
	6.N.12 Demonstrate an understanding of the inverse relationship of addition and subtraction, and use that understanding to simplify computation and solve problems.	
	6.P.4 Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	
6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	**6.N.6** Find and position integers, fractions, mixed numbers, and decimals (both positive and negative) on the number line.	MA 2011 specifies recognition of opposites of numbers
6.NS.6a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.	**6.N.7** Compare and order integers (including negative integers), and positive fractions, mixed numbers, decimals, and percents.	

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.NS.6b Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	**6.G.4** Graph points and identify coordinates of points on the Cartesian coordinate plane (all four quadrants).	MA 2011 relates locations of ordered pairs in terms of reflections across axes of the coordinate plane
6.NS.6c Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	See matches on previous page	
6.NS.7 Understand ordering and absolute value of rational numbers.	**6.N.4** Demonstrate an understanding of fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, and as locations on the number line.	MA 2011 introduces absolute value
6.NS.7 a Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*	**6.N.6** Find and position integers, fractions, mixed numbers, and decimals (both positive and negative) on the number line.	MA 2011 interprets inequality through relative position on the number line
6.NS.7 b Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.*	**6.N.7** Compare and order integers (including negative integers), and positive fractions, mixed numbers, decimals, and percents	
6.NS.7 c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.*	**6.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	
6.NS.7 d Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*	**6.G.5** Find the distance between two points on horizontal or vertical number lines	

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.NS.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	**6.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	
	6.G.5 Find the distance between two points on horizontal or vertical number lines	
	6.G.4 Graph points and identify coordinates of points on the Cartesian coordinate plane (all four quadrants).	
Expressions and Equations		
Apply and extend previous understandings of arithmetic to algebraic expressions.		
6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.	**6.N.1** Demonstrate an understanding of positive integer exponents, in particular, when used in powers of ten, e.g., 10^2, 10^5.	
	6.N.9 Select and use appropriate operations to solve problems involving addition, subtraction, multiplication, division, and positive integer exponents with whole numbers, and with positive fractions, mixed numbers, decimals, and percents.	
	6.N.11 Apply the Order of Operations for expressions involving addition, subtraction, multiplication, and division with grouping symbols (+, –, x, ÷).	
6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.	**6.N.1** Demonstrate an understanding of positive integer exponents, in particular, when used in powers of ten, e.g., 10^2, 10^5.	
6.EE.2a Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y.	**6.N.11** Apply the Order of Operations for expressions involving addition, subtraction, multiplication, and division with grouping symbols (+, –, x, ÷).	
6.EE.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.	**6.P.2** Replace variables with given values and evaluate/simplify, e.g., 2(m) + 3 when m=4.	
	6.P.3 Use the properties of equality to solve problems, e.g., if c + 7 = 13, then c = 13 – 7, therefore c = 6; if 3 x c = 15, then 1/3 x 3 x c = 1/3 x 15, therefore c = 5.	MA 2011 explicitly requires use of mathematical terminology for parts of expressions

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.EE.2c Evaluate expressions at specific values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2.*	**6.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	
6.EE.3 Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*	**6.N.11 A**pply the Order of Operations for expressions involving addition, subtraction, multiplication, and division with grouping symbols (+, –, x, ÷). **6.N.15** Add and subtract integers, with the exception of subtracting negative integers.	MA 2011 introduction to grade 6: Students extend their previous understandings of number ... to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers.
6.EE.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*		This standard is new in MA 2011
Reason about and solve one-variable equations and inequalities.		
6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.		This standard is new in MA 2011
6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	**6.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables. **6.P.5** Solve linear equations using concrete models, tables, graphs, and paper-pencil methods.	

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.	**6.P.3** Use the properties of equality to solve problems, e.g., if c + 7 = 13, then c = 13 – 7, therefore c = 6; if 3 x c = 15, then $^1/_3$ x 3 x c = $^1/_3$ x 15, therefore c = 5.	
	6.P.4 Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.	
	6.P.5 Solve linear equations using concrete models, tables, graphs, and paper-pencil methods.	
6.EE.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.		This standard is new at this grade level; see MA 2000 8.P.7
Represent and analyze quantitative relationships between dependent and independent variables.		
CC.6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*	**6.P.6** Produce and interpret graphs that represent the relationship between two variables in everyday situations.	MA 2011 specifies analyzing dependent and independent variables
	6.P.7 Identify and describe relationships between two variables with a constant rate of change. Contrast these with relationships where the rate of change is not constant.	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 6

