

Nebraska's College and Career Ready Standards for Mathematics Revision Process Overview



Nebraska Revised Statute [79-760.01](#) requires the State Board of Education to “develop a plan to review and update standards for reading, writing, mathematics, science, and social studies” every seven years. Content area standards that are measurable, appropriately rigorous, and scaffolded become the framework for locally determined curricula. Guided by local and national resources, including an [evaluation of state standards](#) by the Fordham Institute (2018), a group of Nebraska educators is working to revise the 2015 Mathematics standards, [Nebraska's College- and Career-Ready Standards for Mathematics](#).”

September 2021. The standards revision process began in the Fall of 2021 with Public Input Survey #1. The survey was disseminated through the Nebraska Department of Education (NDE) website and directly to groups including the Nebraska Mathematics Cadre, the Nebraska MTSS network, District Assessment Contacts, and District Curriculum Contacts. The survey was also sent to state and national mathematics experts identified by the NDE's Mathematics staff. State mathematics experts are individuals with specialized training in mathematics and who work closely and extensively with Nebraska educators. Likewise, the identified national mathematics experts have previously collaborated with both the NDE and Nebraska educators as well as conducted and published mathematics research.

October 2021. Public Input Survey #1 sought feedback on the 2015 Mathematics standards including the content, or the knowledge and skills students are expected to learn, and the rigor, or cognitive complexity, of the standards. The questions were organized into four grade bands—K-2, 3-5, 6-8, and 9-12, respectively, and responses were made either individually or in groups (i.e. ESU staff developers, a school mathematics department, etc.). The survey was open between October 22, 2021 and November 16, 2021 and received a total of 292 responses. The majority of respondents identified as educators (e.g. Pre-K-12 educators, school or district administrators, postsecondary education representatives) followed by parents and business/industry representatives. Educators and other stakeholders were also invited to provide input to nde.mathstandardsinput@nebraska.gov.

Next, the NDE began recruiting educators for revision teams. Invitations to apply were sent to Educational Service Units (ESUs), post-secondary institutions, the Nebraska Association of Teachers of Mathematics (NATM), and the Nebraska Mathematics Cadre (a statewide collaboration between the NDE and ESU math professionals) along with a request to share with educators. The NDE received 134 applications and used a rubric to assess applicants' qualifications. The rubric utilized a 4-point scale that evaluated educators' experiences with teaching, curriculum development, standards writing, and

working with diverse groups of learners, i.e. special education and EL students. In addition, the NDE math staff determined applicants' geographic locations, i.e. rural, urban, and suburban districts in various regions of the state, to ensure writing team members represented Nebraska's diverse student population

November 2021. Selection notifications were sent to applicants in early November. Revision team members will receive a stipend upon completion of the work in the amount of \$600.00. Applicants who had indicated their willingness to lead groups were then identified as team facilitators according to their grade-level experience. The role of the team facilitators is to organize meeting times and locations, provide an agenda to writing team members, track and maintain attendance, and communicate progress with other writing team members and the NDE staff. Team facilitators will receive a stipend of \$750.00. Writing team members and team facilitators also signed an assurance document confirming their status as individual contractors.

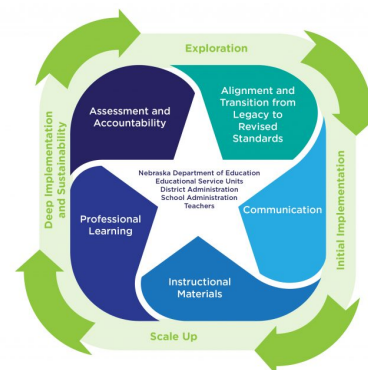
Writing team members participated in an initial, virtual meeting on November 20th, 2021 in which they received an orientation to the revision process, previewed and discussed survey data, and began coordinating future meetings.

