

Product Research



# CCSS-ALIGNED ASSESSMENTS

## MATH

Supporting documentation for the development of  
**CCSS-Aligned Assessments for Math**



## CCSS-Aligned Assessments for Math

The development of national standards for K–12 Mathematics was initiated and coordinated by the National Governors Association Center for Best Practices (NGA Center, 2010) and the Council of Chief State School Officers (CCSSO, 2010). Common Core State Standards (CCSS) are specific academic benchmarks and expectations for all students in public schools endorsing CCSS. The Common Core State Standards in Mathematics measure student proficiency in the acquisition of knowledge and skills covered by the curriculum at the specified grade level. Students should not be compared to each other but rather evaluated on how well they are individually meeting grade-level standards. These standards provide a consistent framework to prepare students for success in college and careers.

The Common Core State Standards (CCSS) earmark a significant change in education and assessment. According to the consortia SMARTER Balanced Assessment (SBAC, 2012), assessments must contain rigorous item types beyond selected-response items. The requirements include extended constructed-response, performance task, and computer-enhanced. Researchers have indicated the importance of a balanced approach to assessments (Black, Harrison, Lee, Marshall, and William, 2003; Garrison and Ehrlinghaus, 2007). This approach focuses on summative assessments, benchmark or interim assessments, and formative assessments. A comprehensive system is a balanced approach, with all assessments having a relatedness intended to improve achievement. *CCSS-Aligned Assessments for Math* are interim assessments that measure student progress in Math at two different points during the year.

The 2015 Every Student Succeeds Act (ESSA) requires that academic assessments for “math and reading or language arts must be administered annually in grades 3–8 and at least once in grades 9–12; science tests not less than once during grades 3–5, 6–9, and 10–12.” to be administered” (Mandlawitz, 2016, p.1). The critical issue of accountability will continue with this federal law ESSA, but assessments will be used to help improve schools and inform instruction. The law allows the state and local levels the opportunity to create systems for accountability, resources, interventions, and teacher evaluation systems. The federal requirements of *Every Student Succeeds Act* and the *Individuals with Disabilities Education Act of 2004* mandate all students participate in the state assessment program with all students being tested in mathematics content at their respective grade levels. The law does allow the states to have more flexibility in developing assessments if they meet specified criteria.

Due to past and present accountability issues, assessment practice is essential to meeting standard mastery. Summative, benchmark, and formative assessments are necessary, developing an accurate picture of a student’s overall academic achievement. Herman, Osmundson, and Dietel (2010) attested to benchmark assessments occupying a space in the middle yet play an important role in a balanced assessment system. Classroom benchmark assessments correlated to standards provide teachers ongoing interval measurements of student progress; thus, the rationale for *CCSS-Aligned Assessments for Math* for Levels 1–8. Summative and formative assessments are necessary and used for developing an accurate picture of a student’s overall academic achievement. Classroom



benchmark assessments correlated to the Common Core State Standards provide teachers ongoing interval measurements of student progress, thus the rationale for *CCSS-Aligned Assessments for Math*.

Benchmark assessments should be well aligned with curriculum to validate improved learning. Utilization of formative assessments and benchmarks provide a continuous, comprehensive flow of information with which to plan and guide instruction. When teachers are provided time to adequately analyze assessment data relative to their content, then weaknesses in individual students or within the curriculum or instruction can be addressed. Thus, there is a definite need to include benchmark assessments as part of the accountability plan for a campus and district.

These benchmark assessments are designed to measure student acquisition of the knowledge and skills specified in the Common Core State Standards at different intervals. The primary purpose of *CCSS-Aligned Assessments for Math* is to provide a valid measure of the quality of mathematics education in the classroom or across the campus. Research shows that students score higher on standardized tests when they experience focused, aligned practice. *CCSS-Aligned Assessments for Math* measure how well students have acquired the knowledge and skills taught during mathematics instruction. The assessments are designed to ensure students are learning at their grade level. Furthermore, *CCSS-Aligned Assessments for Math* provide data to teachers, schools, and school districts to support improved instructional decisions. The *CCSS-Aligned Assessments* serve as accountability measures to help gauge or predict future performance that might occur on state assessments. With the summative assessment data, educators can pinpoint areas that require additional attention and focus.

Periodic exposure to benchmark assessments provides students with opportunities to experience a variety of assessment items and formats for each standard. These experiences will benefit students facing a common assessment. When assessment is an integral part of mathematics instruction, it contributes significantly to students' mathematical learning (Stecker et al., 2005). Assessment should inform and guide teachers as they make instructional decisions. During the school year, students can take practice tests to evaluate their own work and progress. Teachers could create customized assessments by assigning students only the items that measure a specific standard. Students partake in these opportunities to demonstrate what they have learned. After students are supplied with immediate achievement feedback, then students may proceed to intervention settings to develop standard mastery and ensure performance gaps are closed prior to the state or common assessment administrations. As a result, *CCSS-Aligned Assessments for Math* arm teachers with essential data or information that helps in the preparation of high-quality instruction.