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
Geometry **Solve real-world and mathematical problems involving area, surface area, and volume.**		
6.G.1 Find area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. **MA.6.G.1a** Use the relationship between radius, diameter, and center of a circle to find the circumference and area. **MA.6.G.1b** Solve real-world and mathematical problems involving the measurements of circles.	**6.M.1** Apply the concepts of perimeter and area to the solution of problems. Apply formulas where appropriate. **6.M.4** Find areas of triangles and parallelograms. Recognize that shapes with the same number of sides but different appearances can have the same area. Develop strategies to find the area of more complex shapes. **6.M.6** Find volumes and surface areas of rectangular prisms. **6.M.5** Identify, measure, and describe circles and the relationships of the radius, diameter, circumference, and area (e.g., d = 2r, p = C/d), and use the concepts to solve problems.	MA 2011 additional standards give students earlier experience with measurement of circles
6.G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	**6.M.6** Find volumes and surface areas of rectangular prisms.	MA 2011 specifies using fractional side lengths
6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	**6.G.4** Graph points and identify coordinates of points on the Cartesian coordinate plane ~~(~~all four quadrants~~)~~. *This standard is not being assessed at grade 6 (See 7.G.4)* **6.G.5** Find the distance between two points on horizontal or vertical number lines	MA 2011 draws polygons on the coordinate plane and requires solving real-world problems using the coordinate plane

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 6

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	**6.G.9** Match three-dimensional objects and their two-dimensional representations, e.g., nets, projections, and perspective drawings.	
Statistics and Probability		
Develop understanding of statistical variability.		
6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*		This standard is new in MA 2011
6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	**6.D.1** Describe and compare data sets using the concepts of median, mean, mode, maximum and minimum, and range.	
6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	**6.D.1** Describe and compare data sets using the concepts of median, mean, mode, maximum and minimum, and range.	
Summarize and describe distributions.		
6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	**6.D.2** Construct and interpret stem-and-leaf plots, line plots, and circle graphs.	
MA.6.SP.4a Read and interpret circle graphs.	**6.D.2** Construct and interpret stem-and-leaf plots, line plots, and circle graphs.	This MA 2011additional standard includes circles to complement work with circles
6.SP.5 Summarize numerical data sets in relation to their context, such as by: **6.SP.5a** Reporting the number of observations. **6.SP.5b** Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.	**6.D.1** Describe and compare data sets using the concepts of median, mean, mode, maximum and minimum, and range. **6.D.2** Construct and interpret stem-and-leaf plots, line plots, and circle graphs.	

Massachusetts Grade 6 (January 2011)	Grade 5/6 Span (MA 2000)	Comment
6.SP.5c Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered. **6.SP.5d** Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data was gathered.	Continued from previous page	MA 2011 includes interquartile range and does not specify mode in measures

MA 2000 Grade-Span 5/6 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade 5/6 Span (MA 2000)**	**Comment**
7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. (include 1a, 1b, 1c, 1d)	**6.N.10** Use the number line to model addition and subtraction of integers, with the exception of subtracting negative integers.	Matched to MA 2011 Grade 7 standard
7.EE.3 *Solve real-life and mathematical problems using numerical and algebraic expressions and equations.* Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	**6.N.16** Estimate results of computations with whole numbers, and with positive fractions, mixed numbers, decimals, and percents. Describe reasonableness of estimates.	Matched to MA 2011 Grade 7 standard
5.G.4 Classify two-dimensional figures in a hierarchy based on properties.	**6.G.1** Identify polygons based on their properties, including types of interior angles, perpendicular or parallel sides, and congruence of sides, e.g., squares, rectangles, rhombuses, parallelograms, trapezoids, and isosceles, equilateral, and right triangles.	Matched to MA 2011 Grade 5 standard
4.G.1 Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**6.G.3** Identify relationships among points, lines, and planes, e.g., intersecting, parallel, perpendicular.	Matched to MA 2011 Grade 4 standard
8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software. Verify experimentally the properties of rotations, reflections, and translations:	**6.G.6** Predict, describe, and perform transformations on two-dimensional shapes, e.g., translations, rotations, and reflections.	Matched to MA 2011 Grade 8 standard
4.G.3 Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	**6.G.7** Identify types of symmetry, including line and rotational.	Matched to MA 2011 Grade 4 standard
8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained by the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	**6.G.8** Determine if two shapes are congruent by measuring sides or a combination of sides and angles, as necessary; or by motions or series of motions, e.g., translations, rotations, and reflections.	Matched to MA 2011 Grade 8 standard

