New York State Testing Program

Educator Guide to the 2015 Grade 8 Common Core Mathematics Test

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Foreword

Beginning with the 2012–13 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 8 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 2015 Grade 8 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 formulas and 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.[1] Rote test prep practices are incompatible with highly effective teaching and lead to lower student performance.[2]

[1] See, for example, http://ccsr.uchicago.edu/publications/authentic-intellectual-work-and-standardized-tests-conflict-or-coexistence.
[2] See, for example, http://metproject.org/downloads/MET_Gathering_Feedback_Research_Paper.pdf.

2015 Common Core Mathematics Tests

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/.

Shifts in Mathematics		
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 2015 Grade 8 Common Core Mathematics Test and the standards that it measures.

Common Core Learning Standards for Mathematics

In Grade 8, the CCLS focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; and (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

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 $m \cdot A$. 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.

All the content at this grade level are connected to the Standards for Mathematical Practices. The 2015 Grade 8 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

The 2015 Grade 8 Common Core Mathematics Test will focus entirely on the Grade 8 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 8 CCLS are divided into *Major Clusters*, *Supporting Clusters*, and *Additional Clusters*. The *Major Clusters* are the intended instructional focus at Grade 8 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 2015 Grade 8 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 8.F.4, "Construct a function to model a linear relationship between two quantities…" In order for a student to construct functions to model a linear relationship between two quantities, it is necessary that they first understand what a function is and

be able to define, evaluate, and compare functions. Standards 8.F.1 ("Understand that a function is a rule…") and 8.F.2 ("Compare properties of two functions…") form the foundational understandings that move students toward standard 8.F.4. Ultimately, standards 8.F.1 and 8.F.2 serve as necessary steps to reach the grand understanding represented by 8.F.4.

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 2015 Grade 8 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 8 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/2015/math-sept-april-may-june.pdf

Emphases and Sequencing

The chart below 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 2015 Grade 8 Common Core Mathematics Test are indicated by the word "Post." ***The instructional emphasis recommended in this chart is mirrored in the Grade 8 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 2015 Grade 8 Common Core Mathematics Test, while not tested, will be fundamental in ensuring that students are prepared for Grade 9 instruction.***

Cluster Emphasis	Domain	Cluster	Standard	
Major Clusters	Expressions and Equations	*Work with radicals and integer exponents.*	8.EE.1	
			8.EE.2	*Post*
			8.EE.3	
			8.EE.4	
		Understand the connections between proportional relationships, lines, and linear equations.	8.EE.5	✓
			8.EE.6	
		Analyze and solve linear equations and pairs of simultaneous linear equations.	8.EE.7	
			8.EE.8	✓
	Functions	*Define, evaluate, and compare functions.*	8.F.1	
			8.F.2	
			8.F.3	✓
		Use functions to model relationships between quantities.	8.F.4	✓
			8.F.5	
	Geometry	*Understand and apply the Pythagorean Theorem.*	8.G.6	✓ *Post*
			8.G.7	✓ *Post*
			8.G.8	✓ *Post*
		Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.1	
			8.G.2	
			8.G.3	
			8.G.4	
			8.G.5	
Supporting Clusters	Number System	*Know that there are numbers that are not rational, and approximate them by rational numbers.*	8.NS.1	*Post*
			8.NS.2	*Post*
	Statistics and Probability	*Investigate patterns of association in bivariate data.*	8.SP.1	
			8.SP.2	
			8.SP.3	
			8.SP.4	
Additional Clusters	Geometry	*Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.*	8.G.9	

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

The 2015 Grade 8 Common Core Mathematics Test

Testing Sessions and Times

The 2015 Grade 8 Common Core Mathematics Test will consist of **three books** that are administered over **three successive days**, with one book per day. The 2015 Grade 8 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 80 minutes to complete Book 1, 80 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 8 Estimated Time on Task

Book	Day Administered	Estimated Time on Task
1	1	40*
2	2	40*
3	3	70**
Total Estimated Time		150

* Day 1 and Day 2 will be scheduled to allow 80 minutes each 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 8, 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. Students will **NOT** be permitted to use calculators for Book 1. For Book 2 and Book 3, students **must have the exclusive use of a scientific calculator**. For more information about calculator use, please refer to page 13.

The chart below provides a description of the 2015 Grade 8 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 8 Test Design

Book	Number of Multiple-Choice Questions	Number of Short-Response Questions	Number of Extended-Response Questions	Total Number of Questions
1	28	0	0	28
2	27	0	0	27
3	0	6	4	10
Total	55	6	4	65

2015 Grade 8 Common Core Mathematics Test Blueprint

All questions on the 2015 Grade 8 Common Core Mathematics Test measure the CCLS for Mathematics. The test was designed around the Content Emphases (page 3). As such, questions that assess the Major Clusters make up the majority of the test. Additionally, standards recommended for more emphasis within clusters (page 5) are assessed with greater frequency.