Results of the *CCSS-Aligned Assessments for Math* provide information about the academic achievement of students. This information is used to identify individual student strengths, determine areas of challenge, and measure the quality of instruction across the campus. Utilization of reports from various benchmark assessments helps teachers monitor student progress to determine future plans for instruction. The involvement of students in assessment promotes student engagement in individual learning targets. Students need to know what learning targets they are responsible for mastering, and at what level (Stiggins, 2007). Marzano (2005) states, "students who can identify what they are learning significantly outscore those who cannot." Access to online platform assessment reports will be available to



educators. After the analysis of assessment data, findings may indicate students require additional instruction to address deficits in order to achieve skill mastery and close learning gaps. If skill deficits exist, then teachers are encouraged to explore different strategies in order to improve student achievement. Teachers may design learning experiences to revise their curricula, develop formative assessments, examine instructional methods of delivery, target specific populations for remediation and enrichment, create student academic assistance interventions, and/or develop individual plans for student improvement.

Available for Levels 1–8, *CCSS-Aligned Assessments for Math* are diagnostic and prescriptive in nature. These practice assessments provide educators with detailed information on student progress as well as promote flexibility of use in a variety of classroom settings. For each grade level, there are two different versions of the assessments (Form A, Form B). Each form of the assessments features multiple-choice items and technology enhanced items. The assessment items in *CCSS-Aligned Assessments for Math* will measure the depth, rigor, and complexity of comprehension required by the Common Core State Standards. Test items are presented in a “real-world” context when possible. Included will be a mathematics chart with measurement equivalencies and formulas as appropriate for each level. Online reports are available that provide teachers with the data to monitor the progress of students toward standards mastery.

As shared by the United States Department of Education (2003), it is important that assessment items that align with the depth and breadth of the academic content standards. Therefore, assessment items in the *CCSS-Aligned Assessments for Math* are coded to the Common Core State Standards, to the Depth of Knowledge Levels (DOK), and to Bloom’s Revised Taxonomy

Levels. *CCSS-Aligned Assessments for Math* Levels 1 and 2 include items developed at DOK levels 1 and 2, while *CCSS-Aligned Assessments for Math* Levels 3–8 include items developed at DOK levels 1, 2, and 3.

The model Depth of Knowledge (DOK) was developed by Norman Webb (Webb, 2002; 2006). Dr. Webb advocates the necessity of assessment items matching the standard. Webb stated that educators should be aware of the level of demonstration required by a student when a test item is developed; thus, he developed his four levels of DOK. Level 1 assessment items have students recall information. Level 2 items ask students to think beyond reproduction of responses. Students use more than one cognitive process or follow more than one step. Students at Level 3 demonstrate higher levels of thought than the previous levels require as these items are more complex. Responses may have multiple answers, but students must choose one and justify the reasoning behind the selection. Assessment items at Level 4 require students to form several connections with ideas.

Students can be assisted in organizing the content of their thinking to facilitate complex reasoning. According to Sousa (2006), students are not actually taught to think because children are born with the brain organizational structure that originates thinking. Sousa supports Bloom’s Taxonomy as an organizational structure that is compatible with the manner in which the brain processes information to promote comprehension. Bloom, Englehart, Furst, Hill, and Krathwohl (1956) developed this classification system for levels of intellectual behavior in learning. Bloom’s Taxonomy contains three domains: the cognitive, psychomotor, and affective. Within the cognitive domain, Bloom identified six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. The taxonomy was



revised by Anderson and others (2001) to focus on thinking as an active process. The original and revised taxonomies continue to be useful today in developing and categorizing the critical thinking skills of students. Karin Hess (2009; 2010) designed the Cognitive Rigor Matrix and Curricular Examples to integrate Revised Bloom's Taxonomy with Webb's Depth of Knowledge. Webb's DOK framework, Bloom's Taxonomy, and Hess' Cognitive Rigor Matrix and Curricular Examples were all utilized by the Math Curriculum Development Team to develop assessment items that reflect rigor, depth, and complexity of thought.