MA 2000 Grade-Span 5/6 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade 5/6 Span (MA 2000)**	**Comment**
4.G.2 Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	**6.M.2** Identify, measure, describe, classify, and construct various angles, triangles, and quadrilaterals.	Matched to MA 2011 Grade 4 standard
7.G.4 *Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.* Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	**6.M.5** Identify, measure, and describe circles and the relationships of the radius, diameter, circumference, and area (e.g., d = 2r, p = C/d), and use the concepts to solve problems.	Matched to MA 2011 Grade 7 standard; MA 2011 Grade 7 standard requires students to know the formulas; MA 2000 Grade 6 standard did not include this specificity.
8.G.5 *Understand congruence and similarity using physical models, transparencies, or geometry software.* Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.	**6.M.7** Find the sum of the angles in simple polygons (up to eight sides) with and without measuring the angles.	Matched to MA 2011 Grade 8 standard
7.SP.8 Investigate chance processes and develop, use, and evaluate probability models. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	**6.D.3** Use tree diagrams and other models (e.g., lists and tables) to represent possible or actual outcomes of trials. Analyze the outcomes.	Matched to MA 2011 Grade 7 standard
7.SP.2 Use random sampling to draw inferences about a population. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.	**6.D.4** Predict the probability of outcomes of simple experiments (e.g., tossing a coin, rolling a die) and test the predictions. Use appropriate ratios between 0 and 1 to represent the probability of the outcome and associate the probability with the likelihood of the event.	Matched to MA 2011 Grade 7 standard

MA 2000 Grade-Span 5/6 Standards Not Matched by MA 2011 Standards		
No match in MA 2011	**6.N.2** Demonstrate an understanding of place value to billions and thousandths.	MA 2011 does not include place value standards after Grade 5
No match in MA 2011	**6.N.3** Represent and compare very large (billions) and very small (thousandths) positive numbers in various forms such as expanded notation without exponents, e.g., 9724 = 9 x 1000 + 7 x 100 + 2 x 10 + 4.	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 7

How to read this crosswalk:

The first column of this Grade 7 Crosswalk presents the 2011 Massachusetts Curriculum Framework for Mathematics standards for Grade 7. The second column presents related standards from the Massachusetts 2004 Grade 7 standards. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2004 Grade 7 match, the second and third columns are shaded green, with appropriate comments in the third column. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one MA 2011 standard, and conversely, one MA 2000 standard could be matched to several MA 2011 standards.

At the end of the Grade 7 crosswalk, MA 2004 Grade 7 standards that are unmatched at grade 7 are presented in two ways: (1) MA 2004 Grade 7 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (2) MA 2004 Grade 7 standards that do not match any MA 2011 standards.

Grade 7 Introduction

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.

(1) Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

(2) Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

(3) Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

(4) Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 7

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

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
Ratios and Proportional Relationships **Analyze proportional relationships and use them to solve real-world and mathematical problems.**		
7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks $^1/_2$ mile in each $^1/_4$ hour, compute the unit rate as the complex fraction $(^1/_2)/(^1/_4)$ miles per hour, equivalently 2 miles per hour.*	**7.N.2** Use ratios and proportions in the solution of problems involving unit rates, scale drawings, and reading of maps.	
7.RP.2 Recognize and represent proportional relationships between quantities.	**7.N.2** Use ratios and proportions in the solution of problems involving unit rates, scale drawings, and reading of maps.	
7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	**7.P.4** Solve linear equations using tables, graphs, models, and algebraic methods.	MA 2011 lists a variety of methods for solving proportional relationships
7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	**7.P.5** Identify, describe, and analyze linear relationships between two variables. Compare positive rate of change, e.g., y = 3x + 1, to negative rate of change, e.g., y = –3x + 1.	
7.RP.2c Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.*	**7.P.6** Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate. *This standard is intentionally the same as standard 8.P.9*	MA 2011 specifically includes "represent by equations"

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
7.RP.2d Explain what a point (*x, y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.		
7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.	**7.N.2** Use ratios and proportions in the solution of problems involving unit rates, scale drawings, and reading of maps.	MA 2011 includes solving multi-step percent problems
	7.N.7 Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1). *This standard is intentionally the same as standard 8.N.11*	
	7.P.6 Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate. *This standard is intentionally the same as standard 8.P.9*	
The Number System **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**		
7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.	**7.N.4** Demonstrate an understanding of absolute value, e.g., |-3| = |3| = 3. *This standard is intentionally the same as standard 8.N.6*	
7.NS.1a Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*	**7.N.5** Apply the rules of positive integer exponents to the solution of problems. Extend the Order of Operations to include positive integer exponents.	MA 2011 includes situations where "opposite quantities combine to make zero"
7.NS.1b Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.	**7.N.6** Use the inverse relationships of addition and subtraction, and of multiplication and division to simplify computations and solve problems, e.g., multiplying by 1/2 or 0.5 is the same as dividing by 2.	MA 2011 relates absolute value and distance

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 7

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
7.NS.1c Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. **7.NS.1d** Apply properties of operations as strategies to add and subtract rational numbers.	**7.N.7** Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1). *This standard is intentionally the same as standard 8.N.11* **7.N.9** Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives).	MA 2011 includes subtraction of negative numbers
7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **7.NS.2a** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. **7.NS.2b** Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts. **7.NS.2c** Apply properties of operations as strategies to multiply and divide rational numbers. **7.NS.2d** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	**7.N.7** Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1). **7.N.9** Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives).	MA 2011 focuses on multiplication and division of rational numbers MA 2011 specifies non-zero divisor MA 2011 converts rational numbers to decimals through division and defines rational numbers
7.NS.3 Solve real world and mathematical problems involving the four operations with rational numbers. *(Footnote: Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)*	**7.N.9** Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives).	MA 2011 includes working with complex fractions

