

Data Report

**K-12 Math Standards
Initial Data Review Committee Recommendations
April, 2025**

Data Report

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Introduction

The NC Department of Public Instruction (NCDPI) will review the standards for each content area every five to seven years to ensure the NCSCOS consists of clear, relevant standards and objectives. The standards review, revision, and implementation process provides a comprehensive study of each content area organized by grade level, proficiency level, and/or course.

All standards are reviewed on a perpetual cycle of five to seven years. The process is designed to ensure clear, rigorous, and measurable standards that are easily understood by teachers, parents, and students and are articulated K-12 by grade, proficiency level, and/or course.

The K-12 Math standards review process began in the Spring of 2024 with a target date of April 2025 to request permission from the State Board of Education to officially begin the revision process. The revision process is expected to take the summer of 2025 and the 2025-2026 school year to complete, with a target date of June 2026 to present a final draft of revised standards to the State Board of Education.

NCDPI will facilitate the standards review phase using the following steps, as appropriate:

- A. Collect and review feedback through various methods from stakeholders, including but not limited to educators, administrators, parents, community members, students, institutions of higher education, business/industry, education agencies in other states, and/or national organizations for the specific content area.
- B. Analyze contemporary and current research on standards in the content area being reviewed.
- C. Establish and convene a data review committee.
- D. Facilitate the committee's review of data and research, State or federal legislative requirements, surveys, and other stakeholder feedback.
- E. Evaluate the data review committee's findings and share recommendations for standards revision with the State Board of Education.

The Data Review Committee (DRC) serves to support the review and analysis of the feedback collected. The DRC analyzes all data points for trends, themes, and ultimately recommendations for revision. DRC members use the data reporting template to organize data and corresponding recommendations. DRC members include educational leaders and community members from across the state's eight regions, with varying perspectives and experiences regarding the current Standard Course of Study. Their review of the data and recommendations helps drive the review and revision phases.

How to read/use this report

This report is set up based on the methods and approaches utilized to gather feedback from stakeholders across North Carolina. The report is separated into sections aligned to qualitative data gathered through interviews and focus groups, as well as quantitative data compiled from surveys released to individual public school units and the general public.

The first section, methodology will describe how data was gathered, from who, and when. It will

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also explain how the data was analyzed and prepared for review. The additional data and initial analysis are found in the second section. Raw data can be reviewed through links found in the appendices.

Data Review Committee (DRC) members used this information to determine initial conclusions and recommendations found in the final two sections (Conclusions and Recommendations) based on trends identified in the findings and research provided.

The Scope of Work/The Task

The DRC followed the prescribed steps outlined in the NC Standard Course of Study Manual. The DRC reviewed the extensive data collected through surveys, focus groups, and interviews. The data also included research on other states' standards in Math, national standards and frameworks, and scholarly research in the field of Math. In grade bands, or course groups, the DRC worked with NCDPI K-12 Math consultants to compile their recommendations for the Standards Writing Team.

Methodology for Research Collection

Per the NC Standard Course of Study Manual, the review phase began by collecting and reviewing research related to the existing K-12 Math Standards.

The NCDPI K-12 Math Consultants conducted contemporary and current research on standards for the content area being reviewed. This research was compiled in a spreadsheet format intended to inform the review process through the collection of related legislative requirements, best practices, and benchmarking/crosswalking with state, national, and international standards.

The data collected included an extensive comparison between the NC K-12 Math Standard Course of study and standards from multiple other states, comparisons to national frameworks including the NAEP Mathematics Framework, the GAISE Reports, ACT, and Advanced Placement. The team also collected information from international frameworks including PISA, and TIMMS along with current research in math content and pedagogy.

The spreadsheet is separated into tabs covering legislation, NC State Board of Education policies, state-state comparisons of math standards by grade span and high school courses, national and international comparisons of math standards, and lastly, current research on math content, pedagogy, and high school math pathways. The research can be found by clicking here to access the [K-12 Math Standards Research](#).

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Methodology for Data Collection

Per the NC Standard Course of Study Manual, the review phase included conducting three large-scale surveys, individual interviews, and regional focus groups.

The three large-scale surveys included a Public School Unit (PSU) standard-by-standard survey available for all school districts and charter schools in North Carolina, an identical standard-by-standard survey made available to any North Carolina stakeholder, and a generalized survey that was also available to all North Carolina stakeholders.

Both standard-by-standard surveys allowed participants to provide feedback for each standard or objective for each grade level or course. The surveys were publicized through listservs, the NCDPI website, multiple email notifications, and through NCDPI social media. For the PSU standard-by-standard survey, PSUs were asked to complete one survey to represent the overall consensus of that survey toward each standard and objective per grade level or course with a requirement to complete feedback for each grade and course. Individuals completing the All-Stakeholder standard-by-standard could choose to complete as many grades or courses as they wanted.

The PSU and All Stakeholder standard-by-standard surveys were released on September 18th, 2024, and were originally scheduled to close on November 4th. However, due to Hurricane Helene's impacts, the PSU survey was kept open until November 14th, 2024. A total of 200 responses were collected from the PSU survey, representing ninety-six school districts (79% of all school districts) and 11 charter schools. The All-Stakeholder standard-by-standard survey collected 2,644 responses, with responses from all State Board regions.

The third large-scale survey, the K-12 General, was released on September 18, 2024, and closed on November 4, 2024. The survey provided ten general statements about the standards, and participants then rated their level of satisfaction with the K-12 Math standards as a whole rather than by any specific grade level or course. The survey received 3,126 responses.

In addition to survey data, 8 regional focus groups were held, one in each of the N.C. State Board regions. Each focus group was held in person within the particular region. Regional focus groups included classroom teachers and school and/or district curriculum leaders. The questions posed were those listed on page 13 of the NC Standard Course of Study Manual, with the addition of a new question, gauging opinion of the mathematical skills, concepts, or knowledge all North Carolina graduates should possess. In addition to the 8 regional focus groups, one virtual focus group was held for North Carolina charter schools to attend. In total, 188 people participated in the focus groups.

Nine individual interviews were conducted with representatives from a range of stakeholders including students, teachers, and Institutions of Higher Education (IHEs). The questions posed were those listed on page 13 of the NC Standard Course of Study Manual along with the addition of a new question, gauging opinion of the mathematical skills, concepts, or knowledge all North Carolina graduates should possess.

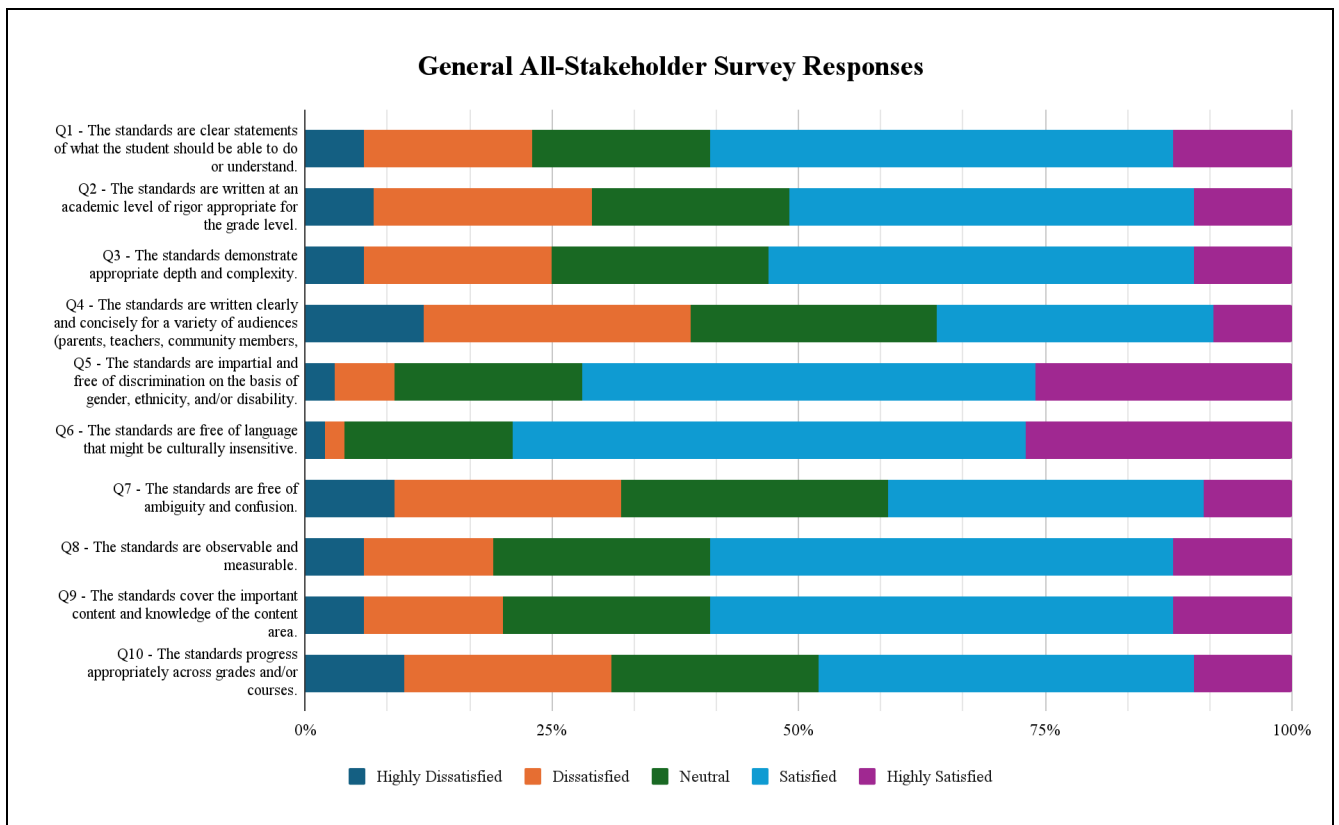
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Quantitative Findings via the All Stakeholder General Survey Responses

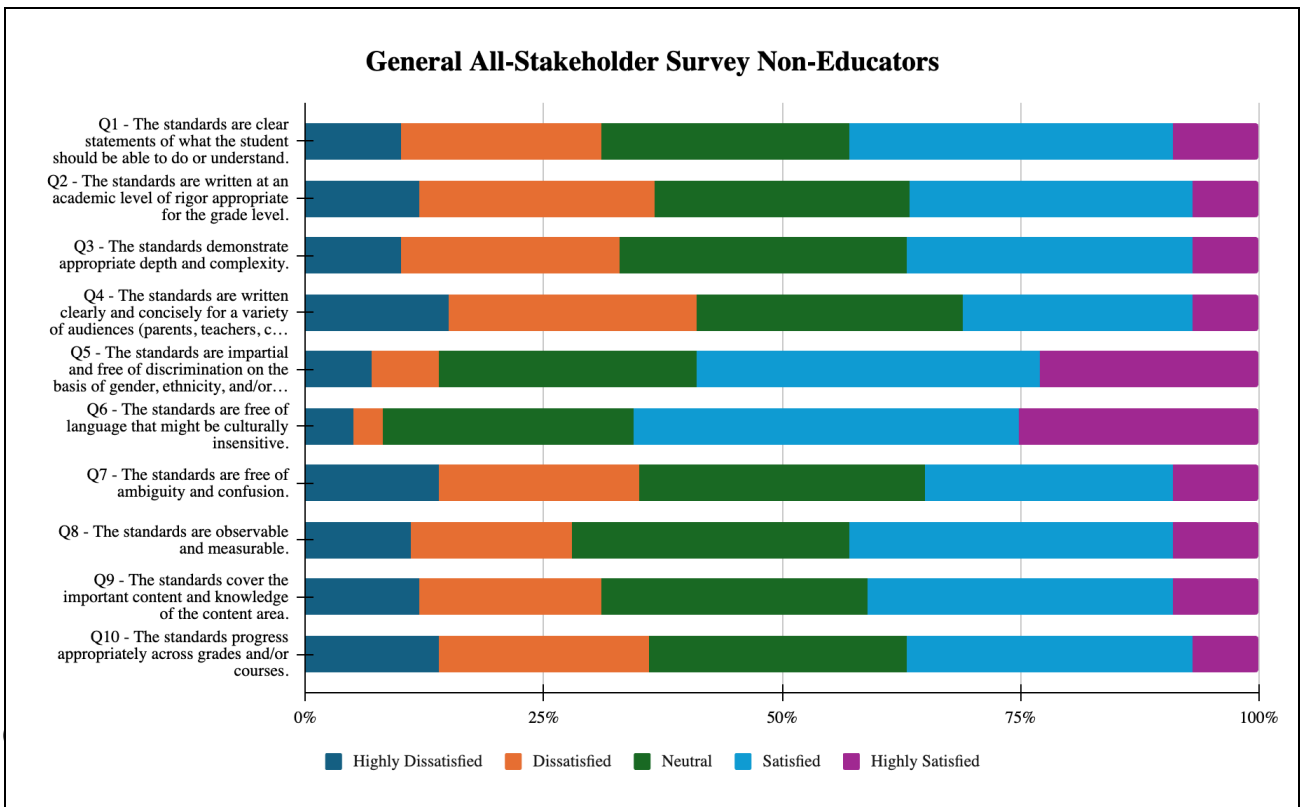
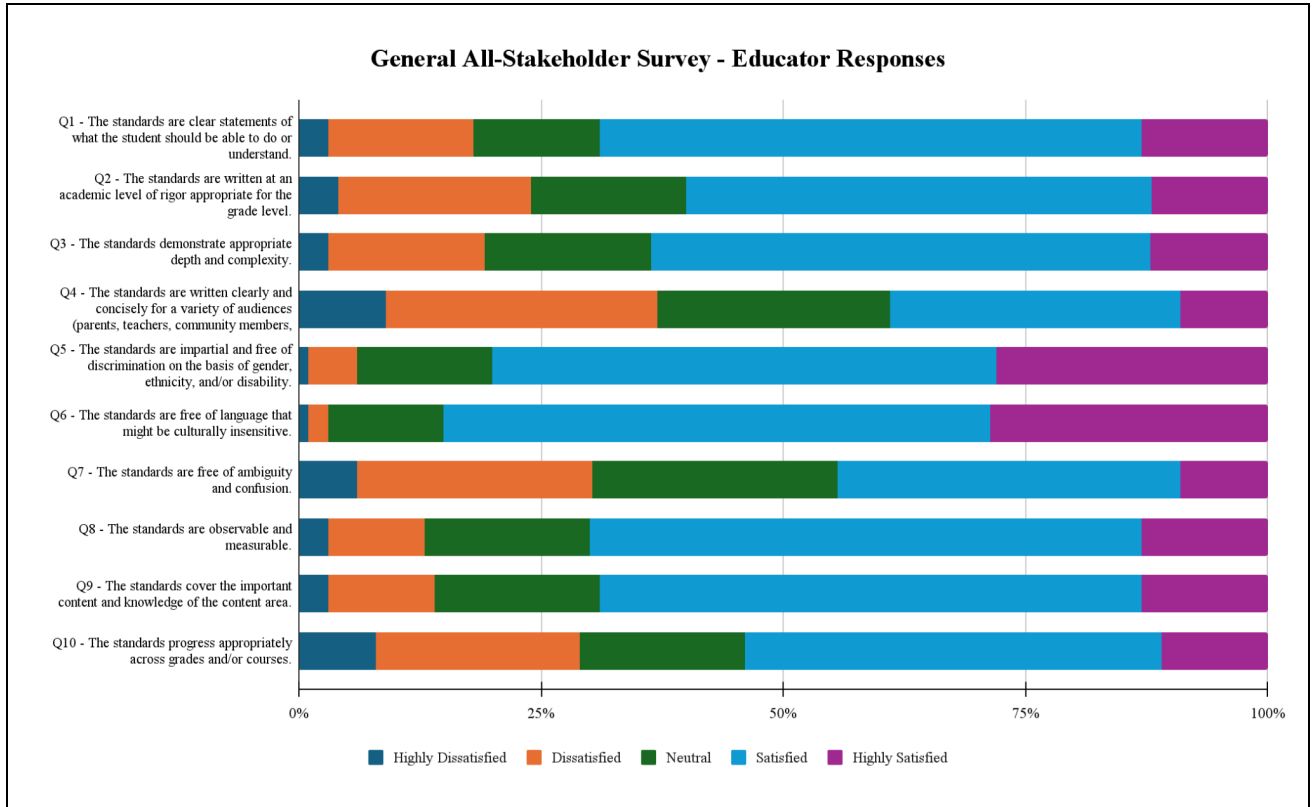
Bar graphs in this section represent the percent (%) of respondents that indicated different levels of satisfaction with the current Math Standard Course of Study concerning various descriptive elements. Respondents indicated one of five levels of satisfaction: highly satisfied, satisfied, neutral, dissatisfied, and highly dissatisfied.

The General Survey received 2,531 responses, including 1,180 educators (46.5% of the sample) and 1,144 parents (45.2% of the sample), representing key stakeholder groups, as well as other groups like administrators, business partners, district leaders, and IHE representatives.

The graphs appear in order by All Stakeholders, Only Educators (educators, school administrators, and district leaders), and Non-Educators (all other categories).



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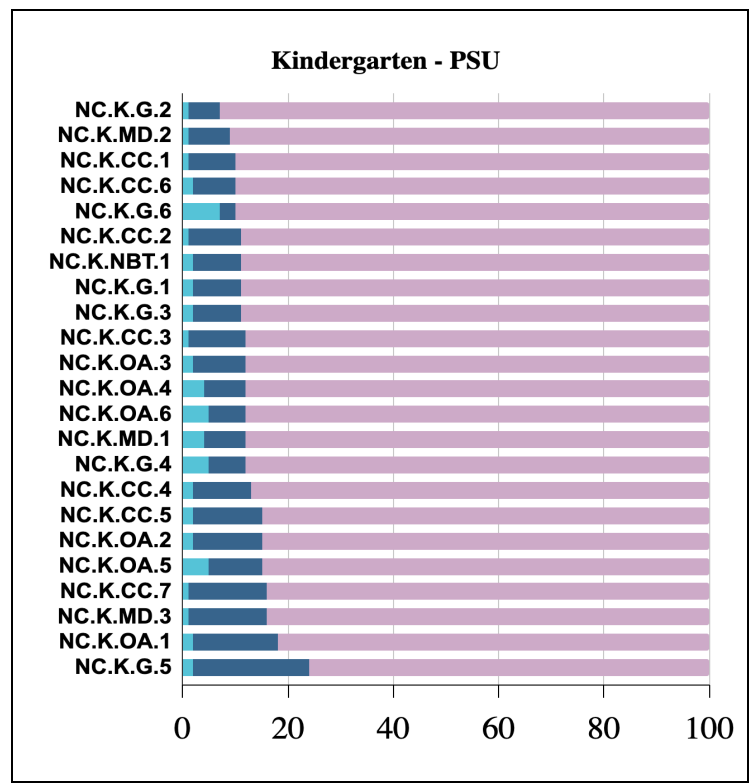
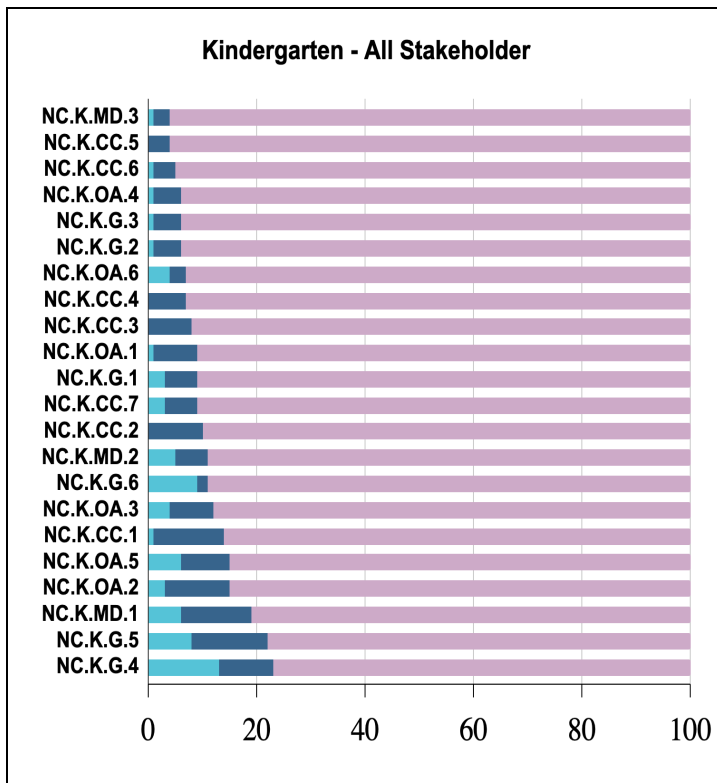
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Quantitative Findings via the Standard-by-Standard Survey Responses

