New York State Testing Program

Educator Guide to the 2017 Grade 5 Common Core Mathematics Test

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Betty A. Rosa, *Chancellor*, B.A., M.S. in Ed., M.S. in Ed., M.Ed., Ed.D.	Bronx
T. Andrew Brown, *Vice Chancellor*, B.A., J.D.	Rochester
James R. Tallon, JR., B.A., M.A.	Binghamton
Roger Tilles, B.A., J.D.	Great Neck
Lester W. Young, JR., B.S., M.S., Ed.D.	Beechhurst
Christine D. Cea, B.A., M.A., Ph.D.	Staten Island
Wade S. Norwood, B.A.	Rochester
Kathleen M. Cashin, B.S., M.S., Ed.D.	Brooklyn
James E. Cottrell, B.S., M.D.	New York
Josephine Victoria Finn, B.A., J.D.	Monticello
Judith Chin, M.S. in Ed.	Little Neck
Beverly L. Ouderkirk, B.S. in Ed., M.S. in Ed.	Morristown
Catherine Collins, R.N., N.P., B.S., M.S. in Ed., Ed.D.	Buffalo
Judith Johnson, B.A., M.A., C.A.S.	New Hempstead
Nan Eileen Mead, B.A.	Manhattan
Elizabeth S. Hakanson, A.S., M.S., C.A.S.	Syracuse
Luis O. Reyes, B.A., M.A., Ph.D.	New York

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MaryEllen Elia

Executive Deputy Commissioner
Elizabeth R. Berlin

Senior Deputy Commissioner, Office of Education Policy
Jhone Ebert

Deputy Commissioner, Office of Instructional Services
Angelica Infante-Green

Director, Office of State Assessment
Steven E. Katz

Table of Contents

Foreword

The New York State Education Department (NYSED) is continuing with Questar Assessment Inc. as the vendor to lead the development of the future New York State Grades 3–8 Mathematics Tests. NYSED has collected significant feedback from students, parents, and New York State educators regarding ways to improve the tests.

Testing Vendor for Grades 3–8 Mathematics

NYSED is pleased to continue its relationship with Questar Assessment Inc. to provide the Grades 3–8 Mathematics Tests to the students of New York State. Questar Assessment Inc. is responsible for the construction of this year's test forms and guidance materials and brings its extensive experience with assessment in New York State to the Grades 3–8 testing program.

Greater Involvement of Educators in the Test Development Process

To improve the quality of the Grades 3–8 Mathematics Tests, NYSED, together with Questar Assessment Inc., has expanded the variety of opportunities for educators to become involved in the development of the Mathematics Tests and significantly increased the number of New York State educators involved in the development of the assessments.

For the 2017 Grades 3–8 Mathematics Tests, educators from throughout the State gathered in Albany and were charged with evaluating and selecting assessment questions for use on the spring 2017 tests. The reliance on New York State educators to select the best questions available ensures that the tests are rigorous and fair for all students.

Moving forward, New York State educators will have considerably more opportunities to review, guide, and author the assessments.

A Shift to Untimed Testing

NYSED has also received extensive feedback from educators from throughout the State about the inability of students to work at their own pace on the Grades 3–8 Mathematics Tests. As a result, in 2016 NYSED announced the transition to untimed testing for the Grades 3–8 Mathematics Tests. This change continues for the spring 2017 tests and provides students further opportunity to demonstrate what they know and can do by allowing them to work at their own pace. In general, this means that as long as students are productively working they will be allowed as much time as they need, within the confines of the regular school day, to complete the Mathematics Tests. Additionally, this change in policy may help alleviate the pressures that some students may experience as a result of taking an assessment they must complete during a limited amount of time.

NYSED remains committed to improving the quality of the State's assessments and the experiences that students have taking these tests.

New Option for Schools to Administer the Mathematics Tests on Computer

For the first time, this school year, schools will have the option to administer the Grades 3–8 Mathematics Tests on computer or paper. More information about this option is available at the NYSED Computer-Based Testing (CBT) Support website: https://cbtsupport.nysed.gov/.

2017 Common Core Mathematics Tests

As part of the New York State Board of Regents Reform Agenda, NYSED 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 impact pedagogy and, ultimately, student learning.

The Common Core Learning Standards (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.

Beginning with the 2013 administration, the Grades 3–8 English Language Arts and Mathematics New York State Testing Program (NYSTP) was redesigned to measure student learning aligned with the instructional shifts necessitated by the CCLS. This document provides specific details about the 2017 Grade 5 Common Core Mathematics Test and the standards that it measures.

Common Core Learning Standards (CCLS) for Mathematics

In Grade 5, the CCLS focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of 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-sized 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.

All the content at this grade level are connected to the Standards for Mathematical Practices. The 2017 Grade 5 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 2017 Grade 5 Common Core Mathematics Test will focus entirely on the Grade 5 New York State CCLS for Mathematics.

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 5 CCLS are divided into *Major Clusters, Supporting Clusters,* and *Additional Clusters*. The *Major Clusters* are the intended instructional focus at Grade 5 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 2017 Grade 5 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 5.NF.2 ("Solve word problems involving addition and subtraction of fractions referring to the same whole"), located in the cluster "Use equivalent fractions as a strategy to add and subtract fractions" in the Number and Operations–Fractions Domain. Standard 5.NF.1 focuses on "Add[ing] and subtract[ting] fractions with unlike denominators," building the foundation for students to be able to apply their understanding of 5.NF.1 to 5.NF.2, where they have to apply their knowledge to the context of word problems.