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
Expressions and Equations		
Use properties of operations to generate equivalent expressions.		
7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	**7.N.3** Represent numbers in scientific notation (positive powers of ten only) and use that notation in problem situations.	MA 2011 includes operations with expressions and equations with rational coefficients
	7.P.3 Create and use symbolic expressions for linear relationships and relate them to verbal, tabular, and graphical representations.	
	7.P.4 Solve linear equations using tables, graphs, models, and algebraic methods.	
7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*		This standard is new in MA 2011
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.		
C7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	**7.N.8** Determine when an estimate rather than an exact answer is appropriate and apply in problem situations. *This standard is intentionally the same as 8.N.11*	
	7.N.9 Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives).	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 7

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	**7.P.4** Solve linear equations using tables, graphs, models, and algebraic methods.	
7.EE.4a Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*	**7.P.6** Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate. *This standard is intentionally the same as standard 8.P.9*	MA 2011 includes inequalities and specifies "compare an algebraic solution to an arithmetic solution"
7.EE.4b Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example, As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*		This standard is new at this grade level; see MA 2000 8.P.7
MA.7.EE.4c Extend analysis of patterns to include analyzing, extending, and determining an expression for simple arithmetic and geometric sequences (e.g., compounding, increasing area), using tables, graphs, words, and expressions.	**7.P.1** Extend, represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic expressions. Include arithmetic and geometric progressions, e.g., compounding. *This standard is intentionally the same as standard 8.P.1.*	MA 2011 additional standard introduces arithmetic and geometric sequences, which will be further extended in high school coursework.
Geometry **Draw, construct, and describe geometrical figures and describe the relationships between them.**		
7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	**7.N.2** Use ratios and proportions in the solution of problems involving unit rates, scale drawings, and reading of maps.	MA 2011 specifies using scale drawings to solve problems
	7.G.2 Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems. *This standard is intentionally the same as 8.G.2*	
	7.M.1 Select, convert (within the same system of measurement), and use appropriate units of measurement or scale. *This standard is intentionally the same as standard 8.M.1*	

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 7

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	**7.G.5** Use a ruler, protractor, and compass to draw polygons and circles.	MA 2011 specifies constructing triangles given measures of angles
7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.		This standard is new at this grade; see MA 2000 10.G.10/G.G.16
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.		
7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	**7.M.3** Demonstrate an understanding of the concepts and apply formulas and procedures for determining measures, including those of area and perimeter/circumference of parallelograms, trapezoids, and circles. Given the formulas, determine the surface area and volume of rectangular prisms and cylinders. Use technology as appropriate.	MA 2011 requires that students "know" circle measurement formulas
7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	**7.G.3** Demonstrate an understanding of the relationships of angles formed by intersecting lines, including parallel lines cut by a transversal. *This standard is intentionally the same as 8.G.3*	MA 2011 requires finding an unknown angle measure related to complementary and supplementary angles
7.G.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	**7.M.3** Demonstrate an understanding of the concepts and apply formulas and procedures for determining measures, including those of area and perimeter/circumference of parallelograms, trapezoids, and circles. Given the formulas, determine the surface area and volume of rectangular prisms and cylinders. Use technology as appropriate.	
MA.7.G.7 Solve real-world problems involving the surface area of spheres.		MA 2011 additional standard introduces work with surface area of spheres in preparation for work in high school.

Crosswalk of 2011 MA Mathematics Standards and MA 2004 Standards
Grade 7

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
Statistics and Probability		
Use random sampling to draw inferences about a population.		
7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.		This standard is new at this grade; see MA 2000 8.D.1
7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*		This standard is new at this grade; see MA 2000 10.D.3
Draw informal comparative inferences about two populations.		
7.SP.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*		This standard is new in MA 2011
7.SP.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*	**7.D.2** Find, describe, and interpret appropriate measures of central tendency (mean, median, and mode) and spread (range) that represent a set of data. Use these notions to compare different sets of data. *This standard is intentionally the same as standard 8.D.3.*	

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
Investigate chance processes and develop, use, and evaluate probability models.		
7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	**7.D.3** Use tree diagrams, tables, organized lists, and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of number cubes.	MA 2011 specifies numerical probability of a chance event
7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*	**7.D.3** Use tree diagrams, tables, organized lists, and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of number cubes.	
7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		This standard is new at this grade level; see MA 2000 8.D.4
7.SP.7a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.*		This standard is new in MA 2011
7.SP.7b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*		This standard is new at this grade level; see MA 2000 12.D.7/PC.D.5

Massachusetts Grade 7 (January 2011)	Grade 7 (MA 2004)	Comment
7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. **7.SP.8a** Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. **7.SP.8b** Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. **7.SP.8c** Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*	**7.D.3** Use tree diagrams, tables, organized lists, and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of number cubes.	MA 2011 requires simulations of compound events.