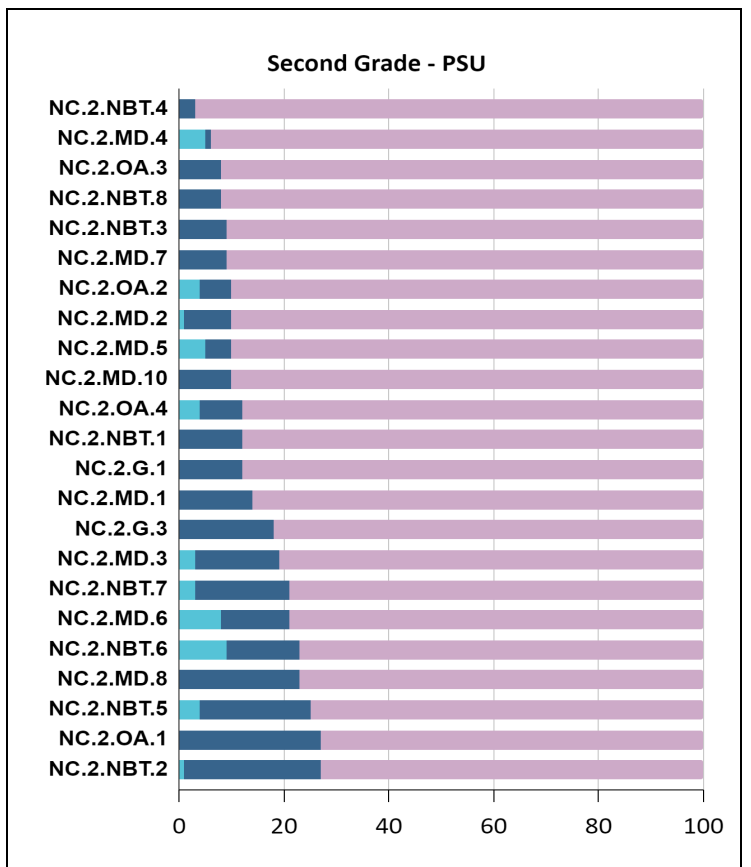
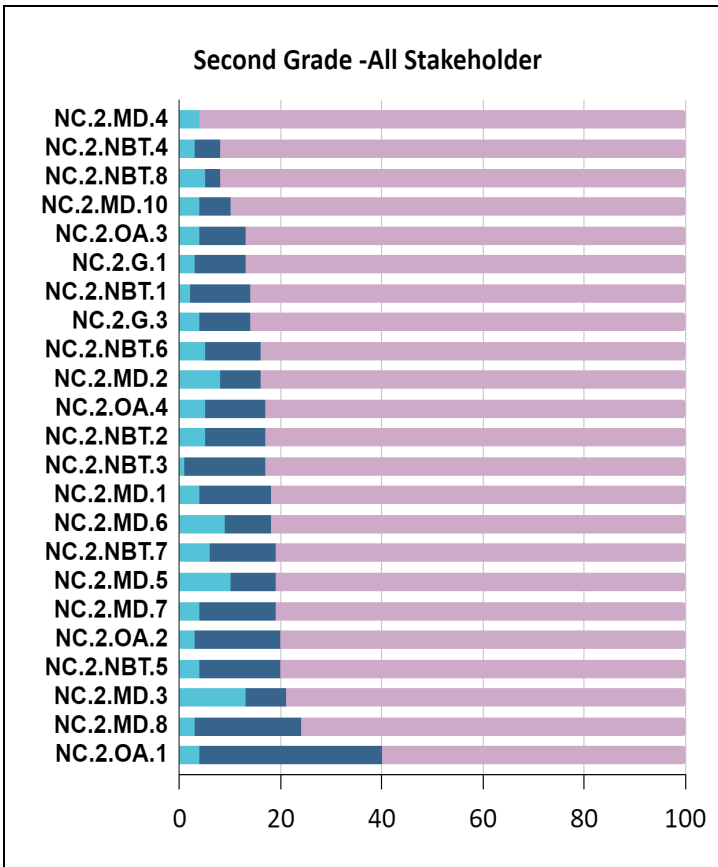
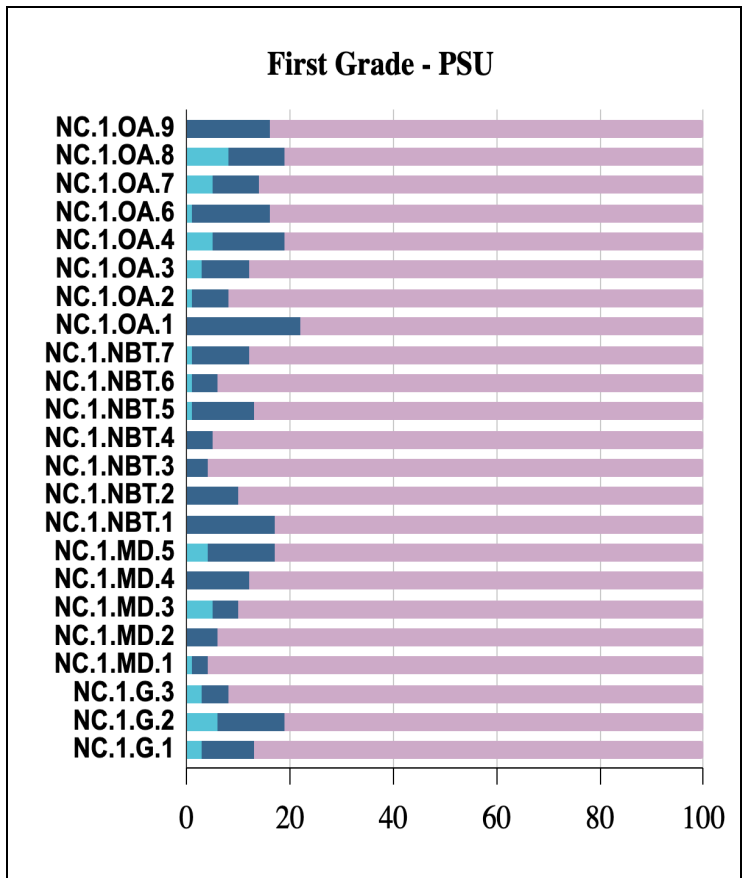
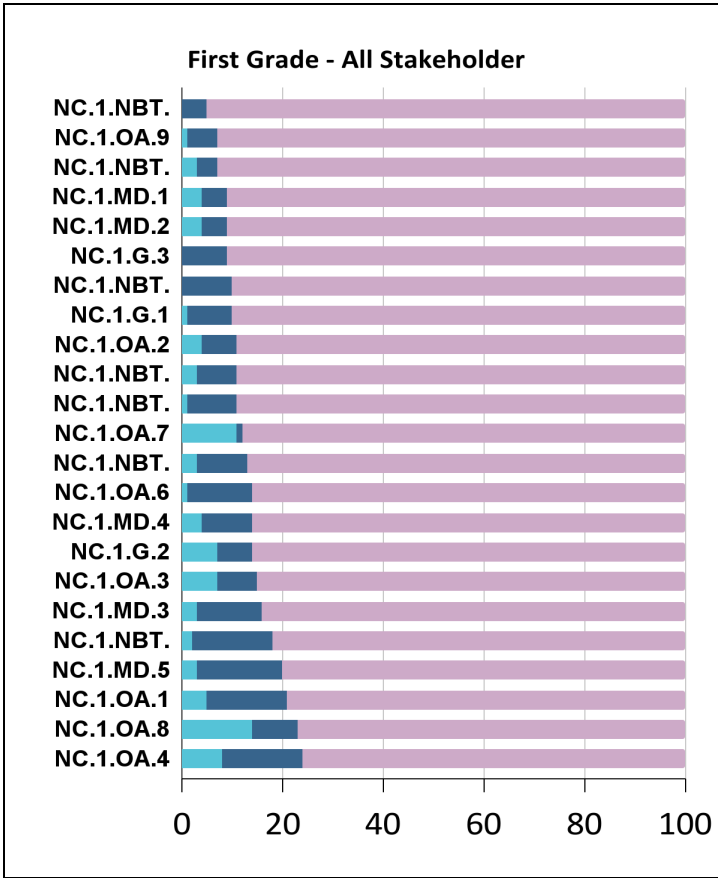
Bar graphs in this section represent the percent (%) of respondents that said either “keep,” “change,” or “remove” for each standard in the Math Standard Course of Study. Bars are sorted according to the percentage of respondents who said either keep (purple), change (dark blue), or remove (light blue).

The graphs are organized by grade level, beginning with Kindergarten and continuing through eighth grade. Following the grade-level graphs are graphs for the high school courses Math 1 through Math 4. The final graphs display standards for Discrete Math for Computer Science and Precalculus programs.

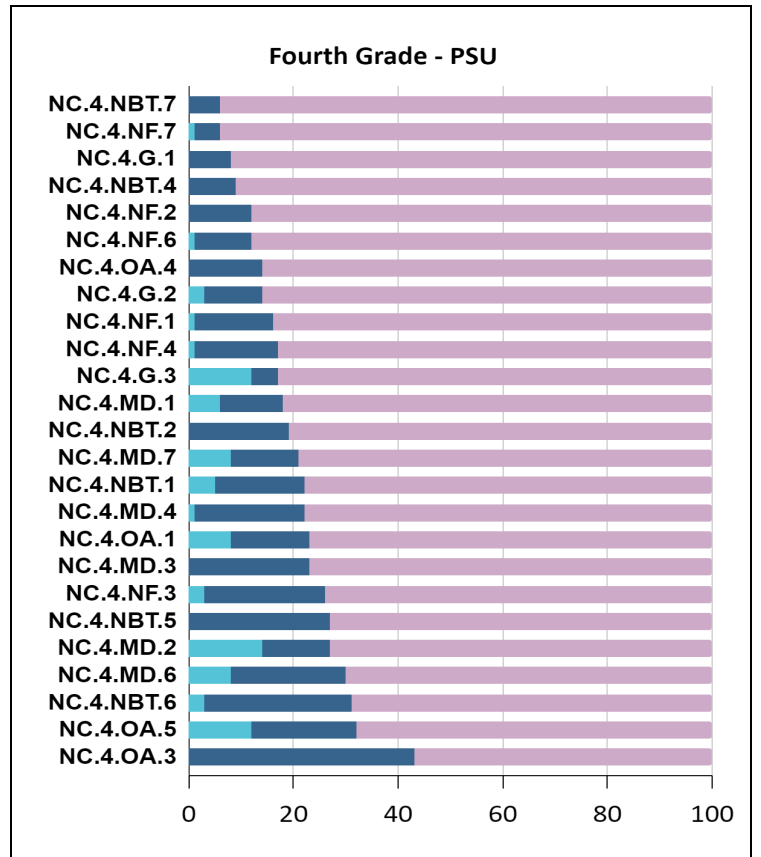
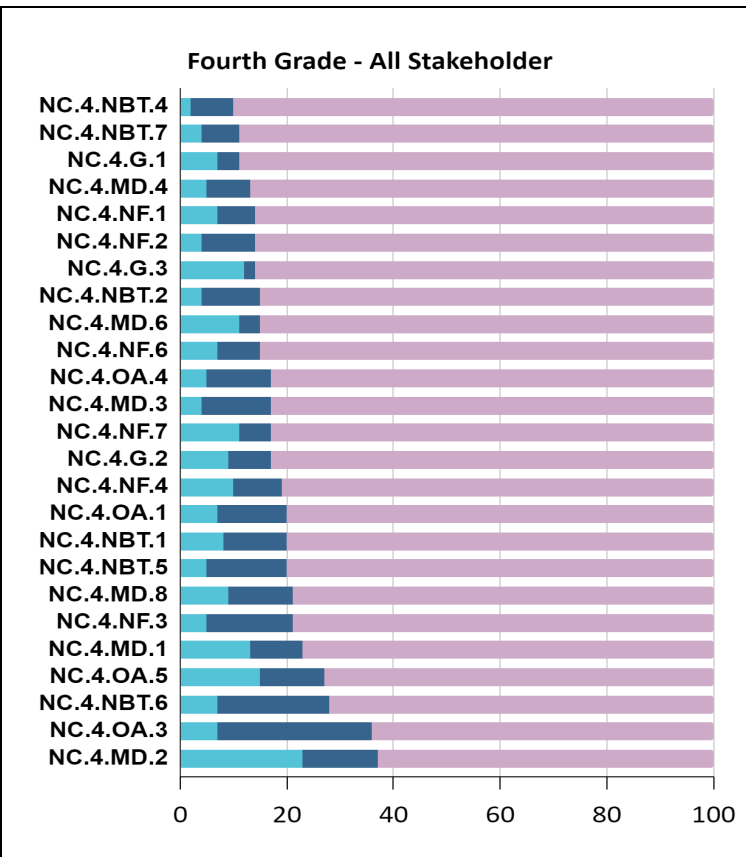
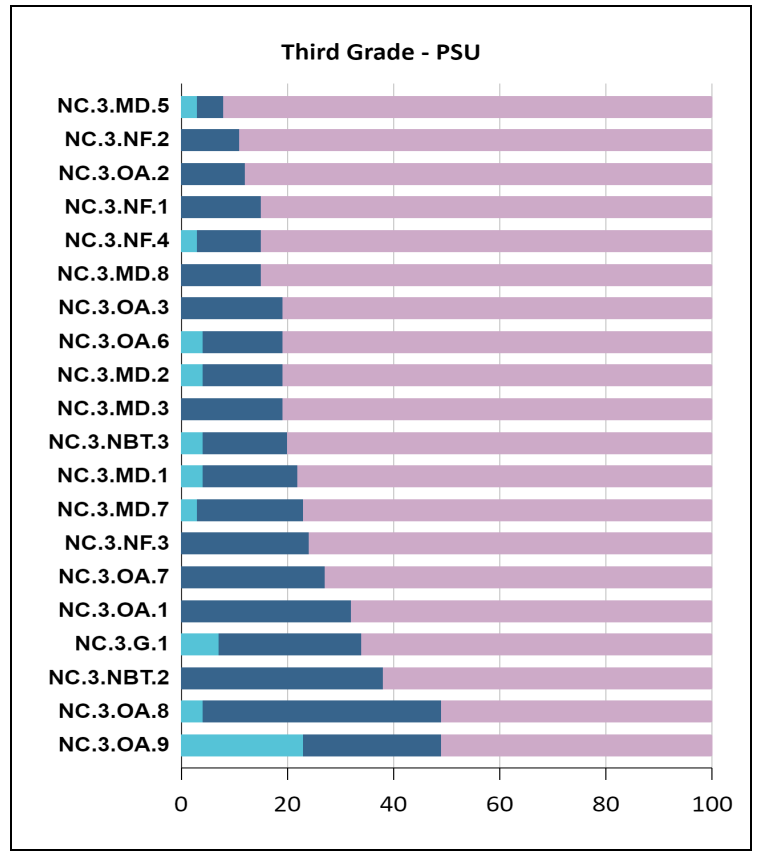
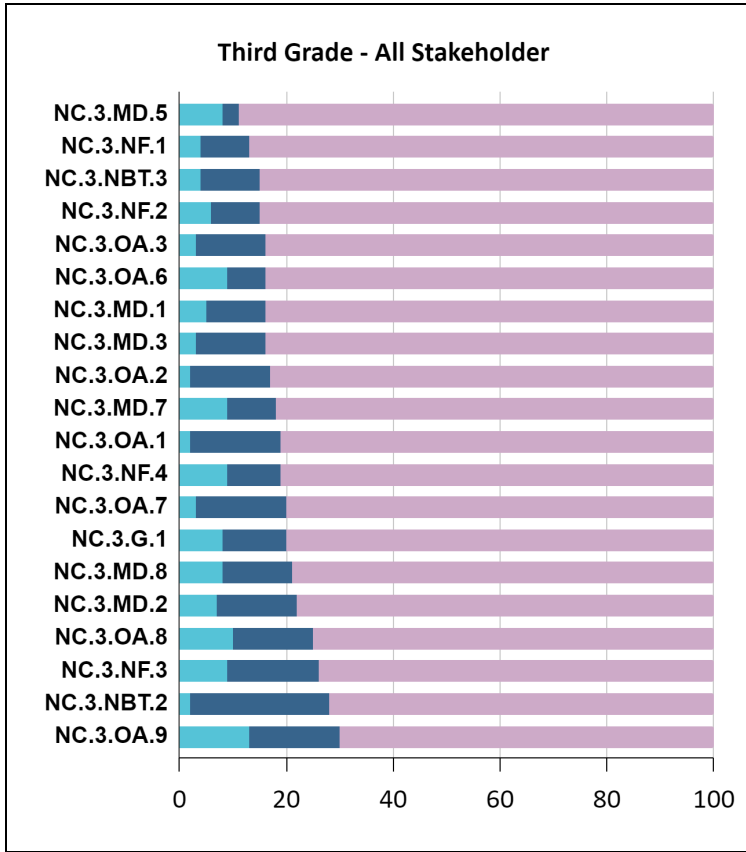
The charts on the left hand side display results from the All-Stakeholder Standard-by-Standard survey. 2,644 responses were received for the All-Stakeholder survey. The PSU responses are displayed on the right hand side. Each PSU was asked to submit one response per grade level/course that represented a consensus from that PSU.