December. Throughout December, team facilitators with their revision team members as part of the planning and preparation phase. Members of the revision also began a book study, [Invigorating High School Math: Practical Guidance for Long-Overdue Transformation](#) by Steven Leinwand. In December, two stakeholder engagement sessions (K-5 and 6-12) were held with mathematics leaders from districts and ESUs. Meetings with the NDE staff (Cory Epler, Marissa Payzant, Deb Romanek, and Jane Strawhecker) are ongoing and occur weekly. This time is used to discuss considerations of the revision team, coordinate revision activities, and develop agenda items for future meetings. December 13th marked the first meeting with subject matter experts from the Nebraska University system. This meeting allowed university subject matter experts to provide input relative to this guiding question: *What do students need to know and be able to do in order to be successful in postsecondary mathematics coursework without the need for remediation?*

January. The January weekly check-in meetings were also used to begin discussing possible standards rollout resources. The NDE would like to, as staff did for the revised English Language Arts standards, develop professional learning modules to support educators in the *Exploration* stage of implementation (see right). The modules would orient educators to the major revisions to structure and content, the instructional shifts, and considerations for initial implementation (SY 2022-23). A steering team, consisting of the NDE staff, ESU staff, and representation from Nebraska's MTSS, would design the professional learning series.



Nebraska Content Area Standards Implementation Framework



Throughout January, the revision teams continued to meet virtually. In addition, a meeting with subject matter experts from Nebraska's State Colleges took place on January 25th. This conversation allowed

state college subject matter experts to provide input on this guiding question: *What do students need to know and be able to do in order to be successful in postsecondary mathematics coursework without the need for remediation?* Table 1 includes key considerations for the revision as of January 2022.

February. The mathematics revision team convened for in-person work on Monday, February 21st. Group members worked in their grade band teams to continue developing the standards draft, as well as across grades to begin aligning the standards and indicators. Teams spent the morning recording information to be communicated with above- and below-grade-level teams pertaining to deleted or relocated standards and any additions of new standards and/or indicators. They also wrote questions for the other grade levels as discussion topics for the afternoon. The NDE staff provided team members a transition chart that indicated essential questions posed to later or earlier grade bands. For example: *Which proposed Kindergarten revisions have important implications for Pre-K?* The latter portion of the day was spent in purposeful discussion and making appropriate adjustments. A closing activity consisted of a whole-group reflection and guidance from the NDE staff regarding next steps for development of the first standards draft. Throughout the day, the teams used a wide variety of math research and resources, including ongoing feedback from public input surveys, post-secondary advisors, and subject matter experts.

The internal team, which consists of NDE staff, continued meeting weekly during the spring months to discuss progress of the revision and organize upcoming events.

March/April 2022. The writing teams met for an in-person collaboration on Monday, March 28th in Kearney during the Nebraska Association of Teachers of Mathematics' (NATM) annual conference. They worked to prepare an initial draft of the revised standards as well as had the opportunity to attend professional learning sessions. The writing teams continued to meet during March and April, working within and across grade bands and content areas to develop the draft.

An embargoed Draft 1 standards document was provided to Planning and Evaluation Committee members on **Apr 11, 2022**. The committee had a two-week period of time to review the draft. On April 27, 2022 NDE staff made the document available to ESU staff developers, district math leads, and superintendents across the state.

At the end of April, NDE staff recruited members of the revision teams to be part of the editing team that will work through the summer months to review data and recommendations from public input. *Editing team members are indicated with an * starting on pg. 8 of this document. In addition to these individuals, two post-secondary advisors, Allan Donsing and Yvonne Lai, were identified for participation on the editing team.*

May 2022. [Draft 1](#) of Nebraska's Revised Standards for Mathematics was released publicly on Monday, May 9, 2022 along with a statewide press release and public input survey. The survey link was made available via NDE's main and Mathematics websites, as well as shared directly with various stakeholder groups. The public input survey closed on May 27, 2022 with 232 total responses.