MA 2004 Grade 7 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade 7 (MA 2004)**	**Comment**
6.NS.6 *Understand a rational number as a point on the number line.* Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	**7.N.1** Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents. *This standard is intentionally the same as standard 8.N.1*	Matched to MA 2011 Grade 6 standard
8.EE.4 *Work with radicals and integer exponents. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.* Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	**7.N.3** Represent numbers in scientific notation (positive powers of ten only) and use that notation in problem situations.	Matched to MA 2011 Grade 8 standard
6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.	**7.P.2** Evaluate simple algebraic expressions for given variable values, e.g., $3a^2 - b$ for $a = 3$ and $b = 7$. *This standard is intentionally the same as 8.P.2*	Matched to MA 2011 Grade 6 standard
8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	**7.G.2** Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems. *This standard is intentionally the same as 8.G.2*	Matched to MA 2011 Grade 8 standard
6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. (see also 6.a, 6b, 6c)	**7.G.4** Graph points and identify coordinates of points on the Cartesian coordinate plane (all four quadrants). *This standard is intentionally the same as 6.G.4, which is not currently being assessed at grade 6. Standard 7.G.4 will be assessed at grade 7.*	Matched to MA 2011 Grade 6 standard
8.G.3 Understand congruence and similarity using physical models, transparencies, or geometry software. Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	**7.G.6** Predict the results of translations and reflections of figures on unmarked or coordinate plans and draw the transformed figure.	Matched to MA 2011 Grade 8 standard
6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots. **MA.6.SP.4a** Read and interpret circle graphs.	**7.D.1** Select, create, interpret, and utilize the following tabular and graphical representations of data: circle graphs, Venn Diagrams, stem and leaf plots, tables and charts.	Matched to MA 2011 Grade 6 standard Matched to MA 2011additional Grade 6 standard

MA 2004 Grade 7 Standards Not Matched by MA 2011 Standards		
Massachusetts January 2011	**Grade 7 (MA 2004)**	**Comment**
No match in MA 2011	**7.G.1** Analyze, apply, and explain the relationship between the number of sides and the sums of the interior angle measures of polygons.	
No match in MA 2011	**7.G.7** Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces. *This standard is intentionally the same as standard 8.G.7*	
No match in MA 2011	**7.M.2** Given the formulas, convert from one system of measurement to another. Use technology as appropriate. *This standard is intentionally the same as standard 8.M.2*	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 8

How to read this crosswalk:

The first column of this Grade 8 Crosswalk presents the 2011 Massachusetts Curriculum Framework for Mathematics standards for Grade 8. The second column presents related standards from the Massachusetts 2000 Grade-span 7/8. The third column provides informational comments, usually highlighting differences. If there is no appropriate MA 2000 Grade-span 7/8 match, the second and third columns are shaded green, with appropriate comments in the third column. This crosswalk is designed as a tool for use by districts and schools as they prepare for the 2012-13 implementation of the Massachusetts 2011 Standards for Mathematics.

When reviewing the crosswalk, please keep in mind that the correlations between standards indicated in the crosswalk could be direct, meaning that the standards contain the same content, or could be partial, meaning that parts of the standards are related. Also note that several MA 2000 standards may be matched to one MA 2011 standard, and conversely, one MA 2000 standard could be matched to several MA 2011 standards.

At the end of the Grade 8 crosswalk, MA 2000 Grade-span 7/8 standards that are unmatched are presented in two ways: (1) MA 2000 Grade-span 7/8 standards that match MA 2011 standards at a different grade level, with the best match indicated in the first column; and (2) MA 2000 Grade-span 7/8 standards that do not match any MA 2011 standards.

Grade 8 Introduction

In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equa-tions, 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; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

(1) Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y = mx + b$), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount $m \times A$. Students also use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom). At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question and to interpret components of the relationship (such as slope and y-intercept) in terms of the situation.

Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. Students use linear equations, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve problems.

(2) Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.

(3) Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

The Standards for Mathematical Practice complement the content standards at each grade level so that students increasingly engage with the subject matter as they grow in mathematics maturity and expertise.

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		
Massachusetts Grade 8 (January 2011)	**Grade 7/8 Span (MA 2000)**	**Comment**
The Number System **Know that there are numbers that are not rational, and approximate them by rational numbers.**		
8.NS.1. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.	**8.N.1** Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents. *This standard is intentionally the same as 7.N.1*	MA 2011 identifies the distinction between rational and irrational numbers and their decimal representations
	8.N.2 Define, compare, order, and apply frequently used irrational numbers, such as π and $\sqrt{2}$	
8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	**8.N.1** Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents. *This standard is intentionally the same as 7.N.1*	MA 2011 specifies finding approximations of irrational numbers and locating them on a number line
	8.N.2 Define, compare, order, and apply frequently used irrational numbers, such as π and $\sqrt{2}$	
	8.N.7 Apply the rules of powers and roots to the solution of problems. Extend the Order of Operations to include positive integer exponents and square roots.	