While all questions are linked to a primary standard, many questions measure more than one standard and one or more of the Standards for Mathematical Practices. Similarly, some questions measure cluster-level understandings. As a result of the alignment to standards, clusters, and the Standards for Mathematical Practice, the tests assess students' conceptual understanding, procedural fluency, and problem-solving abilities, rather than assessing their knowledge of isolated skills and facts.

The tables below illustrate the domain-level and cluster-level test blueprint. For more information on which clusters and standards to emphasize in instruction, please refer to page 5.

Domain-Level Test Blueprint—Percent of Test Points on Grade 8 Test				
The Number System	**Expressions and Equations**	**Functions**	**Geometry**	**Statistics and Probability**
0%	**40–45%**	**25–30%**	**20–25%**	**10–15%**

Cluster-Emphasis Test Blueprint—Percent of Test Points on Grade 8 Test		
Major Clusters	**Supporting Clusters**	**Additional Clusters**
70–80%	**10–20%**	**5–10%**

Question Formats

The 2015 Grade 8 Common Core Mathematics Test contains multiple-choice, short-response (2-point), and extended-response (3-point) questions. For multiple-choice questions, students select the correct response from four answer choices. For short- and extended-response questions, students write an answer to an open-ended question and may be required to show their work. In some cases, they may be required to explain, in words, how they arrived at their answers.

Multiple-Choice Questions

Multiple-choice questions are designed to assess CCLS for Mathematics. Mathematics multiple-choice questions will mainly be used to assess standard algorithms and conceptual standards. Multiple-choice questions incorporate both Standards and Standards for Mathematical Practices, some in real-world applications. Many multiple-choice questions require students to complete multiple steps. Likewise, many of these questions are linked to more than one standard, drawing on the simultaneous application of multiple skills and concepts. Within answer choices, distractors[3] will all be based on plausible missteps.

Short-Response Questions

Short-response questions are similar to past 2-point questions, requiring students to complete a task and show their work. Like multiple-choice questions, short-response questions will often require multiple steps, the application of multiple mathematics skills, and real-world applications. Many of the short-response questions will cover conceptual and application standards.

Extended-Response Questions

Extended-response questions are similar to past 3- point questions, asking students to show their work in completing two or more tasks or a more extensive problem. Extended-response questions allow students to show their understanding of mathematical procedures, conceptual understanding, and application. Extended-response questions may also assess student reasoning and the ability to critique the arguments of others.

Additional Assessment Resources

Sample Questions for the Grade 8 Common Core Mathematics Tests are available at

http://engageny.org/resource/new-york-state-common-core-sample-questions

Math Item Review Criteria and Multiple Representations are available at

http://engageny.org/resource/common-core-assessment-design

[3] A distractor is an incorrect response that may appear to be a plausible correct response to a student who has not mastered the skill or concept being tested.

Mathematics Rubrics and Scoring Policies

The 2015 Grade 8 Common Core Mathematics Test will use rubrics and scoring policies similar to those used in 2014. Both the 2014 Mathematics 2-point and 3-point Rubrics were changed to more clearly reflect the new demands called for by the CCLS. Similarly, scoring policies were amended to better address the CCLS Mathematics Standards. The Mathematics Rubrics are as follows:

2-Point Holistic Rubric

2 Points	A two-point response includes the correct solution to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task. This response • indicates that the student has completed the task correctly, using mathematically sound procedures • contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures • may contain inconsequential errors that do not detract from the correct solution and the demonstration of a thorough understanding
1 Point	A one-point response demonstrates only a partial understanding of the mathematical concepts and/or procedures in the task. This response • correctly addresses only some elements of the task • may contain an incorrect solution but applies a mathematically appropriate process • may contain the correct solution but required work is incomplete
0 Points*	A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

*Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

2-Point Scoring Policies

- The Scoring Policies provided for the 2014 New York State Tests will apply to the 2015 Common Core Mathematics Tests.
- The Scoring Policies are provided on page 12.