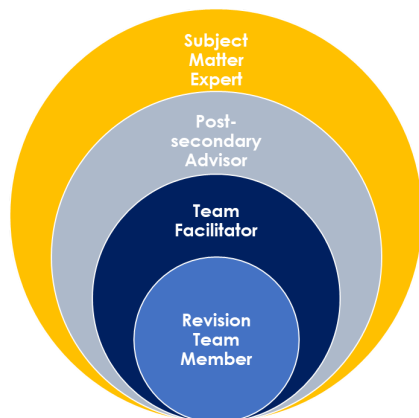
NDE staff worked throughout the month to elicit further recommendations on the initial draft. The document and survey link were shared with approximately 300 Nebraska business and industry leaders on May 11, 2022. Employer engagement informs the revision team of the essential knowledge and skills employers seek from high school graduates entering the workforce. On May 12, two meetings were held to gather feedback from postsecondary faculty. The meetings included NDE staff and representatives from the NU and state college systems. NDE staff also sought input from a handful of national experts by sharing the draft standards and survey link during the week of May 16, 2022.

June 2022. The editing team met June 2nd and 3rd to review feedback data and make additional adjustments to the draft. In addition, a smaller group of educators met on June 9th and 10th to begin drafting supporting information and materials such as the instructional considerations and glossary definitions. The instructional considerations are brief guidance statements related to instruction of some of the standards and/or indicators, as needed for clarification purposes. The team also reviewed the mathematical processes (pgs. 6/7) and provided updated information and language. Both teams, editing and “enhancements,” were members of the larger revision group and received an additional stipend for their work. On June 6th, the University of Nebraska-Lincoln’s Math and Science Summit convened. Draft 1 of the standards was shared with postsecondary faculty in attendance, and were also given the opportunity to provide feedback.

July 2022. Throughout the month of July, NDE staff members collaborated to prepare the second draft. This included establishing the numbering system, finalizing the logo, creating icons (pg. 8) to accompany each of the mathematical processes, and other details related to the overall format. In addition, two members of the 2015 revision team were contracted to do final editing of the draft. This work was completed at the end of July.

Next steps. Validation and sign-off from postsecondary education will be procured in the summer months. The “enhancements” team will continue refining the instructional considerations. The anticipated approval date for the revised College and Career Ready Standards for Mathematics is September 2nd, 2022.

Roles and responsibilities. NDE’s Office of Teaching, Learning, and Assessment, which oversees the development of content standards, uses principles of the [RAPID Model](#) for its revision process. This model emphasizes the importance of establishing clear roles for those involved in decision-making within an organization.



This graphic illustrates the various roles of educators involved in the revision of content area standards. *Revision team members* (see pg. 6) are directly responsible for carefully reviewing the current standards while considering recommendations from various stakeholders. This team adds, removes, or revises standards and indicators based on their grade appropriateness, measurability, specificity, and scaffolding. These decisions determine the content of the final, approved document. *Team facilitators* coordinate the revision team meetings and establish

channels of communication between the NDE and other team facilitators. *Post-secondary advisors* are university faculty who oversee mathematics education programs, and/or prepare pre-service teachers in one of Nebraska's 16 Educator Preparation Programs. The advisors provide feedback and expertise via multiple channels including surveys and collaboration with the NDE staff and revision team members. Their feedback is critical to the development of standards, as they help determine the extent to which the standards support college and career readiness for Nebraska's students. These individuals also share important updates to other faculty and pre-service teachers. *Subject matter experts* are engaged flexibly throughout the process. Subject matter experts provide feedback on key considerations for revision (see Table 1), review standards drafts, share content-specific research and resources, and communicate with other stakeholders during the process of revision.

Key Considerations. Writing team members engaged in activities and conversations designed to build their mathematics knowledge and develop a shared vision for mathematics education for Nebraska's K-12 students. Table 1 outlines the key revisions that have emerged from collaborations amongst the educators involved in the process.

