



# ***New York State Testing Program***

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## **Educator Guide to the 2014 Grade 4 Common Core Mathematics Test**

**engage<sup>ny</sup>**

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## Foreword

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Beginning with the 2012–2013 school year, the New York State Education Department (NYSED) [redesigned its assessment program](#) to measure what students know and can do relative to the grade-level Common Core Learning Standards (CCLS) for Mathematics. The CCLS for Mathematics make up a broad set of mathematics understandings for students. The CCLS for Mathematics define mathematics understanding through the integration of the Standards for Mathematical Content and the Standards for Mathematical Practice.

The Grade 4 Common Core Mathematics Test is designed to measure student mathematical understanding as defined by the CCLS. As such, there will be a noticeable change **in rigor and depth in mathematics**.

Many of the questions on the 2014 Grade 4 Common Core Mathematics Test are more advanced and complex than those found on prior tests that measured prior grade-level standards. Many questions will require that students be fluent in earlier grade level skills, capable of showing their procedural and conceptual proficiency on a single standard in several distinct ways, and capable of negotiating multi-step questions that require knowledge and ability across more than one grade-level standard.

Students will be expected to understand math conceptually, use prerequisite skills with grade-level math facts, and solve math problems rooted in the real world, deciding for themselves which tools (such as protractors or rulers) to use.

This guide details many of the changes involved with both instruction and the newly designed tests that measure the Common Core Learning Standards for Mathematics. While reading about each of the changes will help to understand how to prepare students for the upcoming test, it is important to remember that research has consistently demonstrated that students perform best on local, regional, statewide, or national tests when they have a great teacher delivering high-quality instruction aligned to rigorous standards.<sup>1</sup> Rote test prep practices are incompatible with highly effective teaching and lead to lower student performance.<sup>2</sup>

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<sup>1</sup> See, for example, <http://ccsr.uchicago.edu/publications/authentic-intellectual-work-and-standardized-tests-conflict-or-coexistence>.

<sup>2</sup> See, for example, [http://metproject.org/downloads/MET\\_Gathering\\_Feedback\\_Research\\_Paper.pdf](http://metproject.org/downloads/MET_Gathering_Feedback_Research_Paper.pdf).

## 2014 Common Core Mathematics Tests

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As part of the New York State Board of Regents Reform Agenda, NYSED has embarked on a comprehensive reform initiative to ensure that schools prepare students with the knowledge and skills they need to succeed in college and in their careers. To realize the goals of this initiative, changes have occurred in standards, curricula, and assessments. These changes will impact pedagogy and, ultimately, student learning.

The CCLS call for changes in what is expected from a teacher’s instructional approach. In mathematics courses, the CCLS demand that teachers focus their instruction on fewer, more central standards (<http://engageny.org/resource/math-content-emphases/>), thereby providing room to build core understandings and connections between mathematical concepts and skills.

More specifically, the CCLS demand six key shifts in instruction in mathematics, summarized in the chart below. A more detailed description of these shifts can be found at <http://engageny.org/resource/common-core-shifts/>.

<b>Shifts in Mathematics</b>		
Shift 1	Focus	Teachers significantly narrow and deepen the scope of how time and energy are spent in the mathematics classroom. They do so in order to focus deeply on only the concepts that are prioritized in the standards.
Shift 2	Coherence	Principals and teachers carefully connect the learning within and across grades so that students can add new understanding onto foundations built in previous years.
Shift 3	Fluency	Students are expected to have speed and accuracy with simple calculations; teachers structure class time and/or homework time for students to memorize core functions.
Shift 4	Deep Understanding	Students deeply understand and can operate easily within a math concept before moving on. They learn more than the procedure to get the answer right. They learn the math.
Shift 5	Application	Students are expected to use math and choose the appropriate concept for application even when they are not prompted to do so.
Shift 6	Dual Intensity	Students are practicing procedures and understanding concepts. There is more than a balance between these two things in the classroom—both are occurring with intensity.

The Grades 3–8 English Language Arts and Mathematics New York State Testing Program (NYSTP) has been redesigned to measure student learning aligned with the instructional shifts necessitated by the CCLS. This document provides specific details about the 2014 Grade 4 Common Core Mathematics Test and the standards that it measures.

## Common Core Learning Standards for Mathematics

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In Grade 4, the CCLS focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; and (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle 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.

All the content at this grade level are connected to the Standards for Mathematical Practices. The 2014 Grade 4 Common Core Mathematics Test will include questions that require students to connect mathematical content and mathematical practices.

**For more information about the CCLS and Standards for Mathematical Practice, please refer to <http://engageny.org/resource/new-york-state-p-12-common-core-learning-standards-for-mathematics/>.**

## Clusters, Standards, and Sequencing in Instruction and Assessment

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The 2014 Grade 4 Common Core Mathematics Test will focus entirely on the Grade 4 New York State CCLS for Mathematics. As such, the test will be designed differently than in the past.