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
Expressions and Equations		
Work with radicals and integer exponents		
8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/(3)^3 = 1/27$.	**8.N.7** Apply the rules of powers and roots to the solution of problems. Extend the Order of Operations to include positive integer exponents and square roots.	MA 2011 includes working with negative integer exponents
	8.N.9 Use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems, e.g. multiplying by ½ or 0.5 is the same as dividing by 2.	
8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	**8.N.2** Define, compare, order, and apply frequently used irrational numbers, such as π and $\sqrt{2}$	MA 2011 includes working with cube roots
	8.N.7 Apply the rules of powers and roots to the solution of problems. Extend the Order of Operations to include positive integer exponents and square roots.	
8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.*	**8.N.4** Represent numbers in scientific notation, and use them in calculations and problem situations.	
8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	**8.M.1** Select, convert (within the same system of measurement), and use appropriate units of measurement or scale. *This standard is intentionally the same as 7.M.1*	MA 2011 requires operations with numbers expressed in scientific notation
	8.N.4 Represent numbers in scientific notation, and use them in calculations and problem situations	

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
Understand the connections between proportional relationships, lines, and linear equations		
8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	**8.N.3** Use ratios and proportions in the solution of problems, in particular, problems involving unit rates, scale factors, and rate of change	MA 2011 requires comparison of two different proportional relationships represented in different ways
	8.P.4 Create and use symbolic expressions and relate them to verbal, tabular, and graphical representations	
	8.P.5 Identify the slope of a line as a measure of its steepness and as a constant rate of change from its table of values, equation, or graph. Apply the concept of slope to the solution of problems.	
	8.P.8 Explain and analyze - both quantitatively and qualitatively, using pictures, graphs, charts, or equations - how a change in one variable results in a change in another variable in functional relationships, e.g., $C = \pi d$, $A = \pi r^2$ (A as a function of r), $A_{rectangle} = lw$ ($A_{rectangle}$ as a function of l and w).	
	8.P.9 Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate. *This standard is intentionally the same as 7.P.6.*	
	8.M.5 Use models, graphs, and formulas to solve simple problems involving rates, e.g., velocity and density.	
8.EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	**8.P.6** Identify the roles of variables within an equation, e.g., y = mx + b, expressing y as a function of x with parameters m and b.	MA 2011 relates slope and similar triangles
	8.G.2 Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems. *This standard is intentionally the same as 7.G.2*	

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 8

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
Analyze and solve linear equations and pairs of simultaneous linear equations.		
8.EE.7 Solve linear equations in one variable. **8.EE.7a** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions.Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). **8.EE.7b** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	**8.P.3** Demonstrate an understanding of the identity (-x)(-y) = xy. Use this identity to simplify algebraic expressions, e.g., (-2)(-x+2) = 2x – 4.	MA 2011 requires examples of linear equations with one solution, infinitely many solutions and no solution
	8.P.7 Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models, and/or graphs.	MA 2011 does not include linear inequalities in grade 8 (see grade 7)
	8.P.9 Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate. *This standard is intentionally the same as 7.P.6.*	MA 2011 specifies using rational number coefficients
	8.N.12 Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives). *This standard is intentionally the same as 7.N.9.*	
8.EE.8 Analyze and solve pairs of simultaneous linear equations. **8.EE.8a** Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. **8.EE.8b** Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* **8.EE.8c** Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*		These standards are new at this grade level; see 10.P.8/AI.P.12

Crosswalk of 2011 MA Mathematics Standards and MA 2000 Standards
Grade 8

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
Functions		
Define, evaluate and compare functions.		
8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. *(Footnote: Function notation is not required in Grade 8.)*	**8.P.6** Identify the roles of variables within an equation, e.g., y = mx + b, expressing y as a function of x with parameters m and b.	MA 2011 introduces the concept of function
	8.P.8 Explain and analyze - both quantitatively and qualitatively, using pictures, graphs, charts, or equations - how a change in one variable results in a change in another variable in functional relationships, e.g., $C = \pi d$, $A = \pi r^2$ (A as a function of r), $A_{rectangle} = lw$ ($A_{rectangle}$ as a function of l and w).	
8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*		This standard is new in MA 2011
8.F.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	**8.P.6** Identify the roles of variables within an equation, e.g., y = mx + b, expressing y as a function of x with parameters m and b.	MA 2011 interprets linear equation as a function
Use functions to model relationships between quantities.		
8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	**8.P.6** Identify the roles of variables within an equation, e.g., y = mx + b, expressing y as a function of x with parameters m and b.	MA 2011 requires reading information about a relationship from a variety of displays