Table 1

**Nebraska's College and Career Ready Standards for Mathematics
Key Considerations (Presented in March 2022)**

Revision	Rationale
Identification of "big" mathematical ideas to consider reducing number of standards	<p>Teachers indicated there was insufficient time to develop students' understanding of math concepts. Fewer, but more focused, standards will allow teachers and students time to develop conceptual understanding of key math ideas. The refined distribution of concepts will also allow students to understand the "why" of a math concept and how to apply it in real-world contexts.</p> <p>For example, current K-2 standards acknowledge the importance of building number sense. To identify the "big ideas" and foundational framework, the team proposed adding <i>Numeric Reasoning: Counting and Cardinality</i> along with <i>Numeric Reasoning: Base 10</i>, in order to refine the distribution of number sense concepts.</p>
Grade 6-8 focus on ratios and proportional reasoning and arithmetic of rational numbers to build a strong foundation prior to high school	<p>A shift in focus to these foundational concepts in the middle grades will better prepare students to be successful in high school Algebra courses.</p> <p>For example, to encourage more instructional time to build foundational understanding for high school algebra at the middle grades, a shift toward emphasis of numerical operations, including ratios, has been added to the standards.</p>
Closely examine standards found in high school math to identify skills that may not be relevant to future learning	<p>Public input survey data and feedback from revision teams and subject matter experts indicated the Advanced Algebra 2 course may not be beneficial to students. The first semester is typically a repeat of the full year Algebra 1 and the second semester contains topics that, with technology, may be outdated.</p>
Strengthen the data strand across the standards K-12	<p>A frequent theme of survey data and conversation was the need to develop standards related to understanding data and basic statistics. The revision will support the collection, display, and accurate interpretation of data.</p>
Strengthen the process standards throughout the document	<p>In past input from Nebraska business and industry leaders, the process standards reflected skills that were more important for their employees to have than the content of mathematics. The current format did not provide the emphasis that was desired.</p>

	<p>The proposed revisions reflect input from various stakeholder groups and include the addition of <i>Reasoning</i>. The number of processes at 4-5 increases the likelihood of implementation by classroom teachers. In addition, to make the process standards more transparent, icons were created to represent each one.</p>
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Draft #1 – Key Features & Talking Points (Presented in May 2022)

These standards outline grade-level expectations for mathematics and provide a framework upon which Nebraska districts develop, establish, and implement their locally determined curriculum. The standards are also the foundation for the selection and implementation of instructional materials, resources, and interim, formative, and summative assessments.

The structure of the standards:

- Includes grade-level standards for grades K-8; grade-banded standards for high school.
- Is organized by four (4) content strands: NUMBER SENSE, ALGEBRA, GEOMETRY and DATA, with the addition of Ratios and Proportions in the 6-8 grade band
- Identifies “mathematical processes” that are necessary for success in mathematics at each grade level: PROBLEM SOLVING, REPRESENTATIONS, COMMUNICATION, REASONING, and CONNECTIONS.

The content of the Mathematics Standards:

- Centers deep learning of mathematics concepts while actively building new knowledge across K-12.
- Reflects the processes needed for students develop mathematical habits of mind and become mathematically proficient.
 - Strengthens the mathematics processes within the standards based on previous input from educators, employers, and post-secondary educators.
- Aligns with current research and evidence-based practices for improving teaching and learning in mathematics.
- Strengthens the DATA strand across K-12 and includes revised standards related to understanding data and basic statistics.
- Focuses on ratios, proportional reasoning, and arithmetic of rational numbers in Grades 6-8 to build a strong foundation prior to high school.
- Aligns with the expectations required of the 11th Grade Summative Assessment – the ACT.

Comparison Table: 2015 version to 2022 Draft #1 (Presented in May 2022)

Key Features of Proposed Revisions	Differences Between 2015 and 2022 Versions	Rationale
<p>In K-5, the content strands of NUMBER, ALGEBRA, GEOMETRY and DATA are the same.</p>	<ol style="list-style-type: none"> 1. K-2 has strategically placed all curricular indicators that align with <i>Algebraic Relationships</i> in the main content strand of NUMBER rather than ALGEBRA. 2. Grades 3-5 have added standards related to <i>Fractions</i>. 3. Grades 6-8 have added a standalone strand entitled, <i>RATIOS AND PROPORTIONS</i>. 	<ol style="list-style-type: none"> 1. <i>The foundation for algebra in the early grades is reflected in the essential conceptual knowledge of addition/subtraction or making meaning for these operations. The placement increases the visibility of the interconnectedness for classroom teachers.</i> 2. <i>Fractions are a challenging math concept to comprehend but the foundation starts in elementary grades.</i> 3. <i>To encourage more instructional time to build foundational understanding for high school algebra at the middle grades, emphasis of numerical operations, including ratios, has been added to the standards.</i>