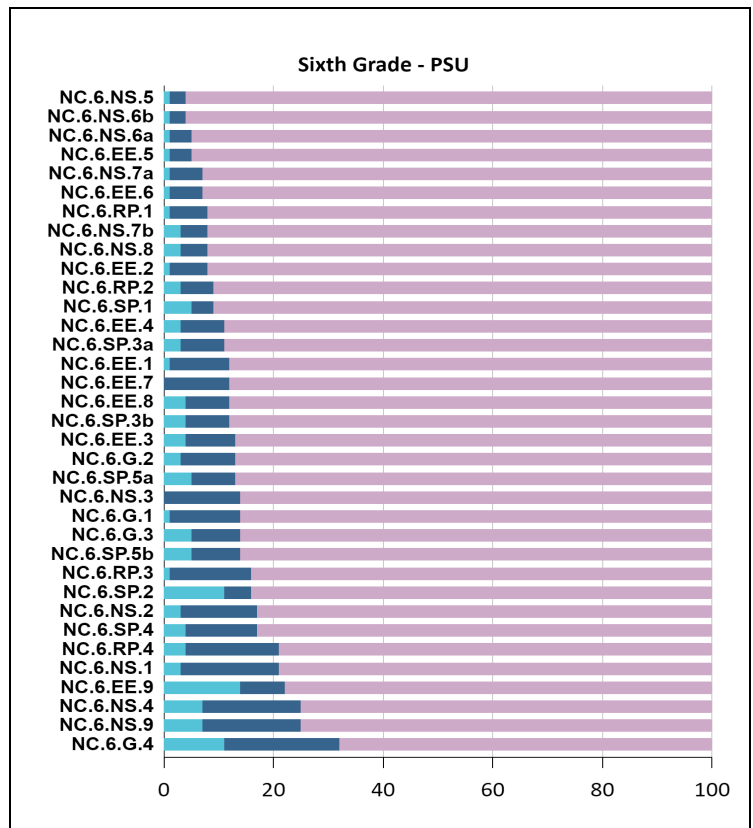
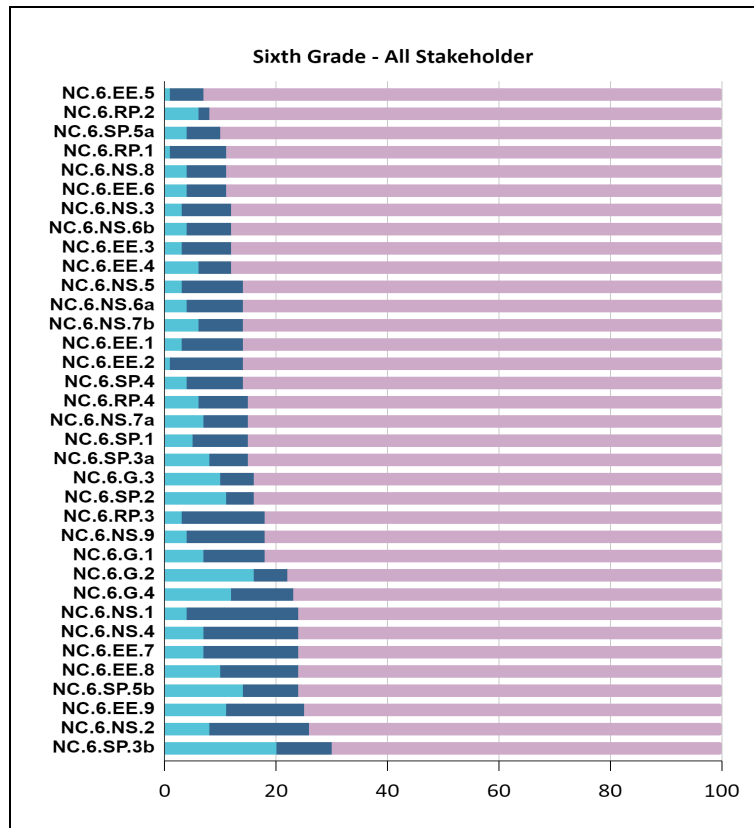
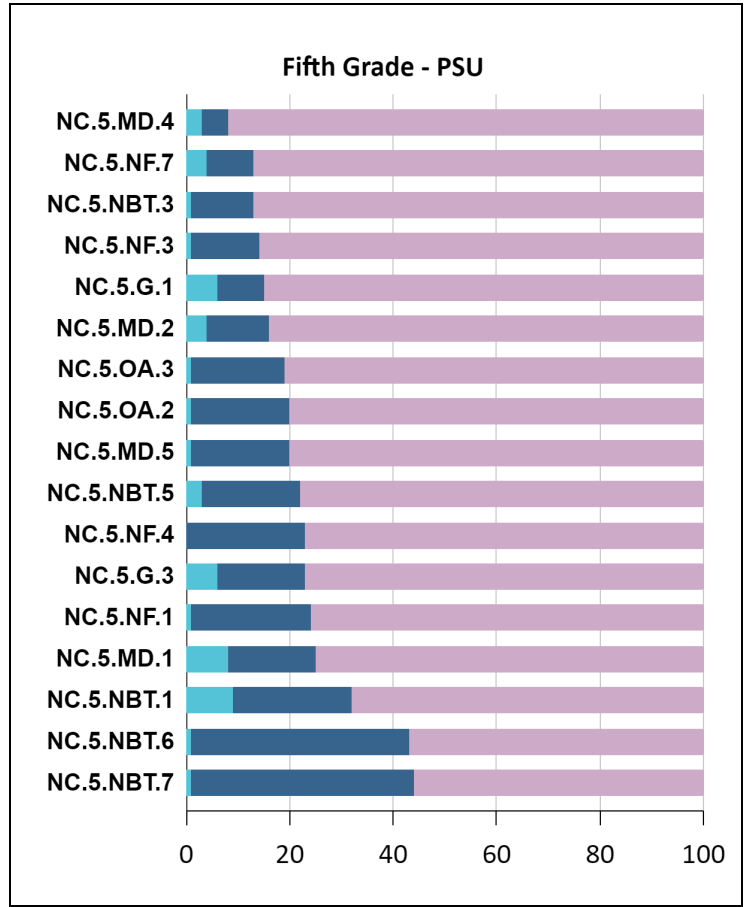
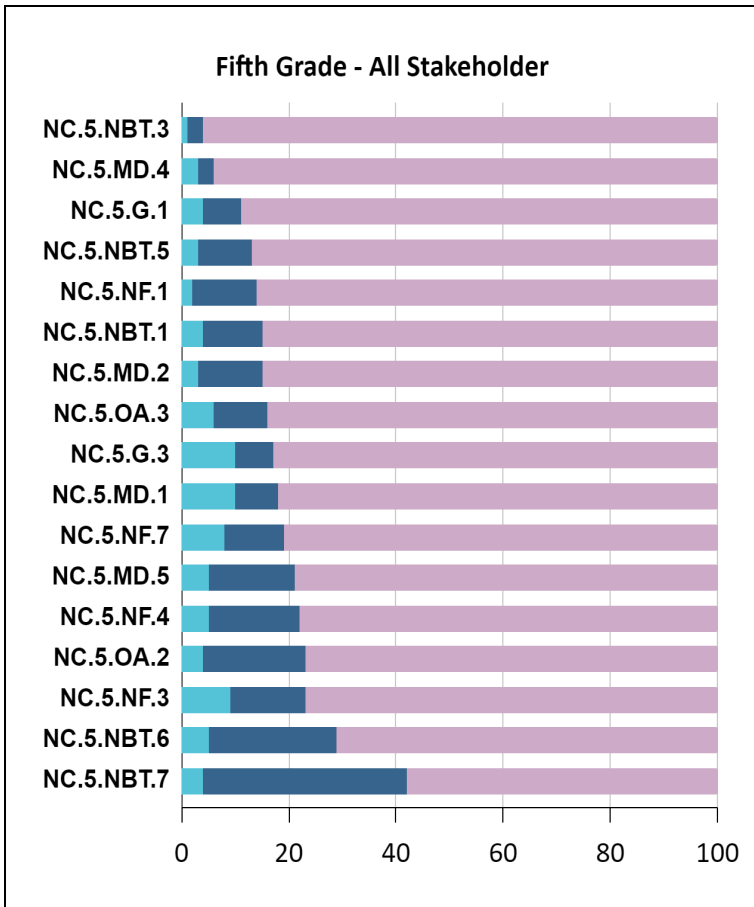
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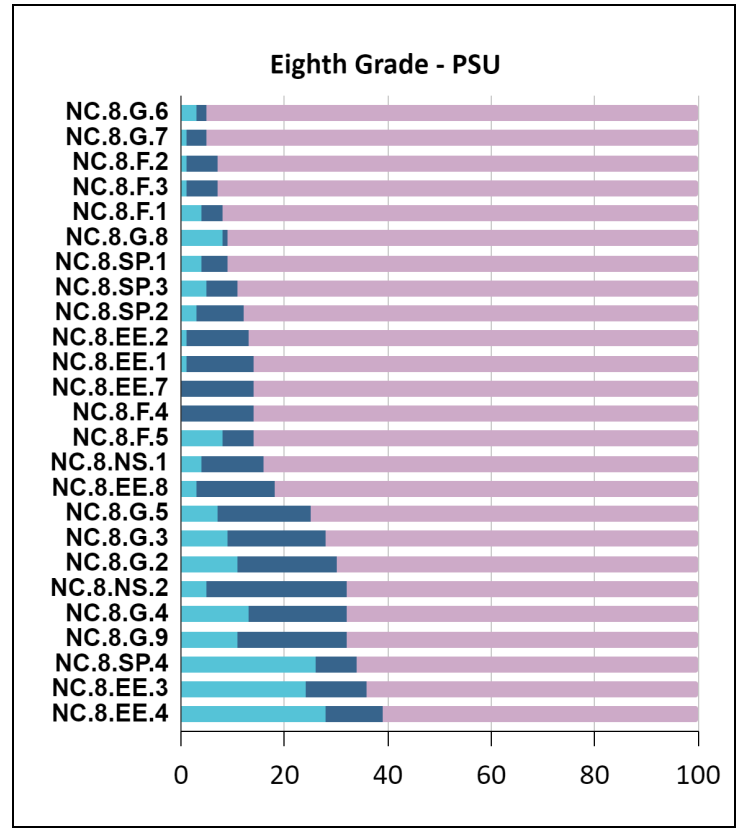
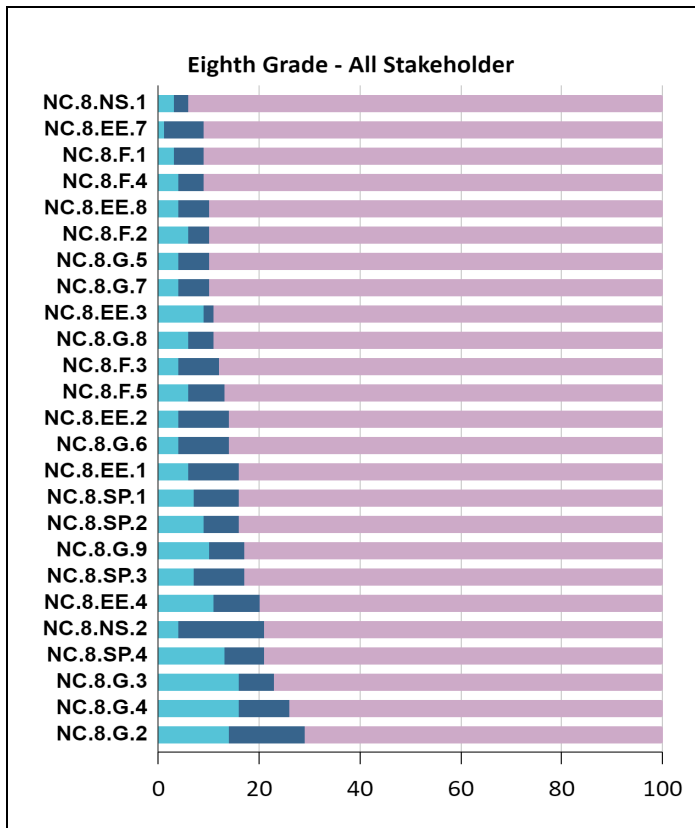
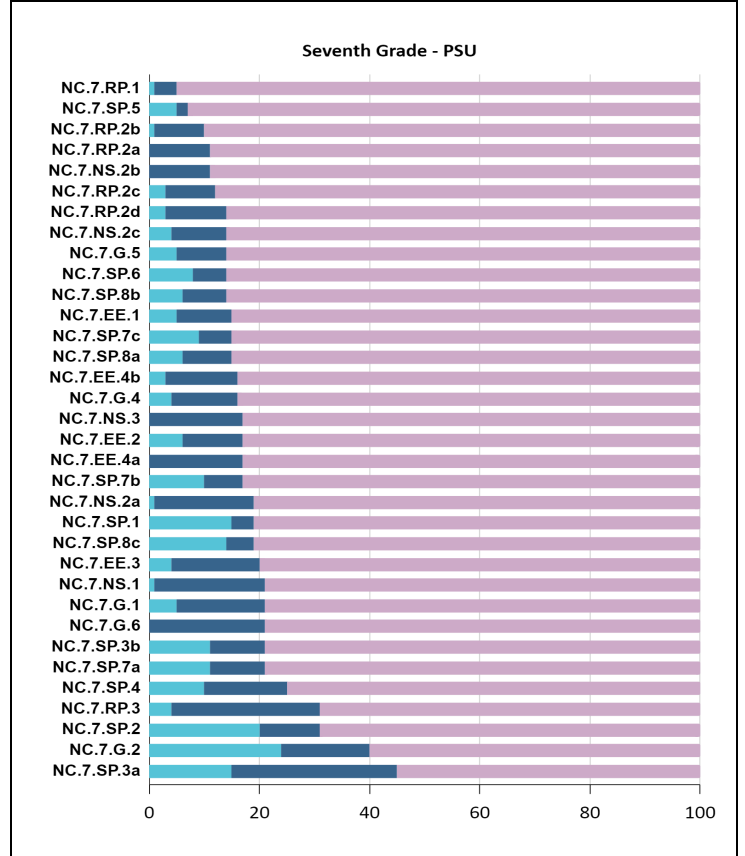
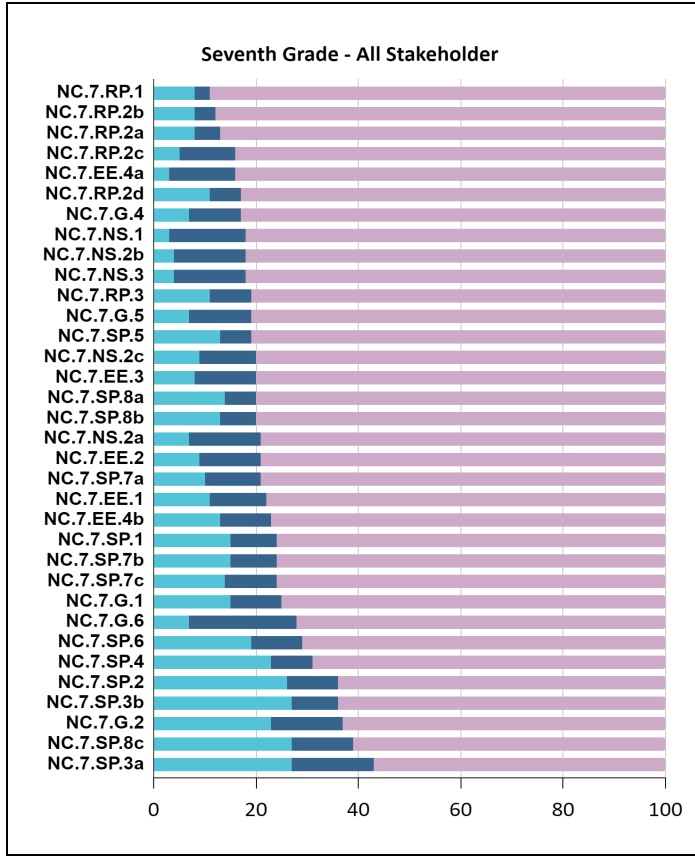
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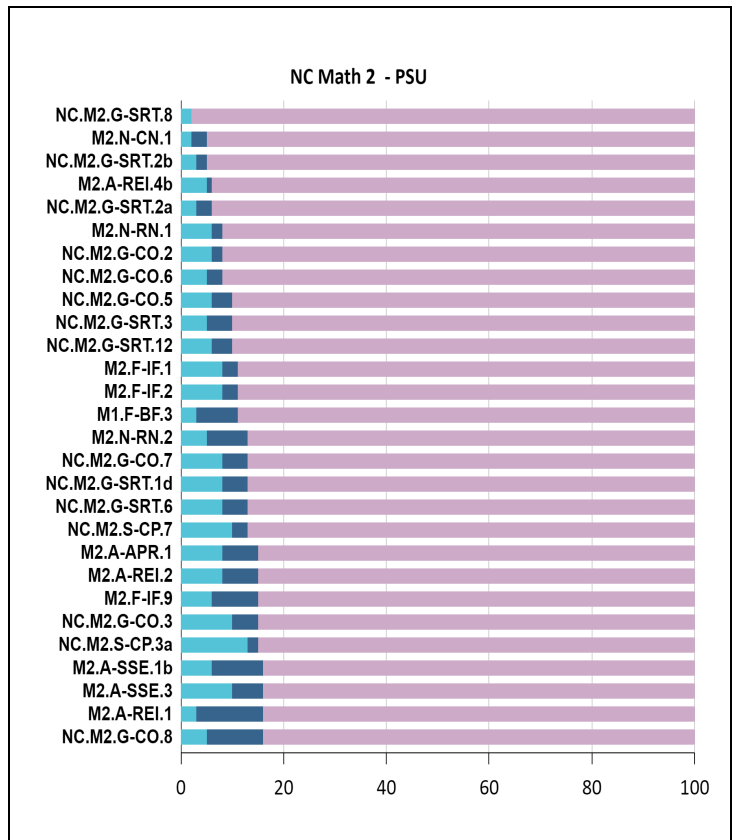
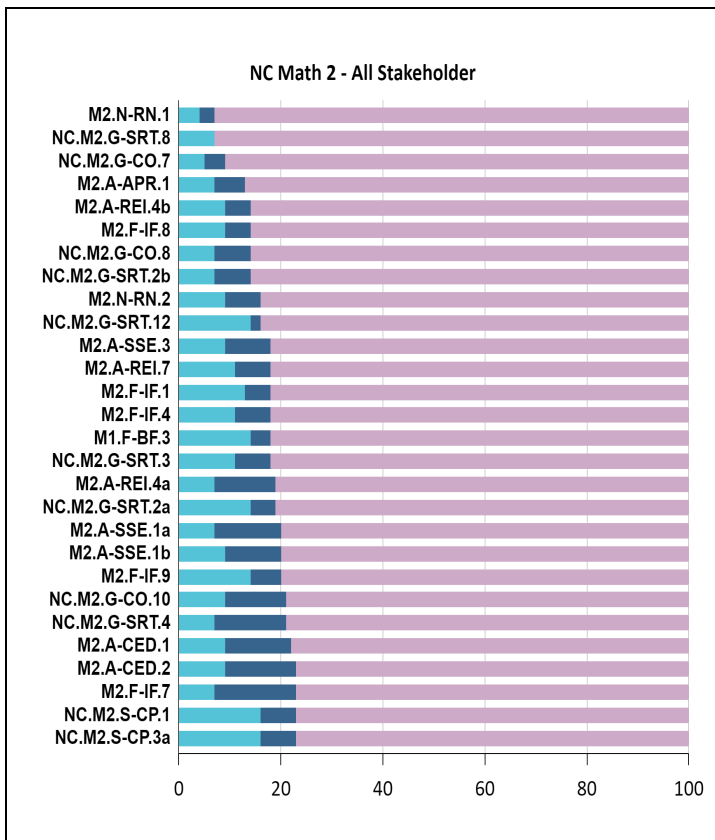
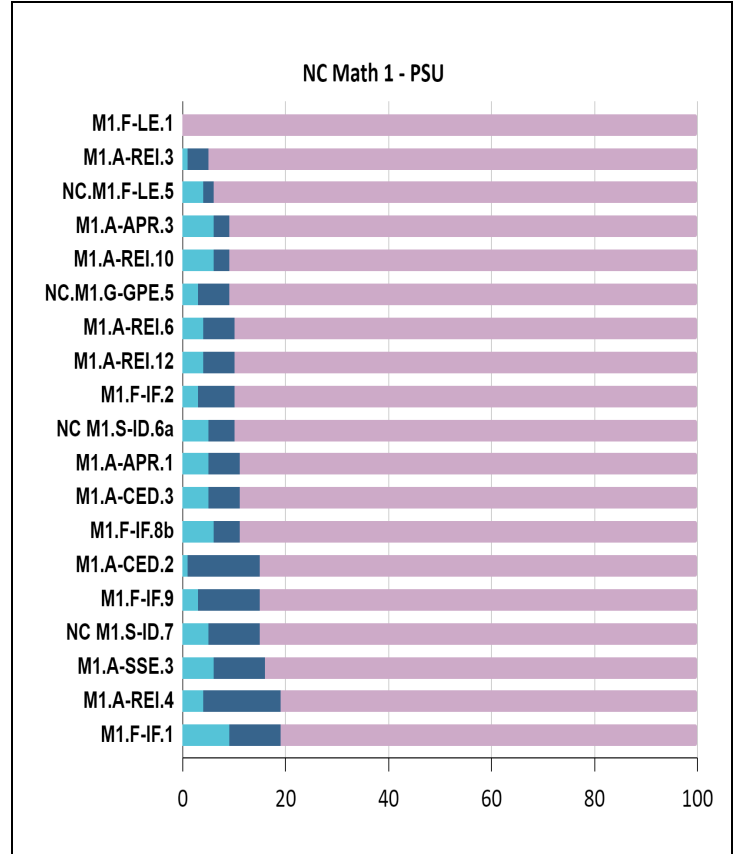
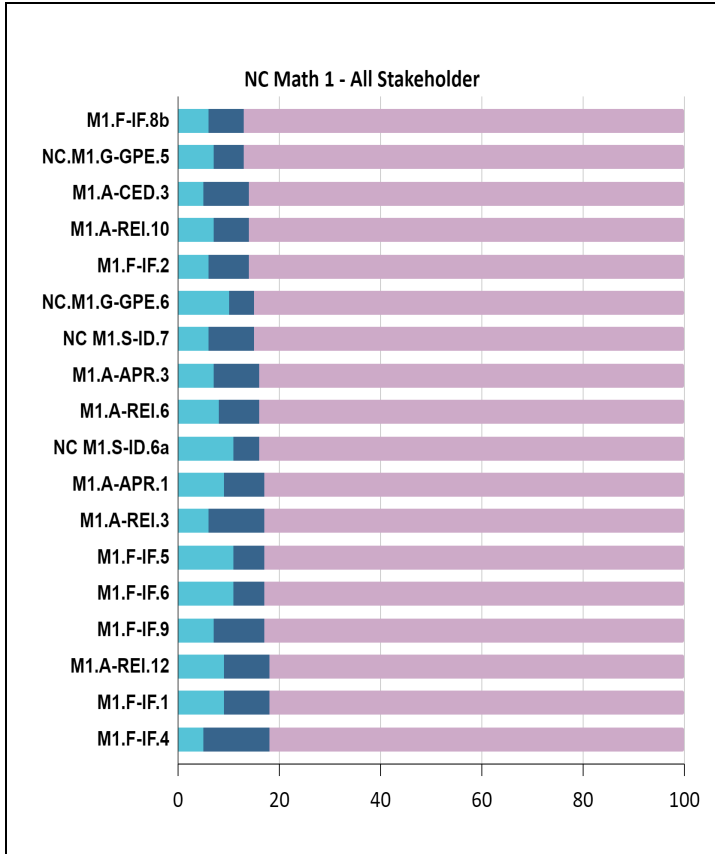