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
continued from previous page	**8.P.7** Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models, and/or graphs.	see previous page
	8.P.8 Explain and analyze - both quantitatively and qualitatively, using pictures, graphs, charts, or equations - how a change in one variable results in a change in another variable in functional relationships, e.g., $C = \pi d$, $A = \pi r^2$ (A as a function of r), $A_{rectangle} = lw$ ($A_{rectangle}$ as a function of l and w).	
	8.M.5 Use models, graphs, and formulas to solve simple problems involving rates, e.g., velocity and density.	
8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	**8.P.4** Create and use symbolic expressions and relate them to verbal, tabular, and graphical representations	MA 2011 requires creating a graph that exhibits the qualitative features of a function
	8.P.5 Identify the slope of a line as a measure of its steepness and as a constant rate of change from its table of values, equation, or graph. Apply the concept of slope to the solution of problems.	
	8.P.6 Identify the roles of variables within an equation, e.g., y = mx + b, expressing y as a function of x with parameters m and b.	
	8.P.8 Explain and analyze - both quantitatively and qualitatively, using pictures, graphs, charts, or equations - how a change in one variable results in a change in another variable in functional relationships, e.g., $C = \pi d$, $A = \pi r^2$ (A as a function of r), $A_{rectangle} = lw$ ($A_{rectangle}$ as a function of l and w).	
	8.P.10 Use tables and graphs to represent and compare linear rates of change and x- and y-intercepts of different linear patterns.	

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
Geometry		
Understand congruence and similarity using physical models, transparencies, or geometry software.		
8.G.1 Verify experimentally the properties of rotations, reflections, and translations: **8.G.1a** Lines are taken to lines, and line segments to line segments of the same length. **8.G.1b** Angles are taken to angles of the same measure. **8.G.1c** Parallel lines are taken to parallel lines.	**8.G.6** Predict the results of transformations on unmarked or coordinate planes and draw the transformed figure, e.g., predict how tessellations transform under translations, reflections, and rotations.	
8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	**8.G.2** Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems. *This standard is intentionally the same as 7.G.2* **8.G.6** Predict the results of transformations on unmarked or coordinate planes and draw the transformed figure, e.g., predict how tessellations transform under translations, reflections, and rotations.	MA 2011 uses transformations to prove congruence
8.G.3 Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	**8.G.6** Predict the results of transformations on unmarked or coordinate planes and draw the transformed figure, e.g., predict how tessellations transform under translations, reflections, and rotations. **8.M.4** Use ratio and proportion (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.	

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
8.G.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	**8.G.2** Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems. *This standard is intentionally the same as 7.G.2*	
	8.G.6 Predict the results of transformations on unmarked or coordinate planes and draw the transformed figure, e.g., predict how tessellations transform under translations, reflections, and rotations.	
	8.M.4 Use ratio and proportion (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.	
8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.*	**8.G.1** Analyze, apply, and explain the relationship between the number of sides and the sums of the interior and exterior angle measures of polygons.	MA 2011 requires "informal arguments" of various facts MA 2011 specifies criterion for similarity
	8.G.2 Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems. *This standard is intentionally the same as 7.G.2*	
	8.G.3 Demonstrate an understanding of the relationships of angles formed by intersecting lines, including parallel lines cut by a transversal. *This standard is the same as 7.G.3.*	
Understand and apply the Pythagorean Theorem.		
8.G.6 Explain a proof of the Pythagorean Theorem and its converse.	**8.G.4** Demonstrate an understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.	MA 2011 requires explanation of a proof of the Pythagorean Theorem and its converse
8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions.	**8.G.4** Demonstrate an understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.	
8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**8.G.4** Demonstrate an understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.	MA 2011 relates Pythagorean Theorem to distance

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.		
8.G.9 Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real world and mathematical problems.	**8.M.3** Demonstrate an understanding of the concepts and apply formulas and procedures for determining measures, including those of area and perimeter / circumference of parallelograms, trapezoids, and circles. Given the formulas, determine the surface area and volume of rectangular prisms, cylinders, and spheres. Use technology as appropriate.	MA 2011 requires students to "know" formulas MA 2011 includes cones
Statistics and Probability **Investigate patterns of association in bivariate data.**		
8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	**8.D.2** Select, create, interpret, and utilize various tabular and graphical representations of data, e.g., circle graphs, Venn diagrams, scatterplots, stem-and-leaf plots, box-and-whisker plots, histograms, tables, and charts. Differentiate between continuous and discrete data and ways to represent them.	MA 2011 specifies bivariate data and specifies investigation of patterns of clustering, outliers, and positive and negative associations
8.SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.		This standard is new to this grade; see 10.D.2/AI.D.2
8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	**8.P.6** Identify the roles of variables within an equation, e.g., y = mx + b, expressing y as a function of x with parameters m and b.	MA 2011 requires interpretation of slope and intercept in context
	8.P.9 Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate. *This standard is intentionally the same as standard 7.P.6*	