<p>The 2015 Nebraska Mathematical Process Standards include Problem Solving, Representations, Communication, and Connections. The 2022 version includes Problem Solving, Representations, Communication, Connections, and Reasoning.</p>	<ol style="list-style-type: none"> 1. Revised the title of "Process Standards" to Mathematical Processes. 2. Addition of Reasoning as a mathematical process. 3. Written narrative for the five mathematical processes 4. Develop a visual that communicates the integration of mathematical processes in all grade levels. 	<ol style="list-style-type: none"> 1. <i>This more accurately describes how processes support the mathematical content included in the standards.</i> 2. <i>Reasoning was included in the 2009 Mathematical Processes, and the writing team indicated it was a critical skill for students to master.</i> 3. <i>With the addition of Reasoning, the narrative for each of the other four mathematical processes was revised to clearly depict the importance for each.</i> 4. <i>Using input from various stakeholders, a banner was designed to increase visibility and placed at the beginning of each grade level. This also highlights the importance of the mathematical processes in teaching the content outlined in the standards.</i>
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<p>NUMBER: Emphasize <i>Number Sense</i> in the K-5 Standards.</p>	<p>1. The categories are <i>specific to the grade level</i>. For example, for K-2, NUMBER is subdivided into:</p> <ol style="list-style-type: none"> 1. <i>Counting</i> 2. <i>Base Ten</i> 3. <i>Number and Algebraic Relationships</i> 4. <i>Number and Operations</i> <p>Similar categories in NUMBER are proposed for Grades 3-5 and High School.</p>	<p>1. <i>In the 2015 standards, the categories under NUMBER were very broad (Numeric Relationships and Operations) and spanned K-12. This revision provides greater specificity and guidance for instruction.</i></p>
<p>ALGEBRA: Create greater K-12 coherence.</p>	<p>1. The 2015 standards have only three broad categories for ALGEBRA.</p> <p>To improve elementary algebra standards, Algebraic Relationships was removed from Grades 3-5 with categories designed that reflect an emphasis on <i>Operations and Algebraic Thinking</i>, followed by Algebraic Processes and Applications for Grades 6-8.</p> <p>The High School categories remain the same.</p>	<p>1. <i>Increases clarity and reserves Algebra 1 concepts for Algebra 1.</i></p>

<p>GEOMETRY: Create greater K-12 coherence.</p>	<ol style="list-style-type: none"> 1. <i>Grade-level categories added to reflect how curricular indicators “cluster” and are unique to age groups. These include:</i> <ol style="list-style-type: none"> 1. <i>Shapes and Their Attributes,</i> 2. <i>Measurement; Time and Money,</i> 3. <i>Area and Perimeter,</i> 4. <i>Area and Volume,</i> 5. <i>Coordinate Geometry,</i> 6. <i>Coordinate Geometry and Transformation and,</i> 7. <i>Logic and Proof</i> 	<ol style="list-style-type: none"> 1. <i>This adds specificity that was lacking in the 2015 Math Standards for Geometry to inform instruction.</i> 2. <i>Many of the basic geometry concepts are to be learned in grades K-8 leaving the proof and logic level of thinking for high school.</i>
<p>DATA: Create greater K-12 coherence.</p>	<ol style="list-style-type: none"> 1. <i>As with other strands (e.g. NUMBER, GEOMETRY), the categories are proposed to be specific to the grade level. For example, at the kindergarten level, Classification is a category under DATA.</i> 2. <i>Probability remains a category under the DATA strand and concepts begin in grade 6.</i> 3. <i>High School DATA represents the content that all students should learn prior to graduation.</i> 	<ol style="list-style-type: none"> 1. <i>Including Classification under DATA for kindergarten emphasizes the foundational skill of sorting to precede graphical representations.</i> 2. <i>A frequent theme of feedback over the past seven years has been the need to further develop standards related to understanding data and basic statistics. It is important to be able to collect, display and interpret data accurately.</i>