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 2017 Grade 5 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 5 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/2013/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 2017 Grade 5 Common Core Mathematics Test are indicated by the word "Post." ***The instructional emphasis recommended in this chart is mirrored in the Grade 5 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 2017 Grade 5 Common Core Mathematics Test, while not tested, will be fundamental in ensuring that students are prepared for Grade 6 instruction.***

Cluster Emphasis	Domain	Cluster	Standard	
Major Clusters	Number and Operations in Base Ten	*Understand the place value system.*	5.NBT.1	
			5.NBT.2	
			5.NBT.3	
		Perform operations with multi-digit whole numbers and with decimals to hundredths.	5.NBT.4	
			5.NBT.5	✓
			5.NBT.6	✓
			5.NBT.7	✓
	Number and Operations – Fractions	*Use equivalent fractions as a strategy to add and subtract fractions.*	5.NF.1	
			5.NF.2	✓
		Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	5.NF.3	
			5.NF.4	
			5.NF.5	
			5.NF.6	✓
			5.NF.7	✓
	Measurement and Data	*Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.*	5.MD.3	
			5.MD.4	
			5.MD.5	
Supporting Clusters	Measurement and Data	*Convert like measurement units within a given measurement system.*	5.MD.1	
		Represent and interpret data.	5.MD.2	
Additional Clusters	Operations and Algebraic Thinking	*Write and interpret numerical expressions.*	5.OA.1	
			5.OA.2	
		Analyze patterns and relationships.	5.OA.3	*Post*
	Geometry	*Graph points on the coordinate plane to solve.*	5.G.1	*Post*
			5.G.2	*Post*
		Classify two-dimensional figures into categories based on their properties.	5.G.3	
			5.G.4	

✓ = Standards recommended for greater emphasis

Post = Standards recommended for instruction in May-June

The 2017 Grade 5 Common Core Mathematics Test

Testing Sessions

The 2017 Grade 5 Common Core Mathematics Test consists of three sessions that are administered over three days. Students will be provided as much time as necessary to complete each test session. On average, students will likely need approximately 70–80 minutes of working time each day to complete Sessions 1 and 2 and approximately 80–90 minutes of working time to complete Session 3. 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."

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 found at

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

When Students Have Completed Their Tests

Students who finish their assessment 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.

Given that the spring 2017 tests have no time limits, schools and districts have the discretion to create their own approach to ensure that all students who are productively working are given the time they need within the confines of the regular school day to continue to take the tests. If the test is administered in a large-group setting, school administrators may prefer to allow students to hand in their test materials as they finish and then leave the room. If so, take care that students leave the room as quietly as possible so as not to disturb the students who are still working on the test.

* 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 5, 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. Session 1 and Session 2 consist of multiple-choice questions. Session 3 consists of short- and extended-response questions.

The chart below provides a description of the 2017 Grade 5 Test Design. Please note that the test design is unchanged from 2016. Embedded field test questions are included in the number of multiple-choice questions in Session 1 and Session 2 listed below. It will not be apparent to students whether a question is an embedded field test question that does not count toward their score or an operational test question that does count toward their score.

Grade 5 Test Design

Session	Number of Multiple-Choice Questions	Number of Short-Response Questions	Number of Extended-Response Questions	Total Number of Questions
1	22	0	0	22
2	23	0	0	23
3	0	6	4	10
Total	45	6	4	55

2017 Grade 5 Common Core Mathematics Test Blueprint

All questions on the 2017 Grade 5 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 (pages 4–5) 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 pages 4–5.

Domain-Level Test Blueprint—Percent of Test Points on Grade 5 Test				
Number and Operations in Base Tens	**Number and Operations-Fractions**	**Operations and Algebraic Thinking**	**Measurement and Data**	**Geometry**
20–30%	**30–40%**	**5–15%**	**20–30%**	**5–15%**

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

Question Formats

The 2017 Grade 5 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[1] 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 5 Common Core Mathematics Tests are available at

http://www.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.

[1] 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 2017 Grade 5 Common Core Mathematics Test will use rubrics and scoring policies similar to those used in 2016. 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).

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).

2017 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 shows the work in other than a designated "Show your work" or "Explain" area, that work should still be scored.
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. If students are directed to show work, a correct answer with **no** work shown receives **no** credit.
4. 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.
5. If the student provides one legible response (and one response only), the rater should score the response, even if it has been crossed out.
6. If the student has written more than one response but has crossed some out, the rater should score only the response that has **not** been crossed out.
7. Trial-and-error responses are **not** subject to Scoring Policy #6 above, since crossing out is part of the trial-and-error process.
8. If a response shows repeated occurrences of the same conceptual error within a question, the conceptual error should **not** be considered more than once in gauging the demonstrated level of understanding.
9. In questions requiring number sentences, the number sentences must be written horizontally.
10. 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.*

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 5 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 5 Common Core Mathematics Test when testing with printed test booklets. A ruler tool and a protractor tool are provided to the student as part of the computer testing delivery system, Nextera.

Calculators

Students in Grade 5 are **NOT** permitted to use calculators on the 2017 Grade 5 Common Core Mathematics Test.

Reference Sheet

A reference sheet will be included within each of the three test books. For the 2017 Grade 5 Common Core Mathematics Test, the reference sheet will look as follows:

Grade 5 Mathematics Reference Sheet

CONVERSIONS

1 mile = 5,280 feet
1 mile = 1,760 yards

1 pound = 16 ounces
1 ton = 2,000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 liter = 1,000 cubic centimeters

FORMULAS

Right Rectangular Prism $V = Bh$ or $V = lwh$