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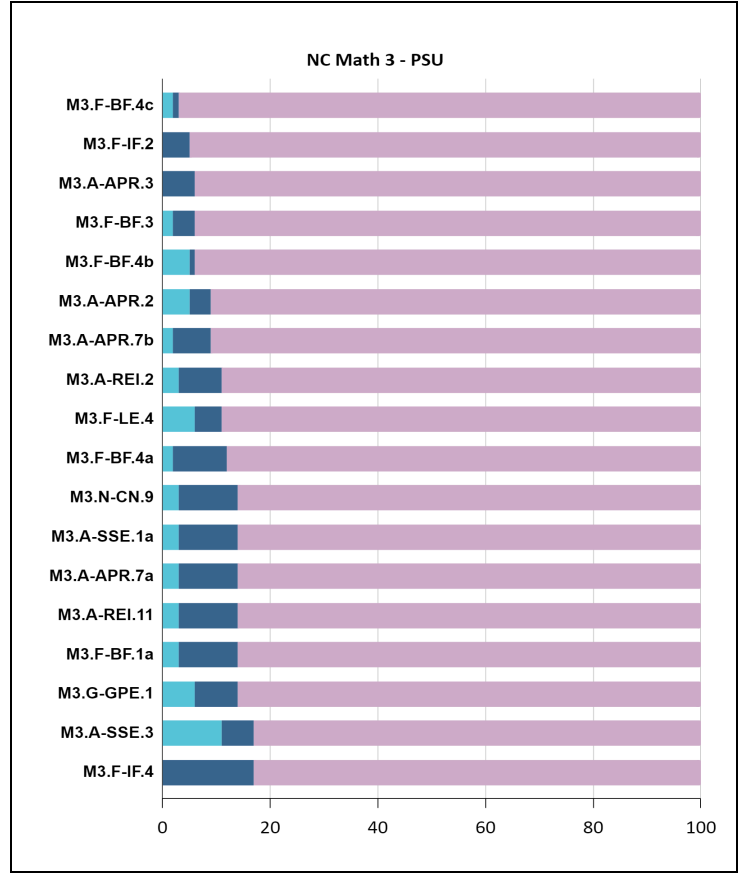
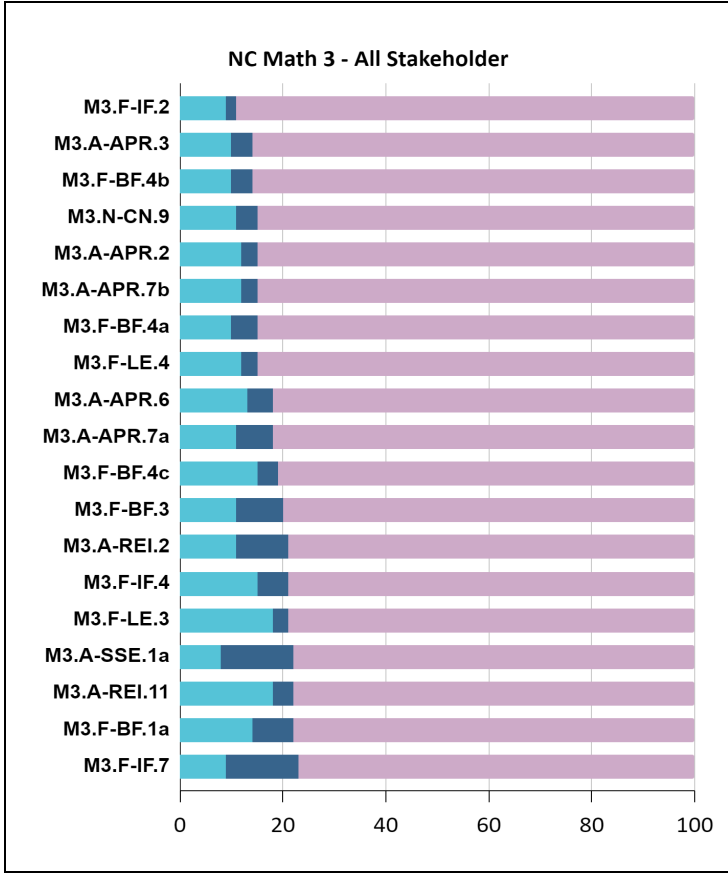
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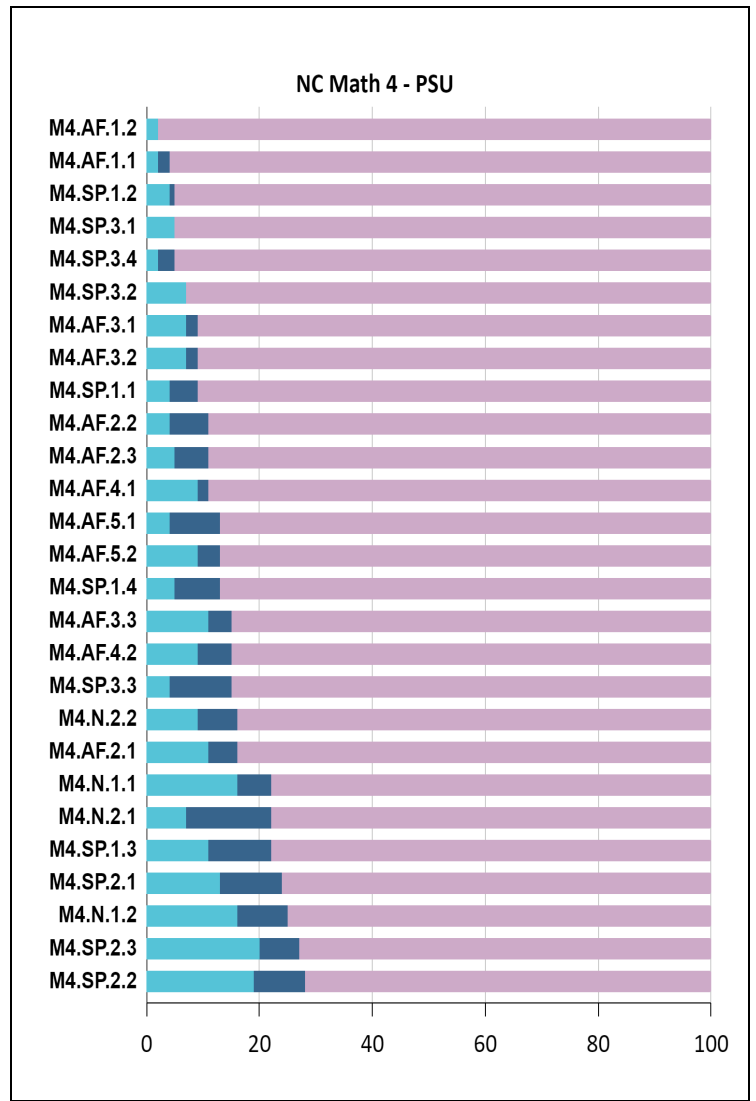
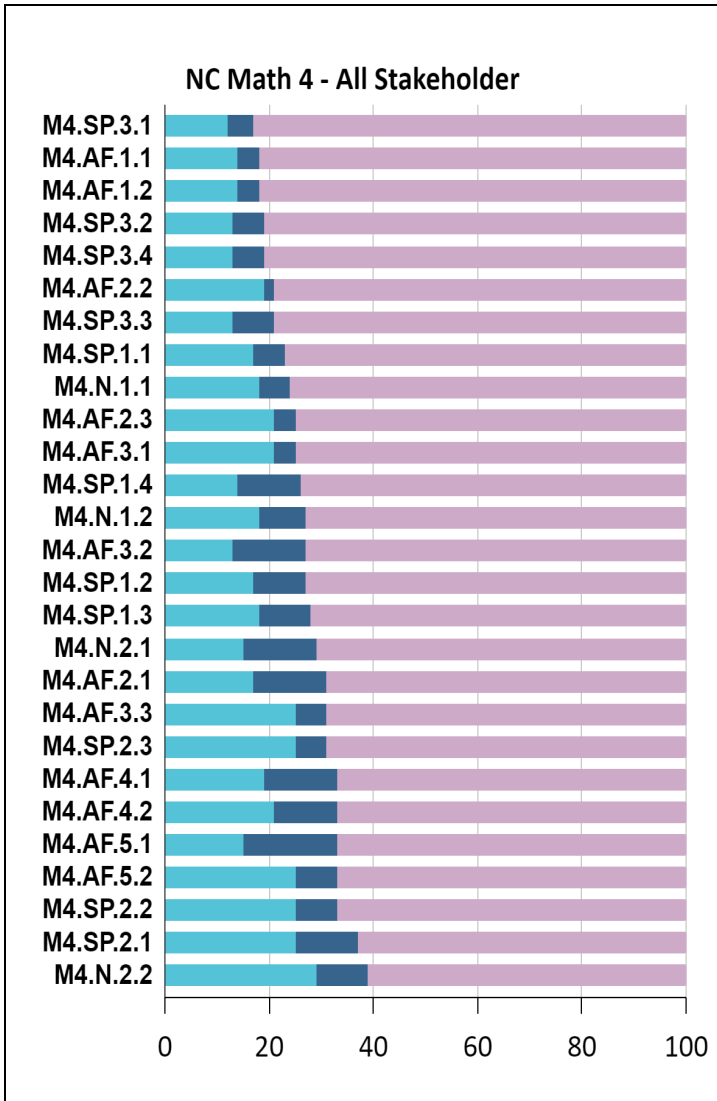
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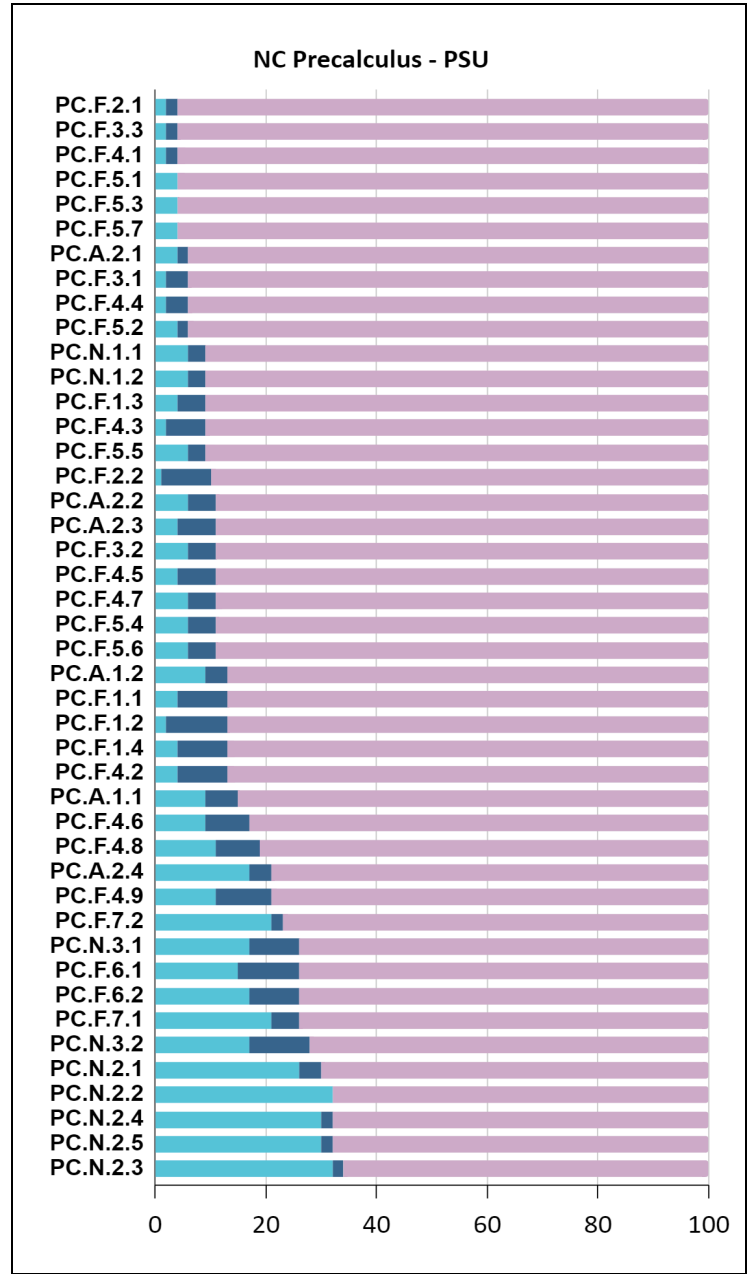
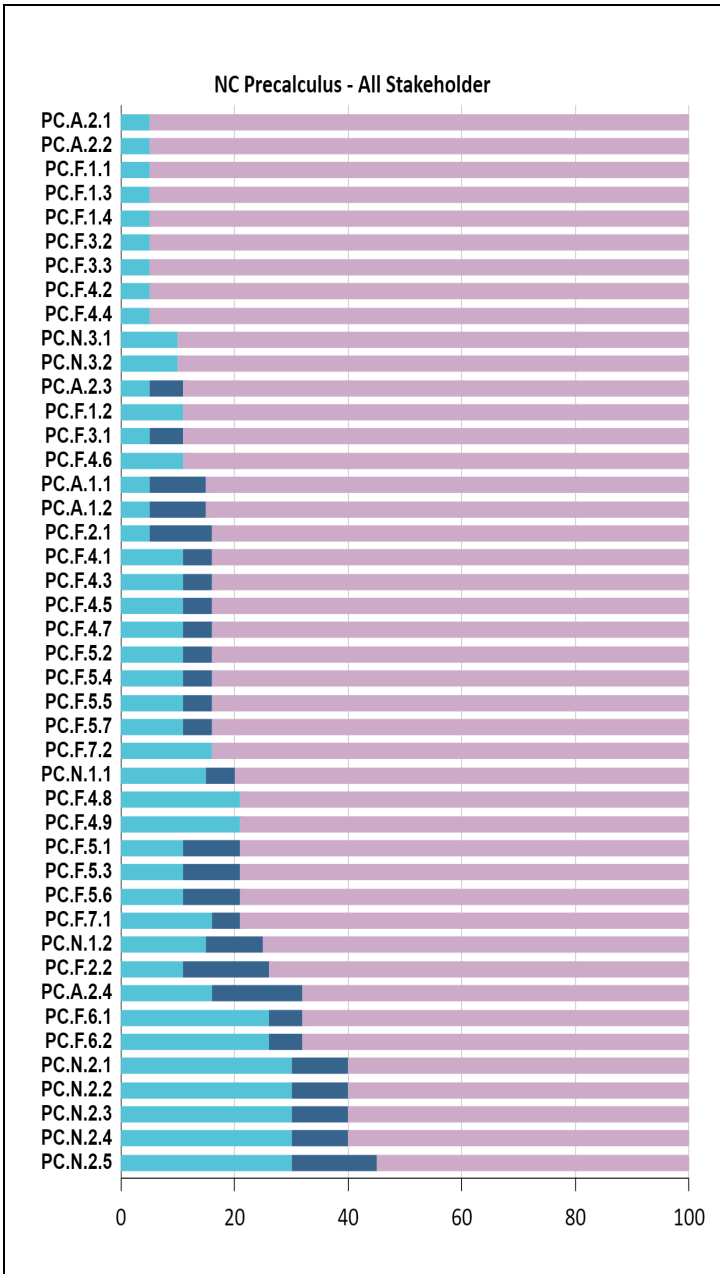
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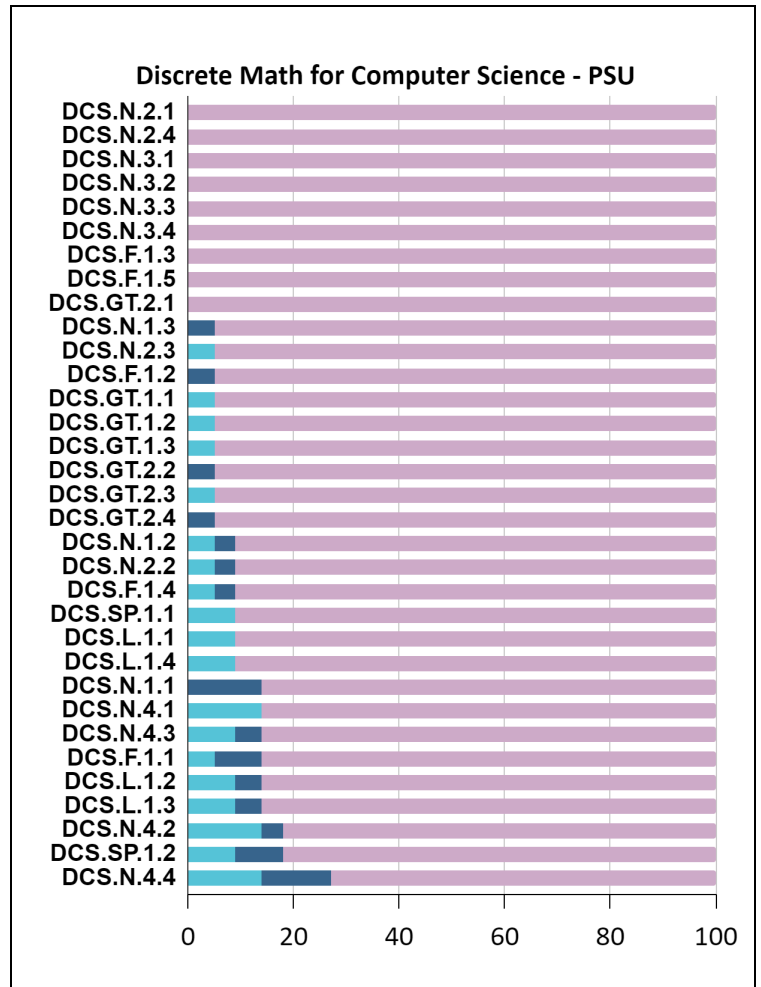
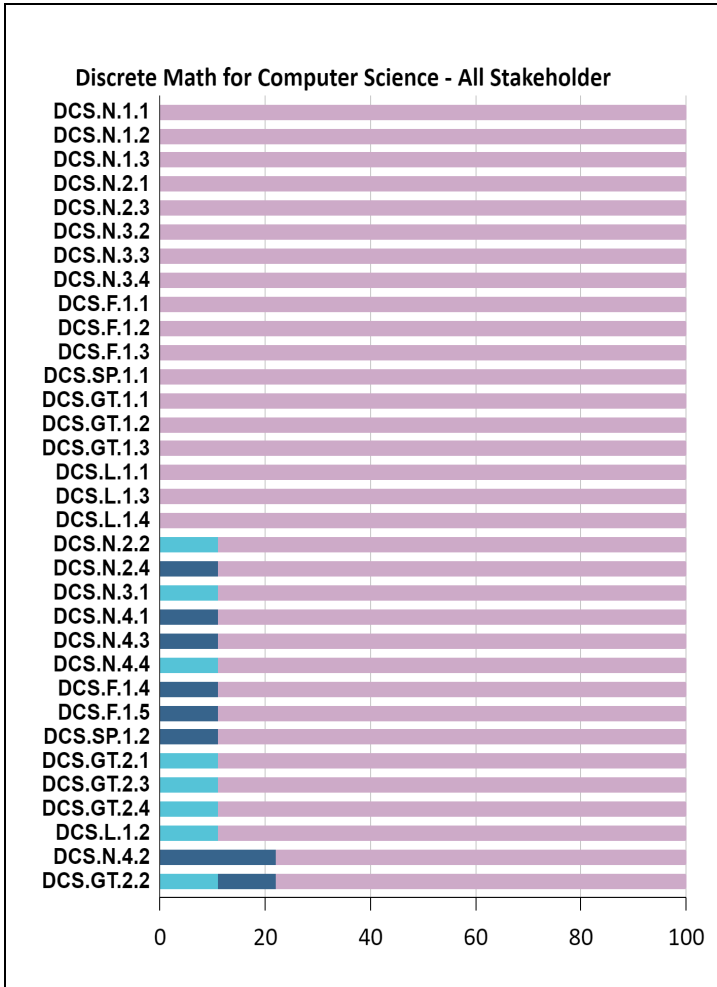
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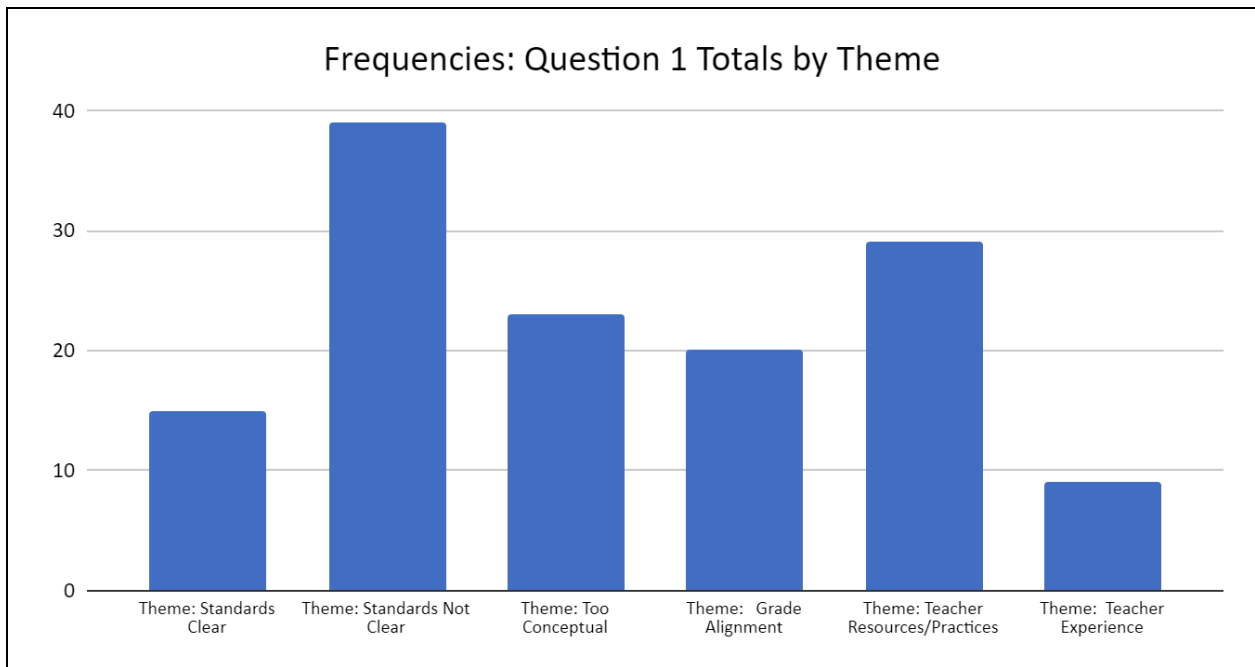
Qualitative Findings via Focus Groups