Massachusetts Grade 8 (January 2011)	Grade 7/8 Span (MA 2000)	Comment
8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	**8.D.2** Select, create, interpret, and utilize various tabular and graphical representations of data, e.g., circle graphs, Venn diagrams, scatterplots, stem-and-leaf plots, box-and-whisker plots, histograms, tables, and charts. Differentiate between continuous and discrete data and ways to represent them.	MA 2011 specifies frequencies and relative frequencies

MA 2000 Grade-Span 7/8 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade 7/8 Span (MA 2000)**	**Comment**
MA.6.NS.4a Apply number theory concepts, including prime factorization and relatively prime numbers, to the solution of problems.	**8.N.5** Apply number theory concepts, including prime factorization and relatively prime numbers, to the solution of problems	Matched to MA 2011additional Grade 6 standard
7.NS.1b Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.	**8.N.6** Demonstrate an understanding of absolute value, e.g., |-3| = |3| = 3. *This standard is intentionally the same as 7.N.4*	Matched to MA 2011 Grade 7 standard
7.NS.1 *Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.* Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.	**8.N.8** Demonstrate an understanding of the properties of arithmetic operations on rational numbers. Use the associative, commutative, and distributive properties; properties of the identity and inverse elements (e.g., -7 + 7 = 0; ¾ x $^4/_3$ = 1); and the notion of closure of a subset of the rational numbers under an operation (e.g., the set of odd integers is closed under multiplication but not under addition).	Matched to MA 2011 Grade 7 standard
Grade 7 Cluster Heading: *Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.*	**8.N.10** Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1). *This standard is intentionally the same as 7.N.7.*	Matched to MA 2011 Grade 7 standards
7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	**8.N.11** Determine when an estimate rather than an exact answer is appropriate and apply in problem situations. *This standard is intentionally the same as 7.N.8.*	Matched to MA 2011 Grade 7 standard
Grade 7 Cluster Heading: *Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.*	**8.N.12** Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives). *This standard is intentionally the same as 7.N.9.*	Matched to MA 2011 Grade 7 standard

MA 2000 Grade-Span 7/8 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade 7/8 Span (MA 2000)**	**Comment**
MA.7.EE.4c Extend analysis of patterns to include analyzing, extending, and determining an expression for simple arithmetic and geometric sequences (e.g., compounding, increasing area), using tables, graphs, words, and expressions.	**8.P.1** Extend, represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic expressions. Include arithmetic and geometric progressions, e.g., compounding. *This standard is intentionally the same as 7.P.1.*	Matched to MA 2011 additional Grade 7 standard NOTE: MA 2011 does not include sequences until high school
6.EE.2c Evaluate expressions at specific values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s^3 and A = 6 s^2 to find the volume and surface area of a cube with sides of length s = 1/2.	**8.P.2** Evaluate simple algebraic expressions for given variable values, e.g., $3a^2$-b for a=3 and b=7. *This standard is the same as 7.P.2*	Matched to MA 2011 Grade 6 standard
7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	**8.G.5** Use a straight edge, compass, or other tools to formulate and test conjectures, and to draw geometric figures.	Matched to MA 2011 Grade 7 standard
Grade 7 cluster heading: Draw, construct, and describe geometrical figures and describe the relationships between them.	**8.G.7** Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces. *This standard is the same as 7.G.7.*	Matched to MA 2011 Grade 7 standards
6.G.4 *Solve real-world and mathematical problems involving area, surface area, and volume.* Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	**8.G.8** Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.	Matched to MA 2011 Grade 6 standard

MA 2000 Grade-Span 7/8 Standards Matched at Other Grades in MA 2011		
Massachusetts January 2011	**Grade 7/8 Span (MA 2000)**	**Comment**
7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	**8.D.1** Describe the characteristics and limitations of a data sample. Identify different ways of selecting a sample, e.g., convenience sampling, responses to a survey, random sampling.	Matched to MA 2011 Grade 7 standard
6.SP.5c Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered.	**8.D.3** Find, describe, and interpret appropriate measures of central tendency (mean, median, and mode) and spread (range) that represent a set of data. Use these notions to compare different sets of data. *This standard is intentionally the same as 7.D.3.*	Matched to MA 2011 Grade 6 standard
7.SP.8b Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.	**8.D.4** Use tree diagrams, tables, organized lists, basic combinatorics ("fundamental counting principle"), and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of dice.	Matched to MA 2011 Grade 7 standard
MA 2000 Grade-Span 7/8 Standards Not Matched by MA 2011 Standards		
Massachusetts January 2011	**Grade 7/8 Span (MA 2000)**	**Comment**
No match in MA 2011	**8.M.2** Given the formulas, convert from one system of measurement to another. Use technology as appropriate. *This standard is intentionally the same as 7.M.2.*	MA 2011 does not convert between measurement systems