3-Point Holistic Rubric

3 Points	A three-point response includes the correct solution(s) to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task. This response • indicates that the student has completed the task correctly, using mathematically sound procedures • contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures • may contain inconsequential errors that do not detract from the correct solution(s) and the demonstration of a thorough understanding
2 Points	A two-point response demonstrates a partial understanding of the mathematical concepts and/or procedures in the task. This response • appropriately addresses most but not all aspects of the task using mathematically sound procedures • may contain an incorrect solution but provides sound procedures, reasoning, and/or explanations • may reflect some minor misunderstanding of the underlying mathematical concepts and/or procedures
1 Point	A one-point response demonstrates only a limited understanding of the mathematical concepts and/or procedures in the task. This response • may address some elements of the task correctly but reaches an inadequate solution and/or provides reasoning that is faulty or incomplete • exhibits multiple flaws related to misunderstanding of important aspects of the task, misuse of mathematical procedures, or faulty mathematical reasoning • reflects a lack of essential understanding of the underlying mathematical concepts • may contain the correct solution(s) but required work is limited
0 Points*	A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

*Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

3-Point Scoring Policies

- The Scoring Policies provided for the 2014 New York State Tests will apply to the 2015 Common Core Mathematics Tests.
- The Scoring Policies are provided below.

2015 2- and 3-Point Mathematics Scoring Policies

Below are the policies to be followed while scoring the mathematics tests for all grades:

1. If a student does the work in other than a designated "Show your work" area, that work should still be scored. (Additional paper is an allowable accommodation for a student with disabilities if indicated on the student's Individual Education Program or Section 504 Accommodation Plan.)
2. If the question requires students to show their work, and the student shows appropriate work and clearly identifies a correct answer but fails to write that answer in the answer blank, the student should still receive full credit.
3. In questions that provide ruled lines for students to write an explanation of their work, mathematical work shown elsewhere on the page should be considered and scored.
4. If the student provides one legible response (and one response only), teachers should score the response, even if it has been crossed out.
5. If the student has written more than one response but has crossed some out, teachers should score only the response that has **not** been crossed out.
6. Trial-and-error responses are **not** subject to Scoring Policy #5 above, since crossing out is part of the trial-and-error process.
7. If a response shows repeated occurrences of the same conceptual error within a question, the student should **not** be penalized more than once.
8. In questions that require students to provide bar graphs,
    - in Grades 3 and 4 only, touching bars are acceptable
    - in Grades 3 and 4 only, space between bars does **not** need to be uniform
    - in all grades, widths of the bars must be consistent
    - in all grades, bars must be aligned with their labels
    - in all grades, scales must begin at 0, but the 0 does **not** need to be written
9. In questions requiring number sentences, the number sentences must be written horizontally.
10. In pictographs, the student is permitted to use a symbol other than the one in the key, provided that the symbol is used consistently in the pictograph; the student does not need to change the symbol in the key. The student may **not**, however, use multiple symbols within the chart, nor may the student change the value of the symbol in the key.
11. If students are not directed to show work, any work shown will not be scored. This applies to items that do not ask for any work and items that ask for work for one part and do not ask for work in another part.

12. Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted). This is not to be confused with a score of zero wherein the student does respond to part or all of the question but that work results in a score of zero.

Mathematics Tools

Why Mathematics Tools?

These provisions are necessary for students to meet Standard for Mathematical Practice Five found throughout the New York State P–12 Common Core Learning Standards for Mathematics:

> **Use appropriate tools strategically**
>
> *Mathematically proficient students consider the available tools when solving a mathematical problem. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a web site, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.*

On prior tests that measured prior grade-level standards, small symbols (calculators, protractors, and rulers) were used to alert students that they should use math tools to help solve questions. These symbols will **NOT** appear on the 2015 Grade 8 Common Core Mathematics Test. It is up to the student to decide when it will be helpful to use math tools to answer a question.

Rulers and Protractors

Students in Grade 8 must have a ruler and a protractor for their exclusive use for all sessions of the test. Students with disabilities may use adapted rulers and protractors if this is indicated as a testing accommodation on the student's Individualized Education Program or Section 504 Accommodation Plan.

Note: Schools are responsible for supplying the appropriate tools for use with the Grade 8 Mathematics Test. NYSED does not provide them.

Calculators

Students in Grade 8 are **NOT** permitted to use calculators with Book 1. For Book 2 and for Book 3, students must have the exclusive **use of a scientific calculator**. Graphing calculators are **NOT** permitted.

Value of Pi

Students should learn that π is an irrational number. For the short-response and extended-response questions in Grade 8 (Book 3), the π key and the full display of the calculator should be used in computations. The approximate values of π, such as 3.1416, 3.14, or $\frac{22}{7}$, are unacceptable.

Reference Sheet

A detachable reference sheet will be included in each of the three test books. For the 2015 Grade 8 Common Core Mathematics Test, the reference sheet will look as follows:

Grade 8 Mathematics Reference Sheet

CONVERSIONS

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5,280 feet	1 pound = 0.454 kilogram	1 quart = 2 pints
1 mile = 1,760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2,000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1,000 cubic centimeters

FORMULAS

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pythagorean Theorem	$a^2 + b^2 = c^2$

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