Eight regional focus groups were held face-to-face: one for each of the eight State Board regions. One additional focus group was held virtually: for charter schools. Each focus group included classroom teachers as well as school and/or district curriculum leaders. In total, 188 individuals participated in the focus groups.

The questions posed for all focus groups were those listed on page 13 of the NC Standard Course of Study Internal Procedures Manual, with the addition of a new question, gauging opinion of the mathematical skills, concepts, or knowledge all North Carolina graduates should possess. Graphs in this section are organized in order of the questions posed during the focus groups and indicate common themes in responses among the respondents.

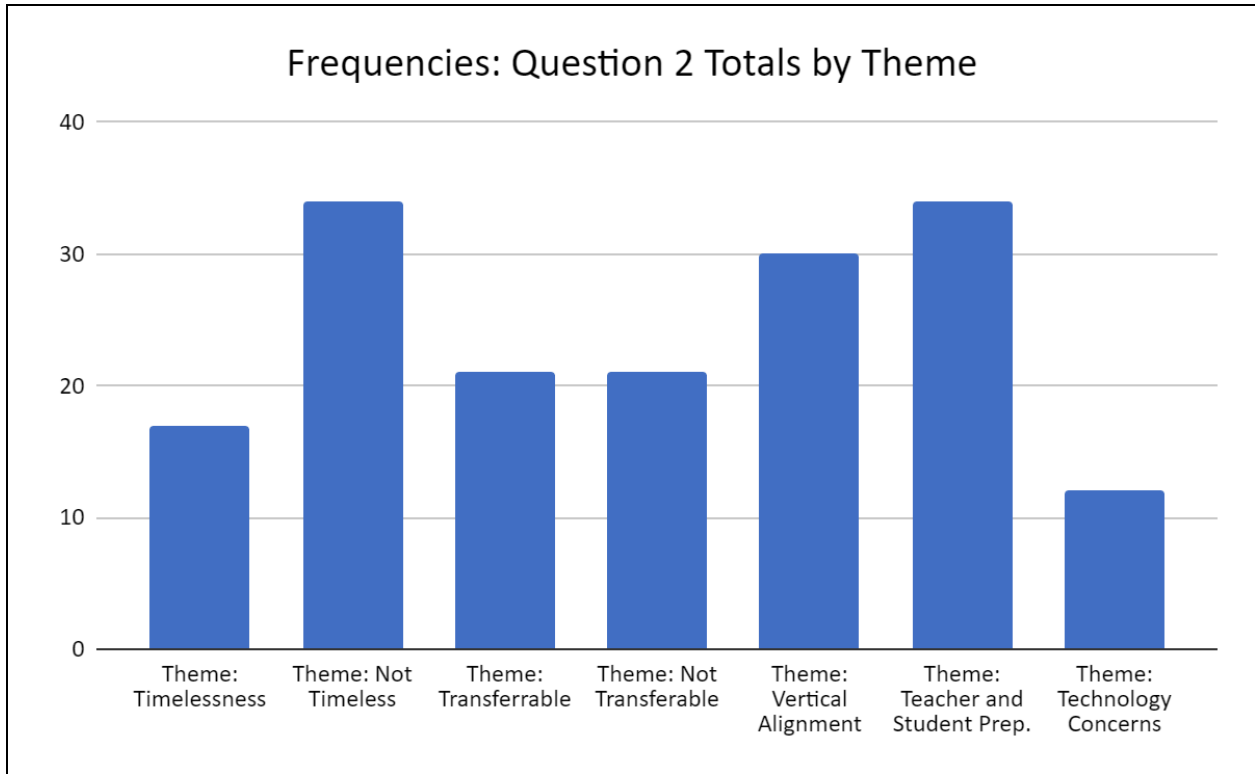
A codebook was created with terms used in categorizing the themes and trends within focus group responses. A link to the codebook can be found in Appendix D. Focus group responses are detailed below with each focus group question followed by a chart detailing the major themes identified from participant responses. The themes identified are listed along the bottom of each chart with each bar representing the number of times the theme was identified within the responses collected from participants across all focus groups.

Q1: Do the standards make a clear statement of what the student should be able to do or understand?

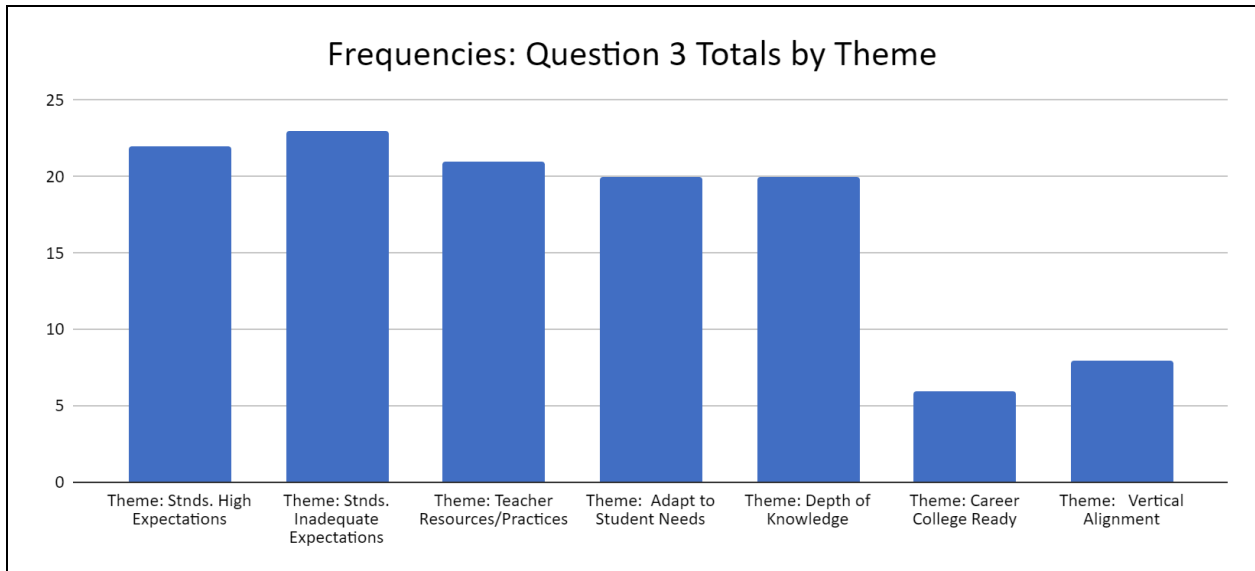


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Q2: Are the standards timeless, universal, and transferable?

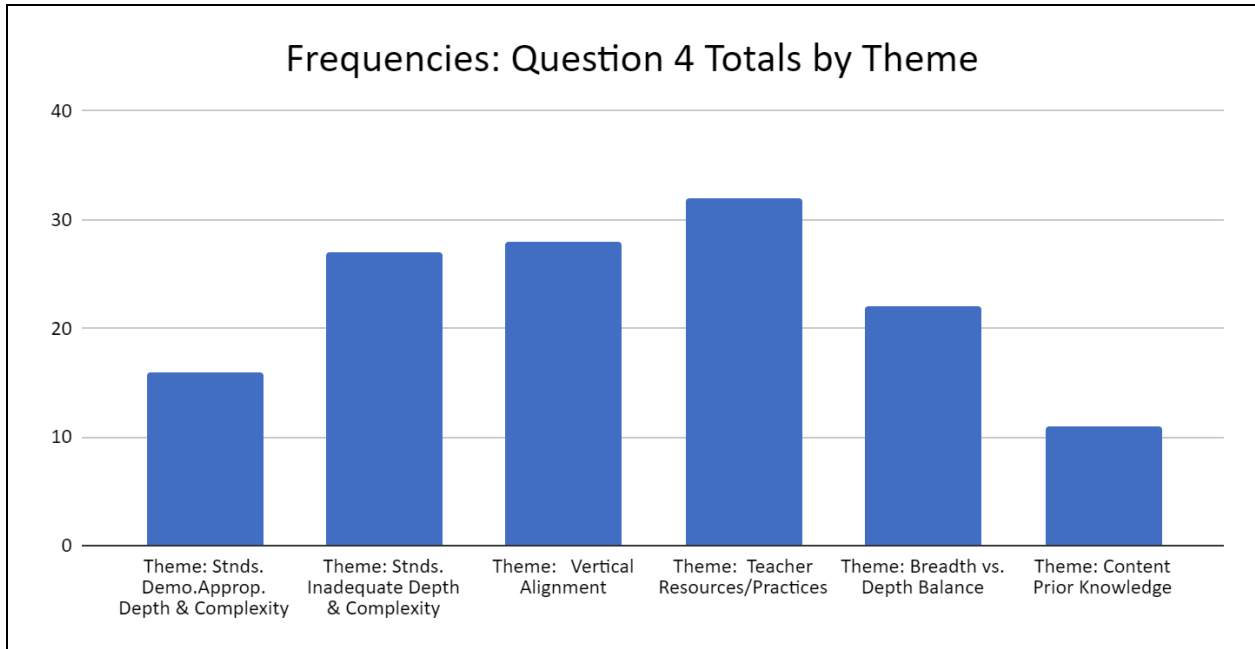


Q3: Do the standards adhere to high expectations for all students?

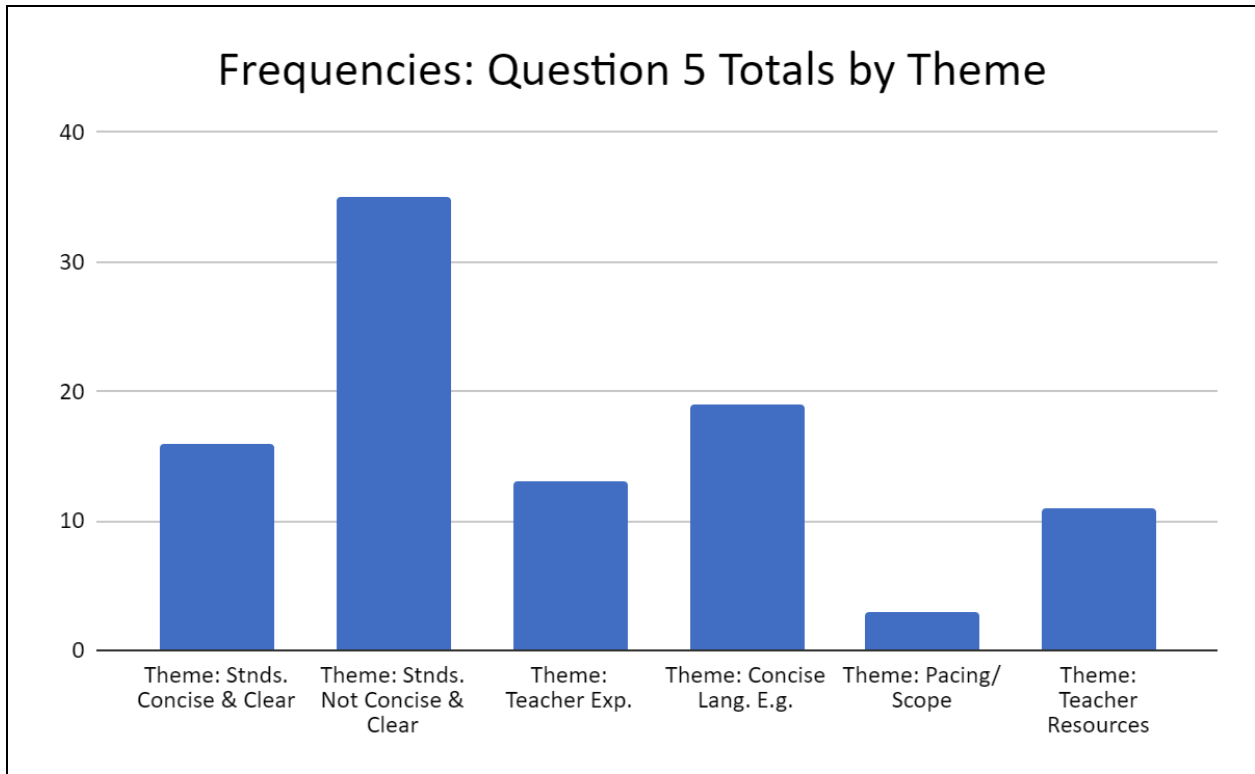


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Q4: Do the standards demonstrate appropriate depth and complexity?

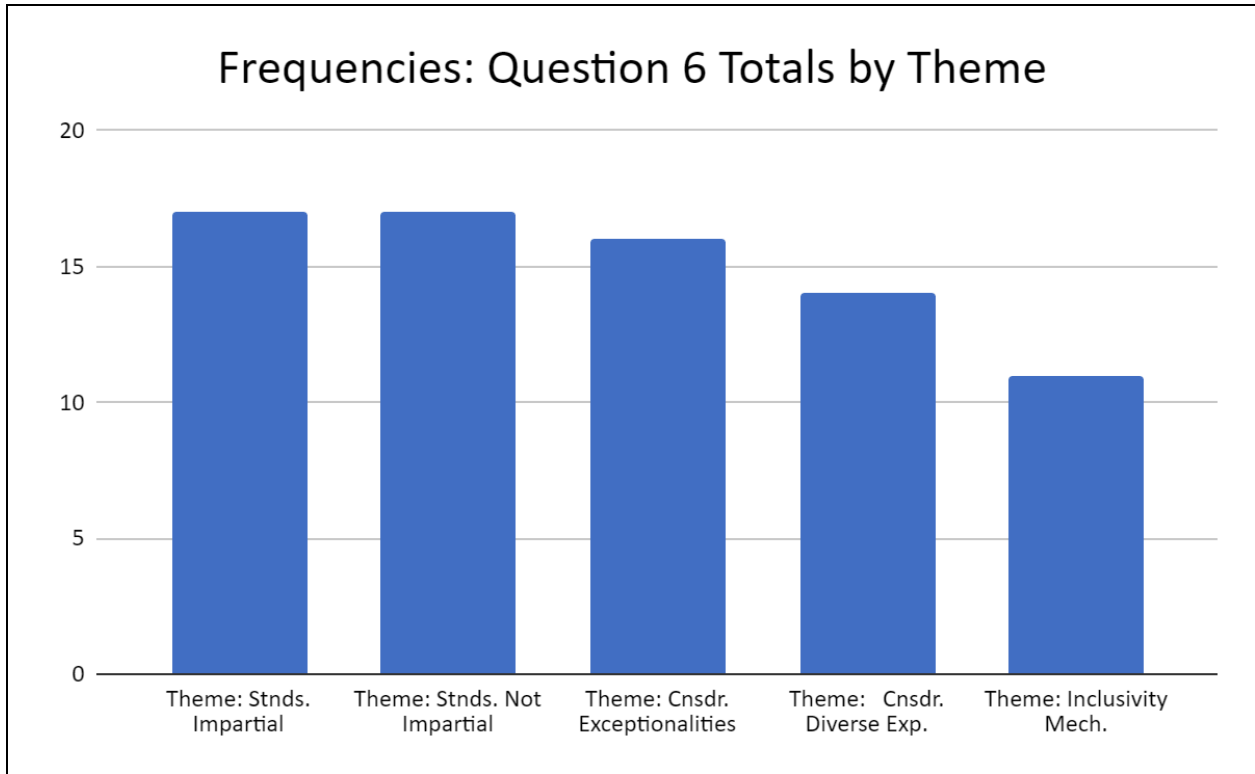


Q5: Are the standards concise and clearly articulated?

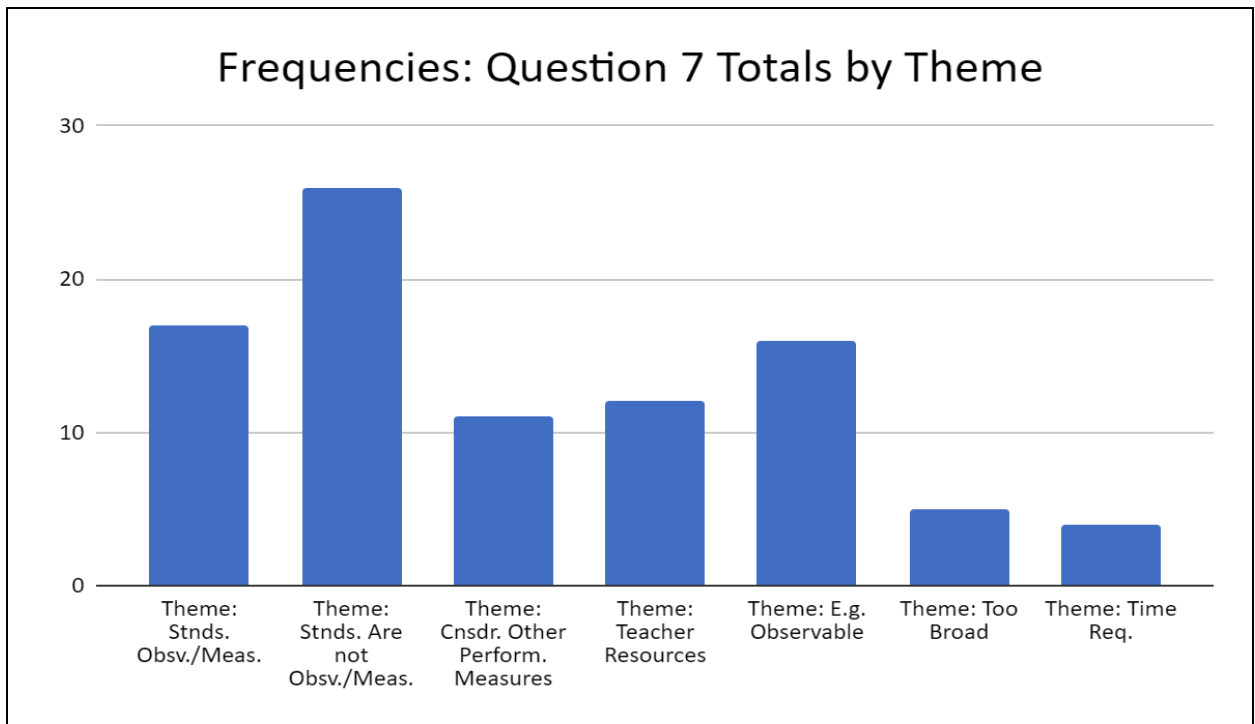


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Q6: Are the standards impartial and free of discrimination on the basis of gender, ethnicity, and/or disability?