The mathematics standards revision team is represented by the following:

Districts

- Omaha Public Schools
- Grand Island Public Schools
- Millard Public Schools

Elementary and Middle Schools

- Wahoo Public Schools
- Gretna Public Schools
- Hastings Public Schools
- Kearney Public Schools
- Papillion LaVista Public Schools
- DC West Community Schools
- Lincoln Public Schools
- Grand Island Public Schools
- Omaha Public Schools

High Schools

- Harvard Public Schools
- Scottsbluff Public Schools
- Columbus Public Schools
- Umoho Nation Public Schools
- Westside Community Schools
- Cambridge Public Schools
- Cross County Community Schools
- Thayer Central Community Schools
- Lexington Public Schools
- North Platte Public Schools
- Nebraska City Public Schools
- Fremont Public Schools

Educational Service Units

- ESU 8

Non-Public Schools

- Faith Christian School
- Creighton Preparatory School
- Boys Town High School

Nebraska Department of Education

- **Cory Epler, Ph.D.**, NDE Academic Officer
- **Marissa Payzant, Ed.D.**, Director - Content Area Standards & Instruction
- **Deb Romanek**, Mathematics Education Specialist
- **Jane Strawhecker, Ph.D.**, Professor of Teacher Education, University of Nebraska Kearney

Members of the mathematics standards revision team, organized by work strand:

	Full Name	School / District (Role)	ESU
Gr K-2	Judy Stukenholtz*	Wahoo Public Schools (Kindergarten teacher)	2
	Andrew Boone	Gretna Public Schools (1st grade teacher)	3
	Whitney Flower	Grand Island Public Schools (K-5 building principal)	10
	Adeline Johnson*	Hastings Public Schools (2nd grade teacher)	9
	Sara Kucera*	Kearney Public Schools (1st grade teacher)	10
Gr 3-5	Laura Melonis*	Papillion-LaVista Public Schools (4th grade teacher)	3
	Janna Giles	DC West Community Schools (5th grade teacher)	3
	Jason Weseman	Grand Island Public Schools (5th grade teacher)	10
	Amy Barton	Lincoln Public Schools (3rd grade teacher)	18
	Marni Driessen*	Omaha Public Schools (K-6 curriculum facilitator)	19
Gr 6-8	Tami Whitted	Millard Public Schools (6-12 math curriculum facilitator)	3
	Susan Christensen	Faith Christian School (4-8 math teacher)	10
	Kevin L Pettigrew*	Valentine Community Schools (7-8 math teacher)	17
	Alicia K Davis*	Lincoln Public Schools (8th grade math teacher)	18

	Mallory Charvat	Elkhorn Public Schools (7th grade math teacher)	3
	Rachel Kluthe	Seward Public Schools (7th grade math teacher)	6
HS Data	Jenne Gregor*	Creighton Preparatory School (H.S. math teacher)	3
	Audrey Smalley	Harvard Public Schools (H.S. math teacher)	9
	Shelby Aaberg*	Scottsbluff Public Schools (H.S. math teacher)	13
	Julie Kreikemeier	Columbus Public Schools (H.S. math teacher, math coach)	7
	Heidi Rethmeier	Educational Service Unit 8 (Staff developer)	8
HS Geom	Ann Marie Scott	Umo ^{ho} Nation Public Schools (H.S. math teacher)	1
	Michelle Mika*	Boys Town High school (H.S. math teacher)	3
	Angela Mosier	Westside Community Schools (H.S. math teacher)	3
	Peter Bogardus	Cambridge Public Schools (H.S. math teacher)	11
	Jennifer Lange*	Cross County Community Schools (H.S. math teacher)	7
HS Alg.	Deb Bulin*	Thayer Central Community Schools (H.S. math teacher)	5
	Peg Fisher	Lexington Public Schools (H.S. math teacher)	10
	Sasha Welch	North Platte Public Schools (H.S. math teacher)	16

	Jason Bartman*	Nebraska City Public Schools (H.S. math teacher)	4
	Alexander Way	Fremont Public Schools (H.S. math teacher)	2