Math Standards Revision Summary **Summer 2017**

The important work of the math standards revision included research, deep exploration of the standards, debate, collaboration, vertical alignment, and consensus about standards that are rigorous, coherent, and focused and will best serve the learning needs of all students in South Dakota.

As participants started this process in June 2016, they took time to reflect upon past standards in order to define what needed to be preserved in our South Dakota standards and also what needed to be improved. Two major themes resulted from these discussions. All k-12 workgroups felt that it was important to **maintain rigor** in our standards in order to prepare South Dakota students to be successful in any college or career pathway. Workgroups also stressed the need to **improve clarity** in the language of the standards so that the intent of each standard can be clearly understood and connections across grades can be easily seen. This clarity points students and teachers to a clear target to guide learning, instruction, and feedback. Clarity was provided in two ways:

- Language. Many standards had language changes that helped stakeholders to better understand the intent of the standard and its connections to both previous and future learning.
- Examples. The use of examples was scrutinized and each grade level looked to make sure that examples were used in a way that clarified the intent of the standard without limiting understanding or instruction. Examples that supported the intent of the standard and helped with clarity were kept (or added), and examples that were confusing or limiting were eliminated.

During the 2016-17 school year, South Dakota educators submitted feedback about the proposed mathematics standards to the mathematics workgroup through a voluntary online survey. In June 2017, the Mathematics Work group reconvened to review each piece of feedback, engage in grade level/course discussions about the feedback, and build consensus for any final refinements to the proposed mathematics standards.

K-5 Notable Changes

- Standards were added in Kindergarten and 1st grade to support 2nd grade money standards and clarify the learning progression.
- The time standard in grade 3 was clarified to include both analog and digital clocks.

K-5 Major Discussions and Decisions

Topics that generated a lot of attention during the revision process included fluency, "know from memory," and standard algorithm. Workgroups engaged in research and lengthy discussion and three important concerns surfaced. First, workgroups found that there can be confusion surrounding how "fluency" and "know from memory" are defined and understood, which impacts student learning progressions and instruction. Secondly, participants were concerned that the progression for multiplication that begins with exploring and ends with knowing facts from memory was too fast. Workgroups feel that students need more time to explore and practice than our current standards allow. Lastly, workgroups want to ensure that the standards clearly communicate that multiple strategies and algorithms exist and should be used by students to add, subtract, multiply, and divide. At the same time workgroups want to ensure that what is understood to be the standard algorithm in the U.S. is also taught as one of the strategies.
The following revisions were made to address concerns.

- Using research, definitions were specified for the following terms and will be placed in both the relevant grade level introductions and the appendix.

    - Know from memory: quick, effortless recall of facts
    - Fluency: skill in carrying out procedures flexibly, accurately, efficiently, and appropriately. There are four tenets of fluency: flexibility, appropriate strategy use, efficiency, and accuracy.
- The multiplication learning progression was extended so that students would have more than a single year to develop their understanding of multiplication and reach "know from memory." The fluency standard for multiplication remains in 3rd grade, but the standard for knowing multiplication facts from memory has been moved to 4th grade.
- Standard algorithm language was changed in relevant standards to say, "an algorithm including but not limited to the standard algorithm."

Grades 6-8 Notable Changes

In grades 6-8, workgroups felt that the standards were quite strong and most changes were made to clarify language, understanding, or vertical alignment with other grades.

Grades 9-12 Notable Changes

In grades 9-12, there were three workgroups: Algebra I/II, Geometry, and 4th Year Math.

- In the Algebra I/II workgroup, standards were specifically separated into Algebra I and Algebra II. In previous standards, some standards were shared by both courses, which caused confusion about what should be taught in each course. Shared standards have been split into two standards and delineated for each course.
- In Geometry, most changes were made in language to clarify the intent of standards. One notable change was to standards with the verb "understand," which can be ambiguous for assessment. "Understand" was changed to a verb that would be clearer for assessment purposes. For example, language that says, "understand that two events are independent" does not give any direction as to how students should demonstrate understanding. The language is changed to say, "determine whether two events are independent." This language change may seem subtle, but gives a direction for assessment questions, as it indicates that a student has to set-up and solve a problem. Also in Geometry, a few standards were moved into 4th Year Math. The moved standards include ones that were previously considered (+) or advanced standards and one standard that fit best with the study of conic sections in 4th Year Math.
- The 4th Year Math workgroup had significant additions to its standards. The group of standards previously assigned to 4th year math lacked coherence and focus. The 4th year math course workgroup has added standards to create alignment, coherence and focus.