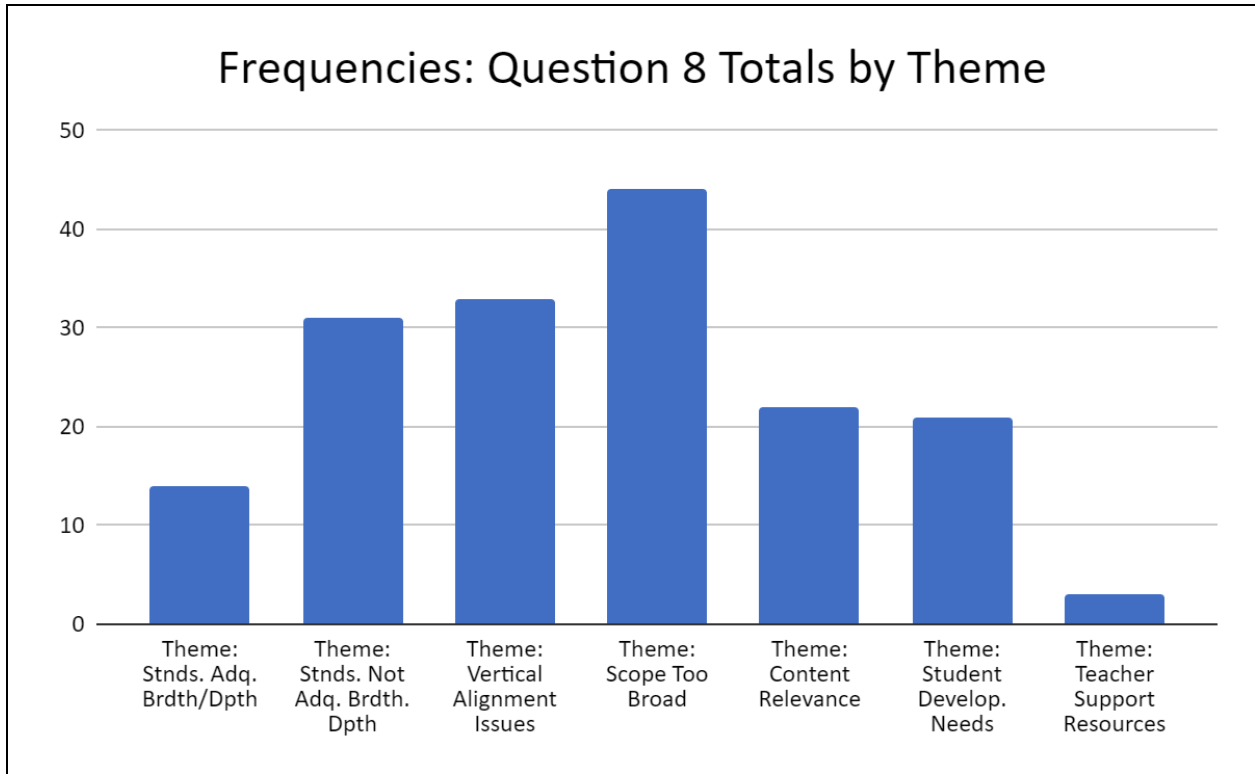


Q7: Are the standards observable and measurable?

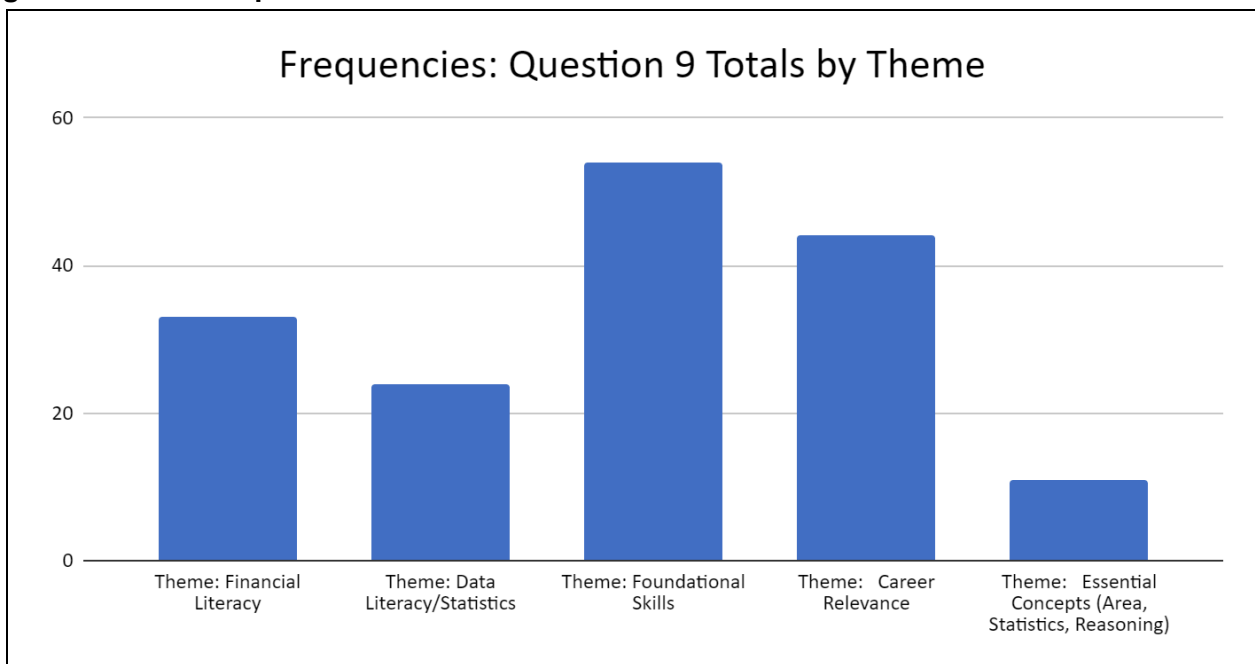


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Q8: Describe your level of satisfaction with the breadth and depth of the standards and objectives.

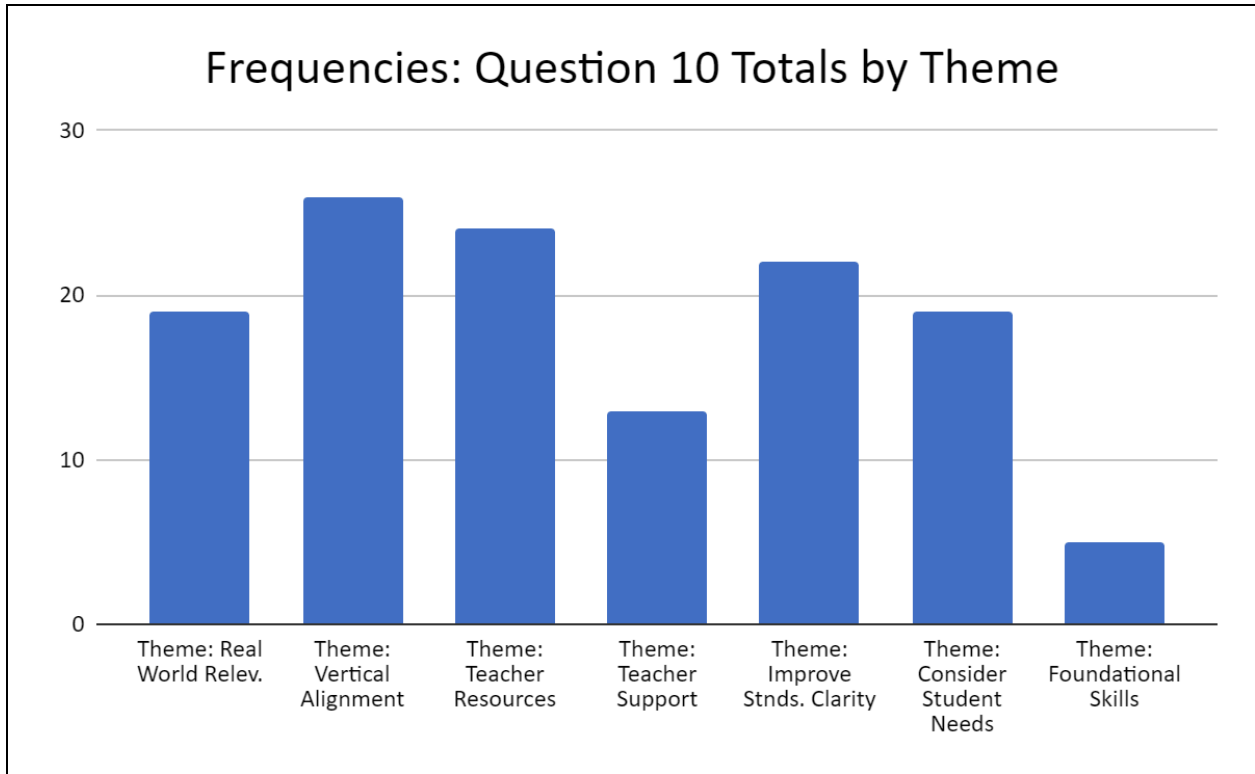


Q9: What mathematical skills, concepts, or knowledge do you think ALL North Carolina graduates should possess?



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Q10: Do you have additional thoughts on the standards, based on your role, location, experience, etc.?



Qualitative Findings via Interviews

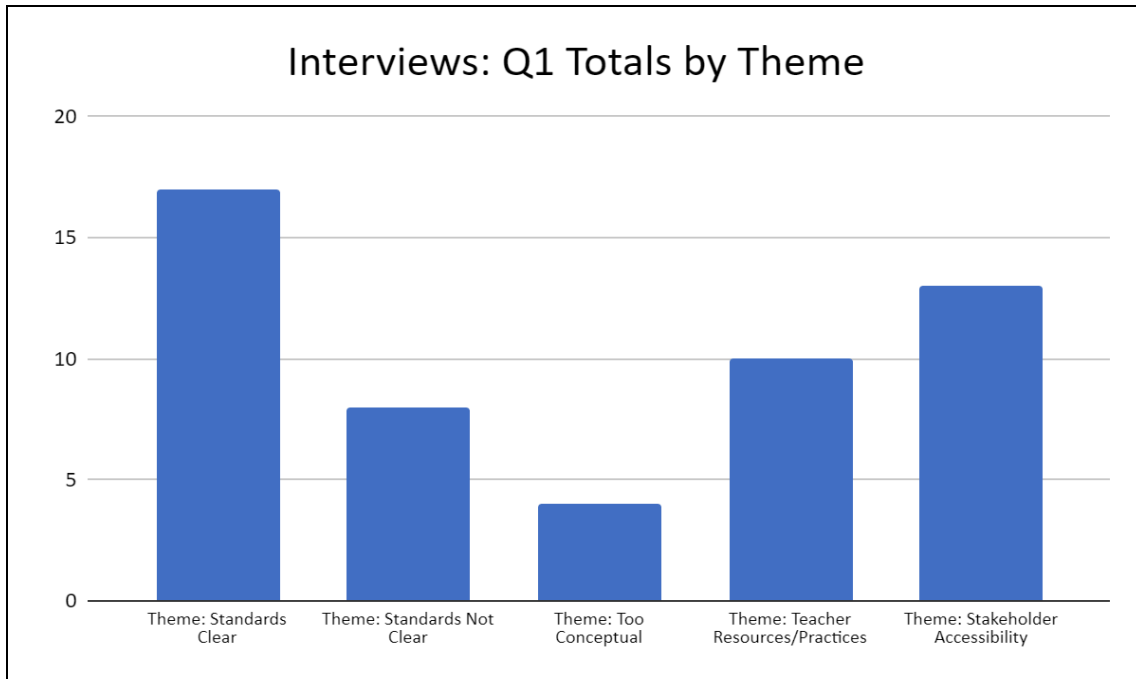
Eight (8) Individual interviews were conducted with representatives from a range of stakeholders including Institutions of Higher Education (IHEs), educators, a principal, and more.

The questions posed for all focus groups were those listed on page 13 of the NC Standard Course of Study Internal Procedures Manual, with the addition of a new question, gauging opinion of the mathematical skills, concepts, or knowledge all North Carolina graduates should possess. Graphs and themes in this section are organized in order of the questions posed during the focus groups and indicate common themes in responses among the respondents.

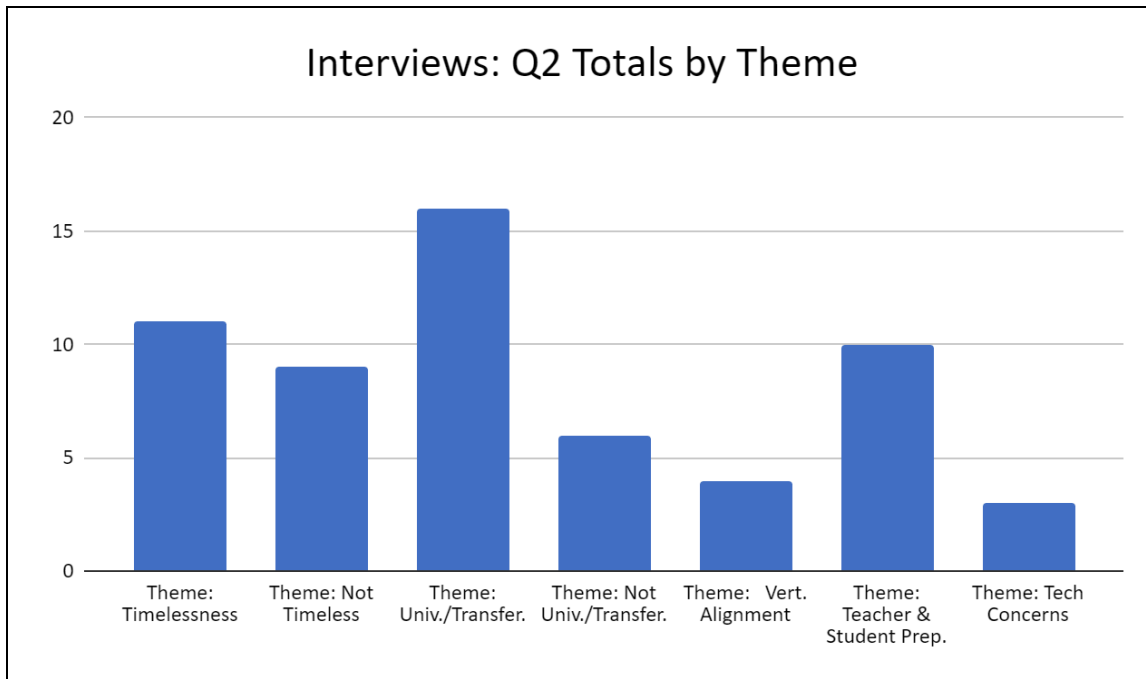
A link to the codebook used to assist with defining codes used in categorizing the themes and trends within focus group responses has been provided in Appendix D .

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Q1: Do the standards make a clear statement of what the student should be able to do or understand?

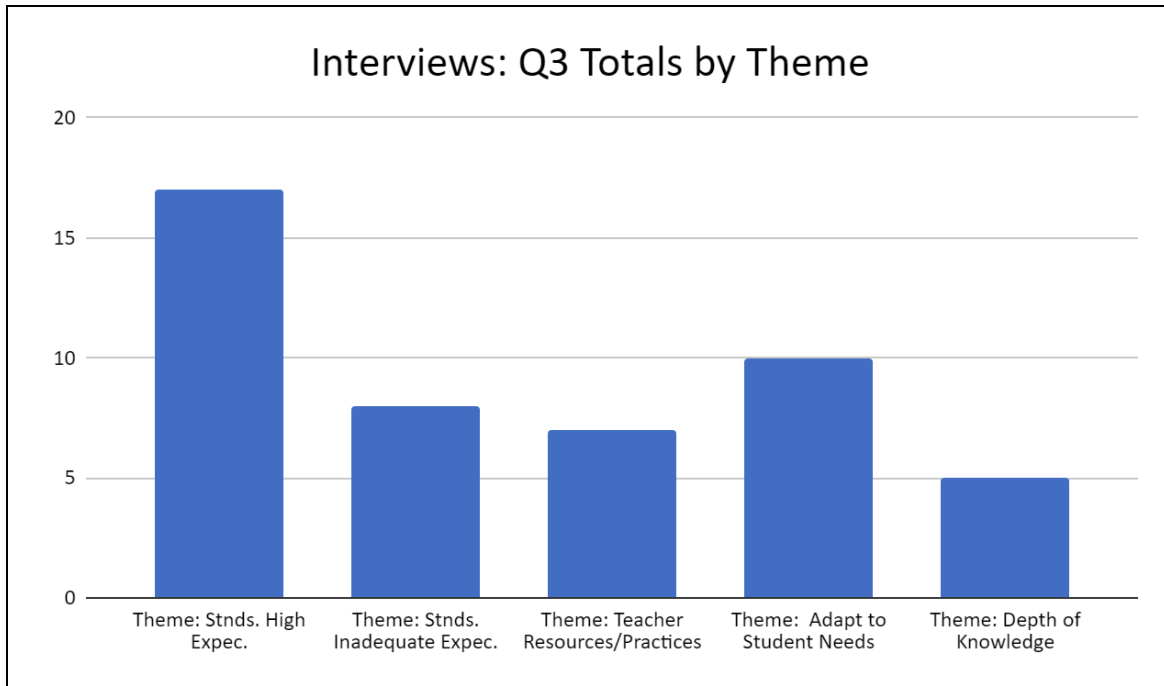


Q2: Are the standards timeless, universal, and transferable?

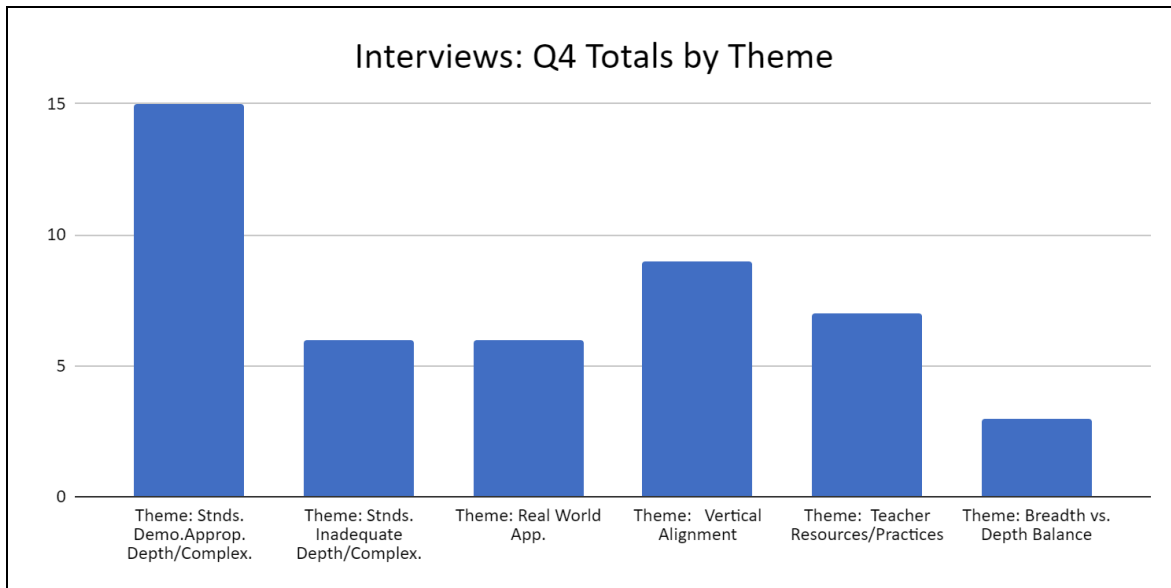


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Q3: Do the standards adhere to high expectations for all students?

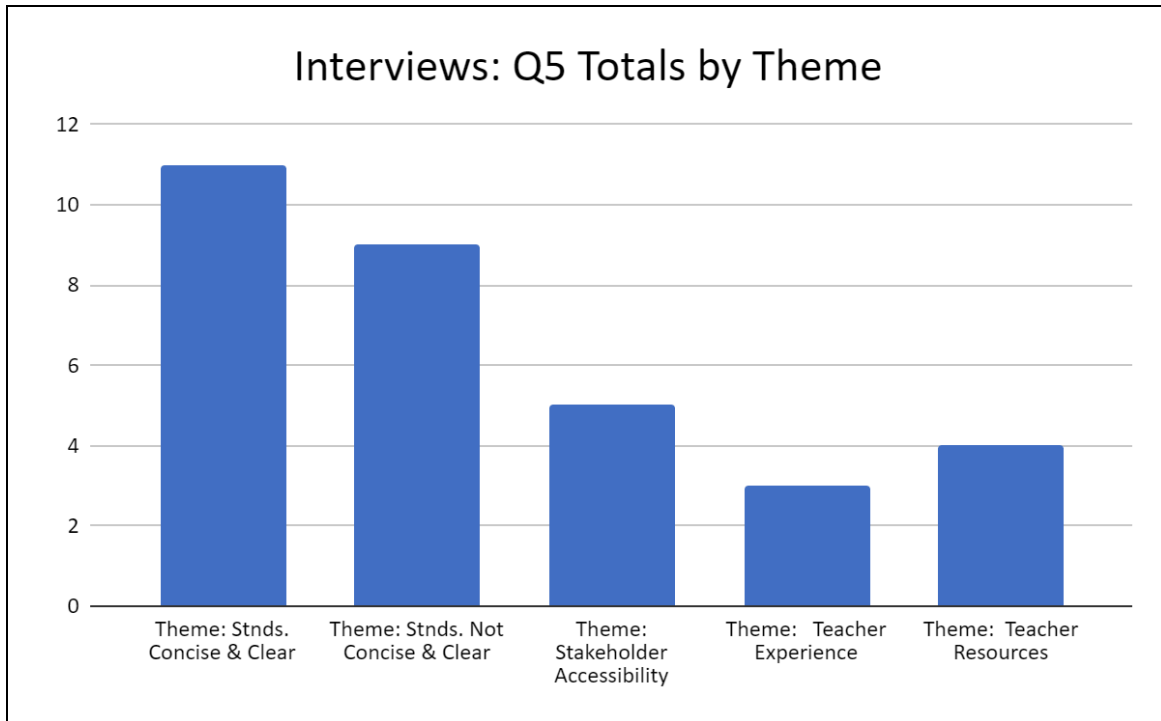


Q4: Do the standards demonstrate appropriate depth and complexity?