The CCLS for Mathematics are divided into *standards, clusters, and domains*.

- *Standards* define what students should understand and be able to do. In some cases, standards are further articulated into lettered *components*.
- *Clusters* are groups of related *standards*. Note that *standards* from different *clusters* may sometimes be closely related, because mathematics is a connected subject.
- *Domains* are larger groups of related *clusters* and *standards*. Standards from different domains may be closely related.

### Content Emphases

The CCLS for Mathematics were designed with the understanding that not all clusters should be emphasized equally in instruction or assessment. Some clusters require greater emphasis than others based on the time that they take to master and/or their importance to future mathematics or the demands of college and career readiness. The Grade 4 CCLS are divided into *Major Clusters, Supporting Clusters, and Additional Clusters*. The *Major Clusters* are the intended instructional focus at Grade 4 and will account for the majority of math test questions. The *Supporting Clusters* and *Additional Clusters* are Mathematics Standards that serve to both introduce and reinforce Major Clusters. The chart below details the recommended instructional focus and the percentage of test questions that assess the Major, Supporting, and Additional Clusters:

**Cluster Emphases for Instruction and the 2014 Grade 4 Common Core Mathematics Test**

Cluster Emphasis	Recommended Instructional Time	Approximate Number of Test Points
Major	65–75%	70–80%
Supporting	15–25%	10–20%
Additional	5–15%	5–10%

### Emphasized Standards

The CCLS for Mathematics were also designed with the understanding that teachers would emphasize standards that best facilitate mastery of the most important grade-level mathematics and best position students for mastery of future mathematics. Similar to the cluster emphases, not all standards should receive similar emphasis. Within each of the clusters and domains, certain standards require more instructional and assessment emphasis.

One example of a standard needing greater emphasis is 4.NF.3, “Understand a fraction  $a/b$  with  $a > 1$  as a sum of fractions  $1/b$ ”, which hinges on students’ understanding of 4.NF.1, “Explain why a fraction  $a/b$  is equivalent to a fraction  $(n \times a)/(n \times b)$  by using visual fraction models...” and 4.NF.2, “Compare two fractions with different numerators and different denominators.” Standards 4.NF.1 and 4.NF.2 build understandings that, at the cluster level, “[e]xtend understanding of fraction equivalence and ordering.”

It is this understanding of fraction equivalence and ordering that enables students to synthesize knowledge from 4.NF.1 and 4.NF.2, thus assuring their ability to “[b]uild fractions from unit fractions by applying and extending previous understandings of operations on whole numbers” at the cluster level for 4.NF.3. Ultimately, 4.NF.1 and 4.NF.2 serve as foundational conceptual understandings that are necessary in order to reach the application of those understandings to apply the operations on fractions, as required by 4.NF.3.

An emphasis on the most critical clusters and standards allows depth and focus in learning, which is carried out through the Standards for Mathematical Practice. Without such depth and focus, attention to the Standards for Mathematical Practice would be unrealistic.

**For more information about the Content Emphases, please refer to**  
<http://engageny.org/resource/math-content-emphases/>.

## Sequencing

The August 2012 memorandum *Grades 3–8 Mathematics Testing Program Guidance: September-to-April/May-to-June Common Core Learning Standards* provides guidance on aligning standards to each time period. Standards designated as September-to-April will be assessed on the 2014 Grade 4 Common Core Mathematics Test. Several standards designated as Major Clusters are included in the May-to-June instructional period. Placing these standards in the May-to-June instructional period provides more coherent September-to-April content blocks and allows for more logical sequencing for standards that closely relate to the Major Clusters of the following year. Starting with the April 2013 administration, most test questions target more than one standard. Some questions assess an entire cluster. As such, many individual test questions assess Grade 3 September-to-April standards in conjunction with standards from past grades.

One of the ways the CCLS are changing instructional practices and our assessment design is through the spiraling of mathematic concepts within and across grade levels. This means that when a student has mastered a particular standard, that student has also inherently mastered the related standards that came before. It is our recommendation, therefore, that all teachers pay close attention to student mastery of May-to-June standards so that student learning can begin promptly and efficiently the following year.

**For more information about the *Grades 3–8 Mathematics Testing Program Guidance: September-to-April/May-to-June Common Core Learning Standards*, please refer to**  
<http://www.p12.nysed.gov/assessment/ei/2014/math-sept-april-may-june.pdf>

## Emphases and Sequencing

The chart on page 5 illustrates the different *clusters* and *standards* recommended for instructional emphasis. *Standards* that are recommended for greater emphasis are indicated with a check mark while those that are recommended for instruction after the administration of the 2014 Grade 4 Common Core Mathematics Test are indicated by the word “Post.” ***The instructional emphasis recommended in this chart is mirrored in the Grade 4 test design, whereby clusters and standards that are recommended for greater emphasis will be assessed in greater number. Standards recommended for greater emphasis that are designated for instruction after the administration of the 2014 Grade 4 Common Core Mathematics Test, while not tested, will be fundamental in ensuring that students are prepared for Grade 5 instruction.***



