



Mathematics Standards Revision

Highlights [December 2016]

This document highlights the revisions proposed for the Mathematics Standards. Overall, the proposed revisions add clarity by reflecting changes recommended by Ohio teachers. These changes resulted in minimal to modest changes to some of the standards. The recommended revisions reflect a variety of changes, including content changes to improve the clarity of content to be taught, content moved to a different grade to improve the progression of the content, and punctuation or footnotes added to clarify the standard. Some revisions, no matter how small, caused a ripple effect of revisions through the standards in other grades, requiring one change to be reflected throughout the standards in previous or subsequent grades.

General Revisions across Grade Bands

Revisions to any standard prompted a review for impact on other standards across the grade band. Standards were checked and revised for vertical alignment in all domains/conceptual categories, and at all grade levels/courses.

Revisions By Grade Band

GRADES K-5

- » The kindergarten domain of Counting and Cardinality was reviewed and revised for both clarity and grade-level appropriateness.
- » Many standards in the domains of Number and Operations in Base Ten and Operations and Algebraic Thinking were clarified with descriptions of the focus of the numbers for each grade.
- » A progression of money concepts was integrated into appropriate K-4 standards.
- » In Measurement and Data, units of measure were specified by grade to complement the study of number and operations at that grade. For example, grade 4 Units of Measures focuses on the metric system, which parallels the extension of the number system to numbers less than one, as well as their place value and operations. The types of data displays, such as bar graphs, picture graphs and line plots, were assigned to each grade.
- » Geometry standards revisions clarify the shapes, figures and expectations for the grade, improving the progression of geometry through K-5 in preparation for the further study of geometry. One standard about symmetry was deleted (4.G.3) because it didn't add to the vertical progression until high school. Instead the concept will be integrated into

other standards via the model curricula to allow the concept to be more meaningful for instruction.

GRADES 6-8

- » Proposed revisions to the Statistics and Probability domain reflect the development of a framework for statistical problem solving. Concepts were moved to different grade levels, language was clarified and the framework skills were reinforced throughout grades 6-8. For example, Mean Absolute Deviation was moved from grade 6 to grade 7 to better align with what students are learning in the number system. Two standards in statistics were also deleted (7.SP.2 and 7.SP.4) with a new standard (7.SP.2) added to broaden concepts students learned in grade 6.
- » Solving algebraic systems algebraically was moved from grade 8 to high school, because high school teachers are already reteaching it. Students in grade 8 are still required to solve systems graphically and through simple inspection.

GRADES 9-12

- » Proposed revisions to the Statistics and Probability domain reflect the changes from grades 6-8 where students learn isolated skills to implement a statistical study from beginning to end. Some statistics standards were changed to (+) standards which are essential to the advanced study of mathematics and are not tested on Ohio's State Tests.
- » Three standards were added to the Geometry conceptual category. These were a version of a missing standard due to a copyist error from an original draft. The other was a standard about quadrilateral hierarchy that moved from grade 7.
- » Language was added to indicate a course's focus for standards that appear in more than one course within either the Traditional or Integrated Pathway. This is shown in purple text. Considerable time was spent checking that the end-of-year-two expectations for the both pathways was consistent. Mathematics 3 and Algebra 2 are now identical courses.
- » Cluster statements and standards were changed to allow students to prove mathematical ideas both formally and informally using a variety of methods instead of just the traditional two-column proof.
- » Standards were checked for course-level appropriateness by determining if the standard was essential for all students, if the course placement was accurate, or if the standard should be changed to a (+) standard. Vertical alignment impacts were reviewed.
- » New documents will show the standards by individual course: Algebra 1, Geometry, Mathematics 1, Mathematics 2 and Mathematics 3.

General Standards Revisions Decisions

- » The majority of all changes were due to issues of clarity. Many of the clarifications were just footnotes added into the standards. Other items were clarified by adding new glossary definitions. Some clarifications were made by changing the language to be more specific and aid in understanding of the intent. An example:

Original

Compare numbers.

K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.

New

Compare numbers.

K.CC.6 Verbally identify (without using inequality symbols) whether the number of objects in one group is greater/more than, less/fewer than, or the same as the number of objects in another group, not to exceed 10 objects in each group.

Other clarifications were made by explaining restrictions that were already in place.

Original

Multiply and divide within 100.

3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

New

Multiply and divide within 100.

3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division, e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$ or properties of operations. Limit to division without remainders. By the end of Grade 3, know from memory all products of two one-digit numbers.

All clarifications were made in efficient and effective ways, e.g., lengthy explanations or assessment limitations will be given more attention in the Model Curriculum or other appropriate documents, and original formatting was maintained to allow easy access to public domain resources and textbooks.

- » Most other standards that were not changed because of clarity were changed due to vertical alignment issues. A revision to any standard prompted a review for impact on other standards. Standards were checked and revised for vertical alignment in all domains/conceptual categories and at all grade levels/courses.
- » Proposed revisions are shown in red text. Deletions are not indicated, but can be found by comparing the original to the proposed revision.
- » Footnotes were added to the appropriate cluster statements and standards in K-12. Those additions are marked in purple text.
- » Content-area terminology was clarified with descriptions or examples embedded in the standard or with a superscript G denoting a glossary entry.