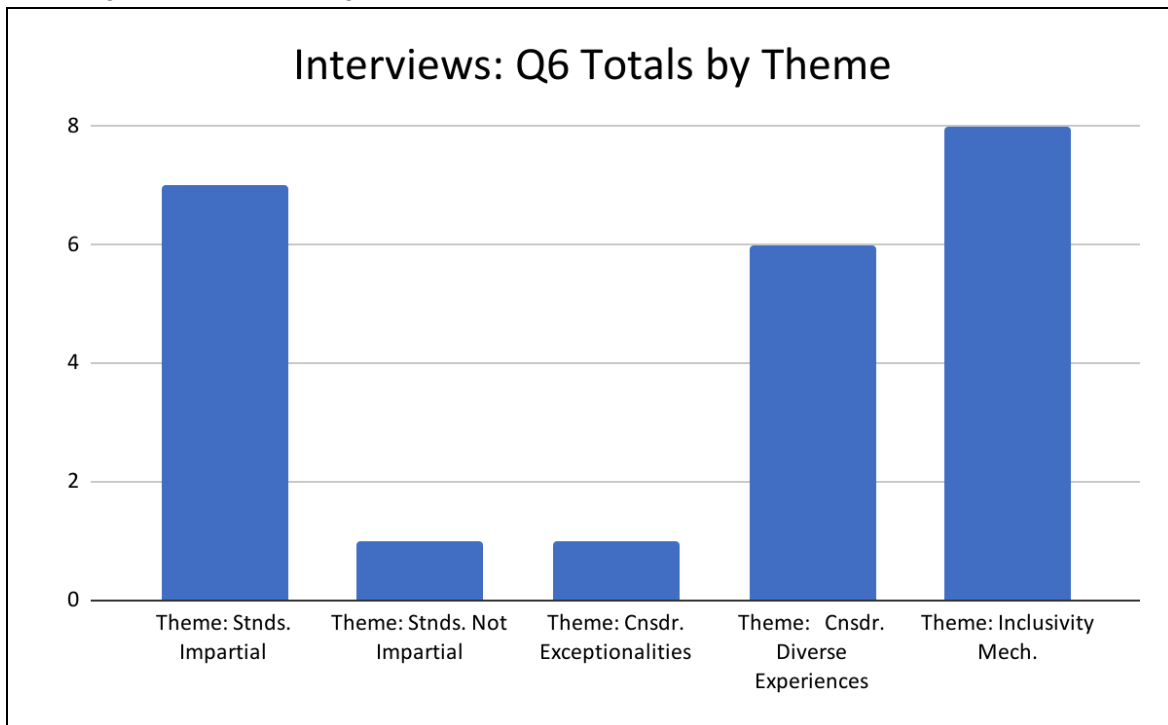


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Q5: Are the standards concise and clearly articulated?

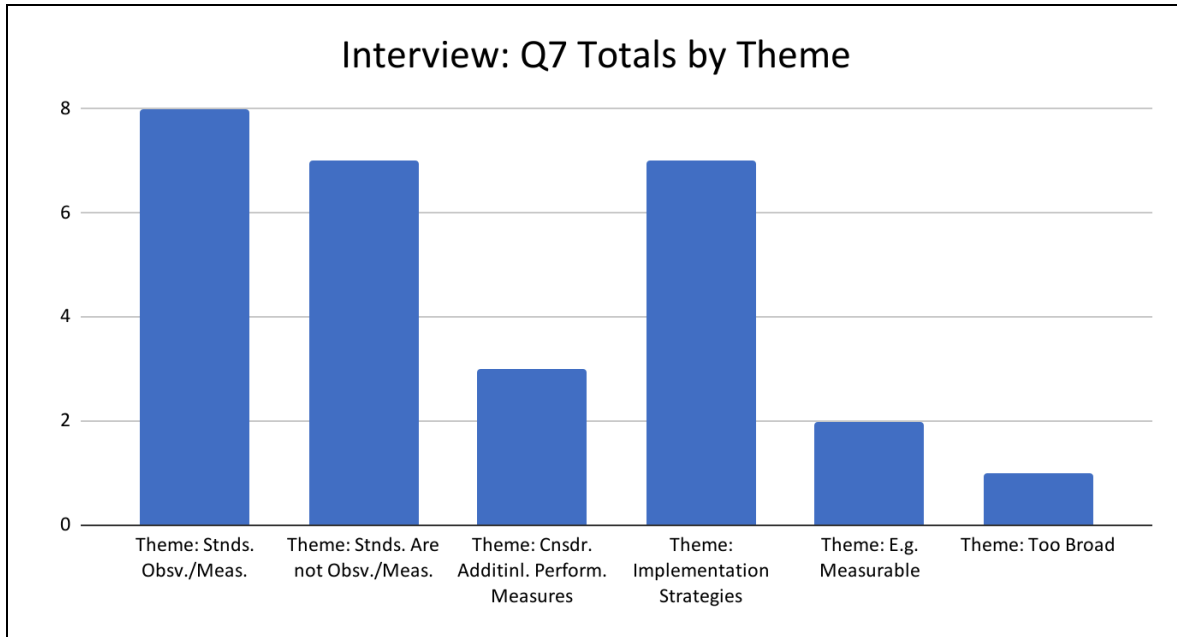


Q6: Are the standards impartial and free of discrimination on the basis of gender, ethnicity, and/or disability?

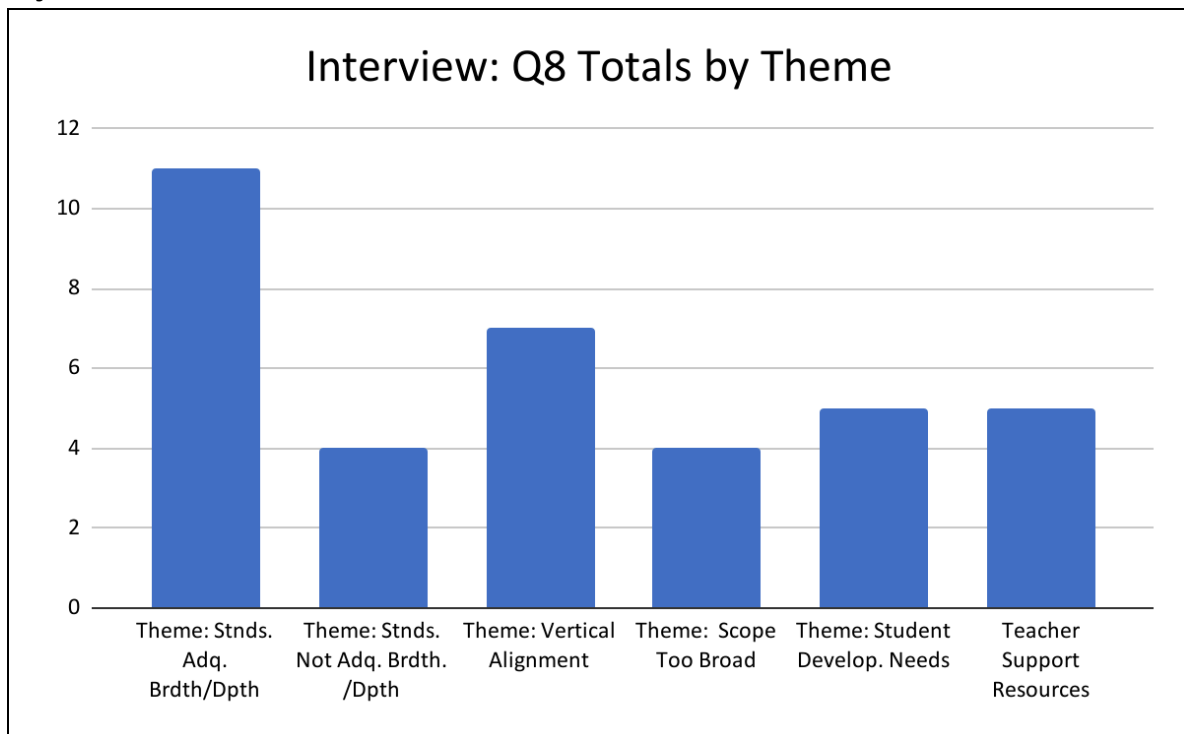


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Q7: Are the standards observable and measurable?

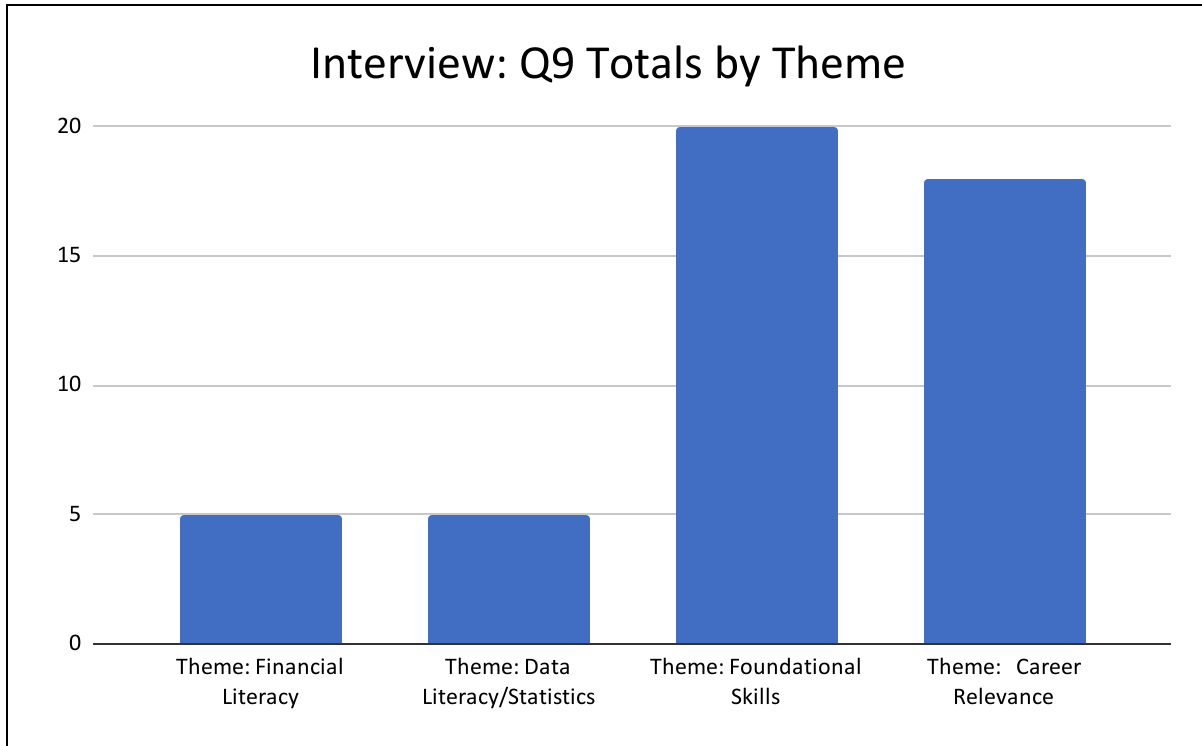


Q8: Describe your level of satisfaction with the breadth and depth of the standards and objectives.

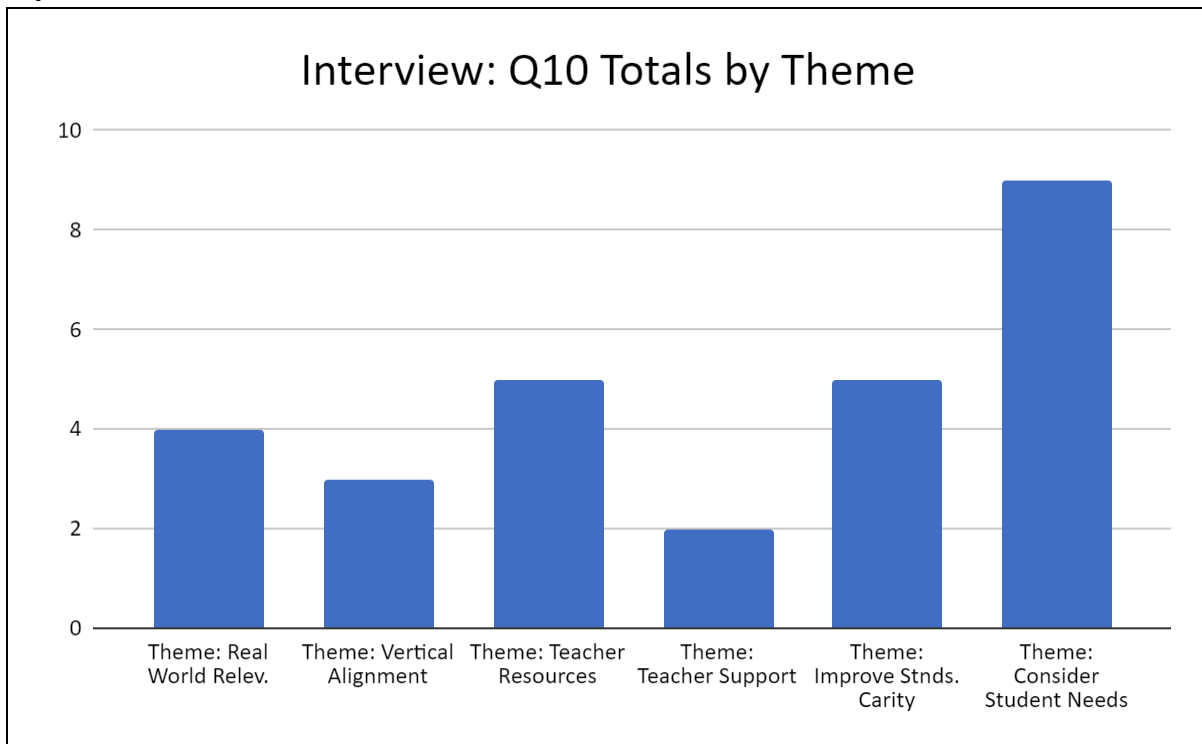


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Q9: What mathematical skills, concepts, or knowledge do you think ALL North Carolina graduates should possess?



Q10: Do you have additional thoughts on the standards, based on your role, location, experience, etc.?



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Essential Mathematical Skills and Knowledge for All North Carolina Graduates

As a further explanation of the answers provided by participants in both the focus groups and interviews, a more detailed review of the themes surrounding what skills, concepts, or knowledge all North Carolina graduates need was conducted. The following charts provide additional information from participants. The first chart provides additional information from focus group participants, the second chart contains details from interviews. Items in bold are themes that were shared across focus groups and interviews.

Theme	Most Frequently Stated Essential Mathematical Skills and Knowledge for All North Carolina Graduates (Across All Focus Groups)
Foundational Skills	All 8 Mathematical Practice Skills, Basic Operations , Time, Basic Operations, Fractions, Number Sense, Decimals, Percentages, Estimation, Place Value, Geometry: Shapes, Measurement, Patterns, Ruler/Tape Measurement.
Financial Literacy	Basic Money Management (E.G. Counting Out/Back Cash), Budgeting And Balancing, Interest And Loans, Financial Percentage Rates, Consumer Math.
Career Relevance	Logic And Problem Solving (Foundational Math Connecting To Careers, Strategizing, Critical Thinking), Real Life Application, Interdisciplinary Connections (Math Tied To Various Other Subjects), Tech And Tools (E.G. Use Of Industry Relevant Software And Computational Logic Like Spreadsheets), Perseverance, Argumentation.
Data Literacy and Statistics	Interpreting And Analyzing Data , Recognizing Patterns And Relationships (Regression, Connections Across Datasets), Quantitative Reasoning And Modeling, Statistical Tools And Visualization, At Least a Functional Understanding of Statistics .

Theme	Frequently Stated Essential Mathematical Skills and Knowledge for All North Carolina Graduates (Across All Interviews)
Foundational Skills	Basic Operations , Algebra, Mathematical Properties, Quadratic Functions, Trigonometry
Financial Literacy	Basic Money Management Skills
Career Relevance	Importance of a Math Identity, Interdisciplinary Connections, Critical Thinking, Real World Application
Data Literacy and Statistics	Statistical Significance, How Data is Collected and Represented.

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Data Review Committee Recommendations

Based on the trends, themes, data, and research provided, members of the Data Review Committee (DRC) completed a standards-by-standards set of recommendations for possible revisions to the K-12 Math Standard Course of Study. The spreadsheets linked below provide details of their findings organized by each of the current K-12 Math Standards.

For each standard that applies to a grade/course, DRC members provided a recommendation and information related to the data source(s) that led them to the recommendation. Possible recommendations included:

- Keep as is - color-coded in green
- Keep as is but move grade level - color-coded in magenta
- Needs minor revisions - color-coded in light blue
- Needs revisions - color-coded in dark blue
- Remove No longer relevant - color-coded in red

The table below provides links to each DRC worksheet detailing the recommendations for each standard or objective and the reason for the recommendation. The following sections provide a high level description of the suggestions made for each course, or grade level, within the K-12 Math Standard Course of Study.

DRC Grade/Course Recommendations Detailed Worksheets		
Kindergarten	First Grade	Second Grade
Third Grade	Fourth Grade	Fifth Grade
Sixth Grade	Seventh Grade	Eighth Grade
NC Math 1	NC Math 2	NC Math 3
NC Math 4	Precalculus	Discrete Math for Computer Science

Kindergarten-2nd Grade Recommendations

Kindergarten

For Kindergarten, the DRC recommends 12 standards without changes and 11 standards with minor to major revisions and does not recommend any standards to be removed. The DRC made the following recommendations for each domain.

Counting and Cardinality

The DRC recommends that counting backward is included based on research from Clements & Sarama (2014) and other state standards included in the research portfolio. The committee also recommends the use of precise language such as fewer than, or greater than when comparing quantities and identifying the number of objects. Further, the DRC recommends

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that estimation is included within the counting and cardinality standards. These recommendations were made based on state standards included in the research portfolio and stakeholder survey feedback suggesting the need for increased vertical coherence.

Operations and Algebraic Thinking

The DRC recommends the inclusion of the symbolic representation of addition and subtraction, combining two standards, and including a standard that addresses patterning. The research supporting these changes was based on state standards in the research portfolio and research from Clements & Sarama (2014) and Van de Walle (2019).

Measurement and Data

The recommendations for the standards in this domain focused generally on including precise language and including opportunities for students to explain their mathematical thinking. The research supporting these changes was based on state standards in the research portfolio. Further, the DRC recommends including opportunities for students to engage in the statistical problem-solving process that are aligned with expectations in Kindergarten.

Geometry

Recommended revisions for geometry emphasize specifying the kinds of shapes students should be working with when engaging in the standard and increasing a focus on spatial reasoning. The recommendations came from a review of state standards in the research portfolio and research from Clements & Sarama (2014).

First Grade

For first grade, the DRC recommends 9 standards without changes, 13 standards with minor to major revisions, and 1 standard to be removed. The DRC made the following recommendations for each domain.

Operations and Algebraic Thinking

The committee recommends dissolving specific properties as strategies standard (OA.3) and include those strategies more authentically within each of the standards where the strategy is appropriate. This is the only standard the committee suggests removing but wants to make sure the content is embedded in other standards.

Numbers and Operations in Base Ten

The DRC recommends including more skip counting within the rote counting standards as a way to provide more coherent skill progression to odd and even as well as addition and subtraction work in second grade.

Measurement and Data

The DRC has included some recommendations to consider to provide more specific connections to real world applications within this domain. Further, the DRC recommends including opportunities for students to engage in the statistical problem-solving process that are aligned with expectations in Kindergarten.

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Geometry

The DRC recommends including the expectations that students justify their reasoning within the geometry domain as well as provide more clarity for educators that equal shares is the precursor to fraction work in second, third, and grades beyond.

Second Grade

For Second grade, the DRC recommends 14 standards without changes and 9 standards with minor to major revisions. The committee made the following recommendations for each domain.

Operations and Algebraic Thinking

The DRC recommends adding a few words for clarity in two standards within this domain as a way to respond to survey data and uses other state standards as a specific data source.

Numbers and Operations in Base Ten

The DRC recommends adding counting backwards and building on the skip counting the committee recommended to include in first grade. The committee referenced other state standards and feedback for vertical alignment in the survey data. Further, the committee suggests expanding the strategies students have access to in second grade. To make this recommendation, other state standards were referenced and feedback calling for the vertical alignment of grade level standards in the survey data.