Cluster Emphasis	Domain	Cluster	Standard
Major Clusters	Operations and Algebraic Thinking	<i>Use the four operations with whole numbers to solve problems.</i>	4.OA.1
			4.OA.2 ✓
			4.OA.3
	Number and Operations in Base Ten	<i>Generalize place value understanding for multi-digit whole numbers.</i>	4.NBT.1
			4.NBT.2
			4.NBT.3
			4.NBT.4
			4.NBT.5 ✓
			4.NBT.6
	Number and Operations – Fractions	<i>Extend understanding of fraction equivalence and ordering.</i>	4.NF.1
			4.NF.2
		<i>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</i>	4.NF.3 ✓
			4.NF.4 ✓
<i>Understand decimal notation for fractions, and compare decimal fractions.</i>			4.NF.5 Post
		4.NF.6 ✓ Post	
4.NF.7 ✓ Post			
Supporting Clusters	Operations and Algebraic Thinking	<i>Gain familiarity with factors and multiples.</i>	4.OA.4
	Measurement and Data	<i>Solve problems involving measurements and conversion of measurements from a larger unit to a smaller unit.</i>	4.MD.1 Post
			4.MD.2 Post
			4.MD.3
	<i>Represent and interpret data.</i>	4.MD.4	
Additional Clusters	Operations and Algebraic Thinking	<i>Generate and analyze patterns.</i>	4.OA.5
	Measurement and Data	<i>Geometric measurement: understand concepts of angles and measure angles.</i>	4.MD.5
			4.MD.6
			4.MD.7
	Geometry	<i>Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</i>	4.G.1
			4.G.2
			4.G.3

✓ = Standards recommended for greater emphasis  
 Post = Standards recommended for instruction in May-June

# The 2014 Grade 4 Common Core Mathematics Test

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## Testing Sessions and Times

The 2014 Grade 4 Common Core Mathematics Test will consist of **three books** that are administered over **three successive days**, with one book per day. The 2014 Grade 4 Common Core Mathematics Test is designed so that most students will complete Book 1 and Book 2 in approximately 40 minutes each and Book 3 in about 70 minutes. While it is likely that most students will complete each book sooner, students are permitted 60 minutes to complete Book 1, 60 minutes to complete Book 2, and 90 minutes to complete Book 3. This design provides ample time for students who work at different paces. For more information regarding what students may do once they have completed their work, please refer to the section, “When Students Have Completed Their Tests.”

**Grade 4 Estimated Time on Task**

<b>Book</b>	<b>Day Administered</b>	<b>Estimated Time on Task</b>
1	1	40*
2	2	40*
3	3	70**
Total Estimated Time		150

\* Day 1 and Day 2 will be scheduled to allow 60 minutes for completion.

\*\* Day 3 will be scheduled to allow 90 minutes for completion.

The tests must be administered under standard conditions and the directions must be followed carefully. The same test administration procedures must be used with all students so that valid inferences can be drawn from the test results.

NYSED devotes great attention to the security and integrity of the NYSTP. School administrators and teachers involved in the administration of State Assessments are responsible for understanding and adhering to the instructions set forth in the *School Administrator’s Manual* and the *Teacher’s Directions*. These resources will be posted at

<http://www.p12.nysed.gov/assessment/ei/eigen.html>.

## When Students Have Completed Their Tests

Students who finish their assessment before the allotted time expires should be encouraged to go back and check their work. Once the student checks his or her work, or chooses not to, examination materials should be collected by the proctor. After a student's assessment materials are collected, that student may be permitted to read silently.\* This privilege is granted at the discretion of each school. No talking is permitted and no other schoolwork is permitted.

\*For more detailed information about test administration, including proper procedures for talking to students during testing and handling reading materials, please refer to the *School Administrator's Manual* and the *Teacher's Directions*.

## Test Design

In Grade 4, students are required to apply mathematical understandings and mathematical practices gained in the classroom in order to answer three types of questions: multiple-choice, short-response, and extended-response. Book 1 and Book 2 will consist of multiple-choice questions. Book 3 consists of short- and extended-response questions.

The chart below provides a description of the 2014 Grade 4 Test Design. Please note that the number of multiple-choice questions in Book 1 and in Book 2 includes embedded field test questions. It will not be apparent to students whether a question is an embedded field test question that does not count towards their score or an operational test question that does count towards their score.

**Grade 4 Test Design**

<b>Book</b>	<b>Number of Multiple-Choice Questions</b>	<b>Number of Short-Response Questions</b>	<b>Number of Extended-Response Questions</b>	<b>Total Number of Questions</b>
1	24	0	0	24
2	25	0	0	25
3	0	6	4	10
<b>Total</b>	49	6	4	59