As previously stated, the national shift towards preparing students to survive in the global market will impact the type assessments undertaken by students. Assessments that focus on the Common Core State Standards will not only demonstrate if students can succeed in school but also in the real world. Assessments will indicate if students are both college and career ready. For the purpose of the *CCSS-Aligned Assessments for Math*, the various DOK and Bloom's coding is utilized to reflect the rigor and depth in levels of thought required by students on the benchmark assessments. Assessment items displaying rigor require students to use higher levels of thought, exhibiting a more challenging 21st Century learning environment. Students may be asked to use such processes as examine, create, prioritize, decide, produce, assess, generate, or classify.

Over the past years, changes in accountability and testing have led to data playing a major role in the education of students. The United States Department of Education advocates the importance of using data for guiding instruction and improving student learning. Schools are being strongly encouraged to respond to assessment data, using it to identify students' academic strengths and needs (U.S. Department of Education, 2009; 2016). As educators face

increasing accountability pressure from federal, state, and local entities to improve student achievement, data should become the central element in how students' academic progress is monitored and how instructional practices are evaluated. Research seems to indicate there is no single assessment that provides a complete picture of student performance. *CCSS-Aligned Assessments for Math* offer two forms in order to keep a pulse on the progress of student performance, rather than a single snapshot assessment. Each assessment plays a prominent role in determining if quality teaching and learning are occurring. As correct and incorrect assessment answers are analyzed, teachers are able to observe the patterns of thought in which students experience difficulty or exhibit success. This data is informative in that teachers may appropriately adjust and revise instruction to address the diversity of needs more appropriately within classrooms. Thus, assessments have important implications for teaching and learning. Research indicates it is essential that assessment data be used to make well informed instructional decisions (Armstrong and Anthes, 2001; Feldman and Tung, 2001; Forman, 2007; Liddle, 2000).

Benchmarks yield student achievement data on the Common Core State Standards throughout the school year, including the ability to report student achievement approaching, falling below, or exceeding the standards. With two forms of benchmark assessments per grade, these assessment instruments are capable of providing data to measure mathematics progress and proficiency at two different intervals throughout the year. *CCSS-Aligned Assessments for Math* Forms A and B can be used in different ways: as practice, as a diagnostic instrument, and as a teaching tool. Students need opportunities to practice and develop test-taking skills. These tests focus on the skills students will be expected to



demonstrate on assessments of Common Core State Standards. For the online assessments, access to platform reports is available. This allows teachers to determine students' strengths and weaknesses. Teachers can view the reports to determine specific areas where additional practice for mastery of skills is warranted. Although benchmarks are not formative assessment tools, the data is informative to annual learning goals. Data from the assessments will guide the teacher in identifying possible areas where adjustments in future instruction may be necessary, thus, using the assessments as teaching tools.

Studies support the use of several measures from which to gauge student achievement. The Math Curriculum Development Team recognized that assessment systems should include a balance of formative and summative data to be most effective in improving outcomes and in making a significant impact on mathematics education. The development team studied available guidelines released by the assessment consortia Smarter Balanced Assessment Consortium (SBAC, 2012). Smarter Balanced consortia released a range of sample items and item specifications regarding the assessment of mathematics. The prototype items and other related information were considered by the Math Curriculum Development Team in order to design assessment items and tasks that measure a deeper understanding and reflect the requirements and expectations of the consortia. For *CCSS-Aligned Assessments for Math*, a combination of selected-response items and technology-enhanced items are provided for all forms with all items aligned to the Mathematics Common Core State Standards.

As the school year progresses, the students who are proficient in the various benchmarks can determine how they may perform on the state

or common assessments in math. The two forms offered at each grade enable the benchmarks to be spread out over the year, leaving a window of time for the state or common assessments to be administered. After the *CCSS-Aligned Assessments for Math* data are examined, teachers can identify students who are performing at the grade-specific standard level, those who are exceeding the standards, and those who are approaching or are functioning below the standard. Teachers can also determine and chart the data for the various subgroups (i.e., ethnicity, disadvantaged, special education, and English Language Learners) in order to monitor and determine student growth. The developers of *CCSS-Aligned Assessments for Math* reviewed relevant reform efforts on teaching and learning in mathematics, studied the Common Core State Standards, perused the available and released item specifications shared by the consortia, and employed individual expertise and collective judgment as they designed a resource to lead students into the 21st century.

*CCSS-Aligned Assessments* focus on the grade-level standards for Math. This focus ensures the assessment items align with the assessed standard, resulting in appropriate and effective assessment items based on current information. Webb's Depth of Knowledge and Bloom's Taxonomy were the basis for designing items that stimulated students' higher order thinking skills, encouraging rigor and depth in thinking. With grade-specific Common Core State Standards for Mathematics as the focus, the Mentoring Minds Curriculum Development Team developed *CCSS-Aligned Assessments for Math* as a resource for assessing and strengthening education in mathematics.



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