Measurement and Data

The DRC recommended that this domain include two-step word problems and the number line. The committee also recommends adding the concept of equivalency between coins and dollars. Skip counting can also be reinforced in this standard. Further, the DRC recommends including opportunities for students to engage in the statistical problem-solving process that are aligned with kindergarten expectations.

Geometry

The DRC again recommends providing clarity for educators that equal shares is the precursor to fraction work in third grade and beyond.

3rd-5th Grade Recommendations

The 3rd- 5th grade team recommendations are based on the quantitative and qualitative data received, including the data from survey feedback about changes standard by standard. The team included overall recommendations, along with specific grade level feedback.

Overall Notes

- Overall trends from qualitative and quantitative feedback data demonstrate a need for clarity in the standards' language. Whenever possible, clarify and simplify language in and across standards.

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- Use consistent language across all grades, especially with the term “algorithm”.
- Integration of “real-world” contexts across problem solving standards.
 - Related to the recommendation of incorporating “real-world”, an emphasis on data and statistical literacy language embedded into standards.
- Recommendation to teach fractions and decimals more concurrently and make them clear in the standards. Standard language should include connections between fractions and decimals.
 - Consider including decimals in 3rd grade alongside fractions. Consider how that would potentially impact 4th and 5th grade standards.
- Recommendation to explicitly teach estimation strategies as its own standard in 3rd grade, then embedded in standards involving real world problems in 4th and 5th to determine reasonableness.
- Based on some PSU Data and comments in 5th grade Geometry, include work around 3D shapes in 2nd-4th grade before application work with the volume of rectangular prisms in 5th grade. Perhaps 3rd grade, since there is only one Geometry standard.

3rd Grade

- 7 standards are recommended for Keep as Is
 - These standards align with data from PSUs and stakeholders.
 - While no major changes are needed, improving flow across domains and ensuring consistent language is recommended for clarity and ensuring vertical articulation with previous math courses.
- 11 standards are recommended for minor revision
- 2 standards are recommended for revision
 - 3.OA.8
 - 3.NBT.2

4th Grade

- 9 standards are recommended for Keep as Is
- 13 standards are recommended for minor revision
- 3 standards are recommended for revision
 - 4.OA.3
 - 4.NF.3
 - 4.MD.2

5th Grade

- 9 standards are recommended for Keep as Is
- 7 standards are recommended for minor revision
- 1 standard is recommended for revision
 - 5.NBT.7

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6th-8th Grade Recommendations

Overall Notes

According to the 2024 NAEP report, the average score of eighth-grade students in North Carolina was 276, higher than the national average of 272. However, the average score for North Carolina students in 2024 did not significantly differ from their average score in 2022 (274) and 2000 (276). These scores indicate that North Carolina is well-positioned nationally, yet there remains room for improvement in how students encounter and learn mathematical concepts during their middle school years. There are general trends within the data and standards that should be addressed when revising the standards. These overall trends are discussed in greater detail in their respective sections.

- Trend 1: Discrepancies between the Number System (NS) standards and elementary standards (particularly regarding fraction development)
 - Discussions with the Grade 3-5 DRC team reveal a clear discrepancy in how fractions are taught in elementary school and how those skills transition to middle school. Even within the middle school standards, there are alignment issues concerning fractions.
- Trend 2: Discussion of overall K-12 Statistics and Probability (SP)
 - In broader discussions with elementary and high school educators, a recurring theme emerges: the SP standards require realignment. Many topics and skills appear disjointed and misaligned. This conclusion is also supported by feedback, national research, and standards alignment in other states.

Ratios & Proportions Domain

A majority of the standards need little revision, typically a rewriting or rewording of the standard. The importance of ensuring that these standards align (both developmentally and logically) since the Ration and Proportions (RP) standards was stressed as many have connections to other domains such as Functions, Geometry, and Number Sense. In addition, since this domain is only found in middle school, it further emphasizes the importance of the alignment of skills and knowledge within the RP domain, and to the other domains as well.

- **Sixth grade's** data indicates very few changes to the Ratio and Proportion domain, with the exception of NC.6.RP.4. The comments and recommendations for most of the standards were to keep them the same with minor or no revisions.
- **Seventh grade's** data indicates more revisions than for 6th grade. Except for NC.7.RP.3, the other two standards are recommended to have small changes, if any.
 - The biggest concern for NC.7.RP.2 is the length of that standard. The bullets could be their own standards since they do teach different skills. The team recommends keeping slope in with 8th grade (surveys, other states), but a better connection between 7th grade's RP standards to Functions in 8th grade needs to be addressed.

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- NC.7.RP. 3 is one of the highest ranked standards for PSUs for change or revision. It is an example of a standard that is a “catch all”. When discussing rigor, the issue becomes the difference between building conceptual knowledge versus application. Students are learning about scale factors and then using them and unit rates in proportional relationships to solve ratio and percent problems. The recommendation is to separate the understanding from the application. Several of the states do not include scale factor at all in the discussion of proportionality and it is discussed in geometry.

Functions Domain

It is recommended to retain most of the function standards with only minor revisions to one standard. The goal is to keep functions simple and familiar in 8th grade, ensuring a smooth transition from 7th-grade proportional thinking to 8th-grade function-based reasoning. While maintaining familiarity, it is equally important to prepare students for higher-level mathematics, including Math 1, Math 2, Math 3, and real-world applications. These critical components were at the forefront of the recommendations.

- Keep As Is: NC.8.F.1, NC.8.F.2, NC.8.F.3, NC.8.F.5. (About 90% of participants said to keep)
- Needs minor revisions: NC.8.F.4. Over 90% of participants supported keeping the standard; however, comments indicate that it contains too much information and would better serve students if divided into smaller standards.

Number System Domain

The middle school group recommends revisions to the vertical progressions of the number system and number operation standards to provide smooth transitions and prevent gaps in building understanding from year to year. Recommendations also include clarifying the language of the standards and developing a progression of exponent understanding across Grades 6, 7, and 8. Minor revisions for more clarity in the language of the standards are also noted in the Standards Worksheet.

6th Grade

The revisions highlight more explicit and clear expectations regarding these skills to ensure that students advance to the next grade level with a solid number system foundation.

Recommendations include:

- creating separate standards for building fluency and applying fraction/mixed number operations of addition/subtraction and multiplication/division
- clarifying the language of long division in relationship to the 5th-grade standard
- including estimation in the operation standards
- Connecting conceptual understanding of decimal operations from 5th grade to developing the algorithm in 6th, adding language for application of the decimal operations, and limiting decimal place value in problems
- clarifying forms of rational numbers used in comparisons
- Developing a conceptual understanding of all integer operations

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7th Grade

The 7th grade number system standards extend students' understanding of rational numbers, focusing on addition, subtraction, multiplication, and division. Procedural fluency with these operations is essential for mastering other standards, including complex fractions in unit rates, solving equations with fractional coefficients, using multistep geometric formulas, analyzing data, and computing probabilities. Discussions with the 3rd-5th grade level team suggested placing parameters on the rational numbers used in these applications to support conceptual understanding of the standards found in the other domains.

To lay a solid foundation for these skills, revisions include moving the conceptual understanding of all integer operations to the 6th grade and clarifying the language of the standards. These changes were prioritized based on survey feedback highlighting the importance of clear and precise language.

Recommendations include:

- Include estimation
- Place limitations on decimal values in operations
- Separate the definition and development of rational numbers from the multiplication/division standard to create a dedicated standard focused on rational numbers
- Move the conceptual understanding of multiplication and division of integers to 6th grade to lay a stronger foundation for future learning

8th Grade

Survey feedback highlighted a concern regarding the lack of vertical progression in the development of exponents. While exponents are introduced in 6th grade, no specific standard focuses on this concept in 7th grade. This presents an opportunity for revision in the middle school standards to foster a deeper understanding of exponents, ensuring a smoother transition to upper-level math courses.

Recommendations include:

- Move operations involving rational and irrational numbers from Math 2 to support estimating the value of expressions to 8th Grade
- Move scientific notation from the Expression and Equation domain to the Number System domain in 8th Grade

Equations & Expression Domain

The recommendations described here align with the work happening in other states and align with the feedback provided by North Carolinians.

Recommendation 1: Establish a logical vertical progression for equations and inequalities with the following recommendations for vertical progression:

- 6th: one-step equations and inequalities with all four operations
- 7th: multi-step equations and inequalities with the variable on one side
- 8th: multi-step equations and inequalities with the variable on both sides

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- Separate equations and inequalities into their unique standards at every grade level in the 6-8 band.
- Clarify the wording of the equations and inequalities standards to create a logical vertical progression.

Recommendation 2: Move scientific notation standards (NC.8.EE.3, NC.8.EE.4) to the Number System domain. The scientific notation standards are well-represented in their current language and grade, but that they may have better buy-in from stakeholders if they were more logically included as the culmination of the middle school Number Systems domain rather than in the Expressions and Equations domain.

Geometry Domain

The recommendations described here align with the work happening in other states and align with the feedback provided by North Carolinians.

Recommendation 1: Establish a logical vertical progression for surface area and volume. The following recommendations support vertical progression:

- 6th: rectangular prisms (volume, surface area, nets)
- 7th: all prisms, cylinders, 3D objects composed of prisms and cylinders (volume, surface area, nets)
- 8th: spheres, pyramids, cones (volume)
- Adding $V=Bh$ to 6th grade means that students would be introduced to $V=Bh$ in 6th, find volumes of solids with two bases (prisms and cylinders) in 7th, and the volume of solids with one base (cone and pyramid) or no base (sphere) in 8th.
- Using $V=Bh$ in 6th to reinforce area work in NC.6.G.1 matches the recommendation in 7th of adding cylinder volume to reinforce the area work with circles in NC.7.G.4.
- All of the volume formulas that have a factor of $1/3$ in them are grouped together in the 8th grade content.
- Add formula usage to 6th grade volume standard
- Move pyramid surface area from 6th grade to 8th grade
- Move pyramid volume from 7th grade to 8th grade
- Move cylinder volume from 8th grade to 7th grade
- Consider adding cylinder surface area to 7th grade

Recommendation 2: This recommendation is a reorganization of content encapsulated with grades 7 and 8, not adding or deleting concepts nor impacting the elementary or high school courses on either side of this grade band.

Recommendation 3: Remove NC.8.G.2 and NC.8.G.4 to Math 2 and expand NC.8.G.3 to include reflections over any horizontal or vertical line in the coordinate plane.

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Statistics & Probability Domain

The recommendation is that the middle school Statistics & Probability (SP) standards need some revision. There is a need for a K-12 overhaul of the Statistics and Probability standards to ensure a vertical alignment of K-12 concerning statistics, data science, and probability. In some cases, there are significant gaps in time between when students see the material again in practice - e.g., Probability is introduced in 7th grade and not introduced again until Math 2.

6th Grade

Recommendations are for minor changes to the standards. Many of the comments from the surveys and focus groups were about rewording the standard to make it easier to understand.

- NC.6.SP.3b was the standard with the most feedback to change or remove, especially from stakeholders. Most of the comments were about rewording, calculation versus application, and relevancy.

7th Grade

Recommendations are for minor changes to the standards, just like with sixth grade. Many of the comments from the surveys and focus groups were about rewording the standard to make it easier to understand.

- NC.7.SP.2 and NC.7.SP.3 were the two standards with the largest amount of feedback to change/remove (SP. 2: 31% of PSUs and 36% of stakeholders want to change/remove this standard. SP 3: 45% of PSUs and 43% of stakeholders want this standard changed/removed.)

8th Grade

Recommendations are not to remove or change the SP standards, except for NC.8.SP.4. The recommendations for the scatter plot standards were minor and were about rewording the standards.

9th-12th Grade Recommendations

The findings and recommendations for high school math standards emphasize the need for clearer, more concise language and better vertical alignment of concepts. Stakeholders, including focus groups and survey participants, found the current standards unclear, overly complex, and broad in scope.

Overall recommendations:

1. Clarity & Alignment – The standards should be more straightforward and vertically aligned across K-12 to create a logical progression of learning, particularly in Statistics and Probability.

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2. Course Structure & Content Placement – Improving the vertical alignment of content to ensure deeper learning and mastery over time, with better scaffolding from grade to grade.
3. Relevance & Real-World Applications – Emphasizing mathematical modeling, real-world problem-solving, and technology integration (e.g., Desmos, AI) will better prepare students for modern careers.
4. Differentiation of Core vs. Optional Learning – Standards should clearly define what all graduates must learn versus what students should have the opportunity to explore in more advanced courses.
5. AP Precalculus - In reviewing the AP Precalculus course syllabus, the committee recommends implementing AP Precalculus as the course that public high schools in North Carolina offer. Standards for AP Pre-Calculus are rigorous, similar to the ones North Carolina already provides, and nationally vetted.

NC Math 1

Both research and focus groups highlighted the importance of making math relevant by emphasizing real world applications and mathematical modeling. A stronger focus on modeling within functions and statistics would reinforce the usefulness of mathematics in problem-solving and career readiness. Additionally, integrating evolving technologies, such as graphing calculators (Desmos) and artificial intelligence (AI) as suggested in the survey and feedback group data, would better align with industry demands and modern skill sets.

Math 1 currently has 46 standards. The data shows that 10 standards need revision, 6 standards needing to be moved to other courses, 1 removal, and 29 Keep.

- Keep as Is (29 standards)
- Remove (1 standard)
 - NC.M1.F-LE.3 (End Behavior): End behavior is an expectation in Math 2 and Math 3
- Keep as is but move (6 standards)
 - NC.M1.F-IF.3 and (Recursive and Explicit Sequences)
 - NC.M1.F-BF.2 (Recursive and Explicit Sequences - Translate Between)
 - NC.M1.G-GPE.4 (Coordinate Geometry - Perimeter, Area, and Verify Triangle or Quadrilateral Figures)
 - NC.M1.G-GPE.6 (Distance and Midpoint): This standard is a support standard for NC.M1.G-GPE.4. This standard is not included in Utah's 1st math course, and Virginia connects this standard with applications within geometry rather than abstract information.
 - NC.M1.S-ID.6b (Residuals): It is beneficial for all students to understand how to interpret or use a residual, but not necessarily how to calculate one without technology.
 - NC.M1.S-ID.9 (Association and Causation)

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- **Revise (10 standards)**
 - NC.M1.A-SSE.1b (Interpret linear, exponential, and quadratic expressions): Increase specificity.
 - NC.M1.A-CED.1 (create equations and inequalities in one variable)
 - NC.M1.A-CED.4 (Solve for a quantity of interest in formulas)
 - NC.M1.A-REI.5 (Replacing one equation in a system)
 - NC.M1.A-REI.11
 - NC.M1.F-IF.4 & NC.M1.F-IF.7: Math 2 and Math 3 cover end behavior, increasing/decreasing, and positive/negative intervals.
 - NC.M1.F-IF.8a
 - NC.M1.F-BF.1a: Data from PSUs suggested the removal of arithmetic and geometric sequences from this standard.
 - NC.M1.S-ID.8: In alignment with NC.M1.S-ID.6 it is recommended to remove residuals from this standard.

NC Math 2

Math 2 currently has 54 standards. The data shows that 21 of the standards need revision, 11 standards need to move to another grade level or course, and 22 standards can remain in the course as is.

- **Keep as is (22 standards):** PSU and stakeholder survey data suggest keeping all other standards as is. In addition, Utah and Virginia also have standards that align with these standards in their level 2 high school math course.
- **Revise (21 standards):** Survey data indicates that PSUs and stakeholders requested the removal or revision of these standards. Focus group qualitative data identified trends for the standards to support more application of skills to solve real world problems and to utilize technology for more mathematical modeling. Focus group and survey data supports the need for revisions to make the standards more clear and concise and to remove ambiguity and confusion; however, the content should remain in the course.
 - **Algebra** - NC.M2.A-SSE.1a, NC.M2.A-CED.1, NC.M2.A-CED.3, NC.M2.A-REI.4a, NC.M2.A-REI.7, NC.M2.A-REI.11
 - **Functions** - NC.M2.F-IF.4, NC.M2.F-IF.7
 - **Geometry** - NC.M2.G-CO.9, NC.M2.G-CO.10, NC.M2.G-SRT.1a, NC.M2.G-SRT.1b, NC.M2.G-SRT.2a, NC.M2.G-SRT.3, NC.M2.G-SRT.6
 - **Statistics and Probability** - NC.M2.S-IC.2, NC.M2.S-CP.1, NC.M2.S-CP.3a, NC.M2.S-CP.3b, NC.M2.S-CP.4, NC.M2.S-CP.5
- **Keep as is but move to another grade level or course (11 standards):** Survey responses indicated that PSUs and stakeholders wanted these standards removed from the NC Math 2 course rather than revise. Neither Utah nor Virginia have this in the second level high school math course. The committee recommends moving these standards to a higher level course in which the concepts will be more applicable.

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- **Number and Quantity** - NC.M2.N-RN.3
- **Geometry** - NC.M2.G-CO.2, NC.M2.G-CO.3, NC.M2.G-CO.4, NC.M2.G-CO.5, NC.M2.G-CO.6, NC.M2.G-SRT.1c, NC.M2.G-SRT.1d
- **Statistics and Probability** - NC.M2.S-CP.6, NC.M2.S-CP.7, NC.M2.S-CP.8

NC Math 3

To ensure that Math 3 standards are clear, consistent, free from ambiguity, and vertically aligned, revisions should focus on the following:

- Using precise and consistent language that ensures all stakeholders interpret the standards in the same way.
- Tailoring content to meet the diverse needs of students pursuing different post-secondary paths while keeping the curriculum relevant to modern workforce demands.
- Shifting the focus away from rote memorization and towards critical thinking, problem-solving, and real-world applications.

Math 3 currently has 47 total standards across 5 strands and 15 uniquely identified domains.

- Keep as Is (24 standards)
 - These standards align with data from PSUs and stakeholders.
 - While no major changes are needed, improving flow across domains and ensuring consistent language is recommended for clarity and ensuring vertical articulation.
- Remove (2 standards)
 - NC.M3.G.CO.10 (Centers of Triangles): Data strongly supports complete removal.
 - NC.M3.G.GMD.3 (Volume): Removal requested by middle school educators and supported by feedback data due to a lack of clear vertical alignment.
- Keep but Move (11 standards)
 - These standards were identified as appropriate with some revisions but may not be necessary for all students to master fully.
 - Some may be better suited for a Math 3 course focused on post-secondary STEM pathways, while others align more with humanities-focused pathways.
 - A few may be more appropriate for a course beyond Math 3.

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- Revise (10 standards)
 - Revisions are needed to clarify student expectations and increase relevance.
 - Some standards require articulation across multiple standards for consistency in "grain size."
 - Others need a stronger emphasis on concepts and applications, reducing procedural focus. Data from the research portfolio and NC Stakeholder surveys and feedback group were very clear about the need for relevance to postsecondary and to our current and technologies.

NC Math 4

Math 4 would benefit from a strong focus on modeling mathematics in contextual situations. Research shows that this is critical for students to build a comprehensive knowledge of core content. It is also essential for students who continue to a post-secondary course such as MAT 143—Quantitative Literacy, which is heavily focused on application.

The data shows that many of the standards need revising, some need to move to other grade levels, a few removed, and the remaining need at least minor revisions even within the current course. The creation of pathways and restructuring of the statistics standards throughout K-12 would address a lot of these revisions and suggestions for change.

General Coursewide Feedback:

- Feedback indicated some stakeholders felt that the statistics standards should be removed and placed in a stand-alone fourth-level statistics course, while others felt that the statistics standards should be heavily focused as they apply more to general fields that students will enter post-high school. Some felt that the course should focus more on statistics and less on Math 2 or 3 repetition.
- Teachers shared that it is difficult to create a flow in NC Math 4. Math 4 is a mixture of topics that did not fit into previous Math courses. The standards in the course are such that topics are skimmed over and then left for another topic to be skimmed. Students would be better served with a course that places focus on a topic such as Statistics for students entering healthcare or business fields.
- Math 4 should be a precursor to a college math class.
- Some felt that the current fourth-level math options do not prepare all students for postsecondary options. Additional math course options, and pathways could be devised that better prepare students based on their life/career goals.

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Discrete Math for Computer Science

Ten standards in Discrete Math require minor revisions. PSU and stakeholder survey data suggest that many of the standards lack specificity. The data highlights the need for clearer and more specific language in the standards to help teachers better understand the intended direction and instructional goals (The unpacking document currently helps with some of these concerns). PSU and stakeholder survey data suggest reincluding the following topics in the course:

- Fair division
- Apportionment
- Voting theory
- Graph theory
- Cross-curricular connections

Precalculus

General Findings

In reviewing the AP Precalculus course syllabus, the committee recommends that writers and reviewers consider implementing AP Precalculus as the course that public high schools in North Carolina offer. Standards for AP Pre-Calculus are rigorous, similar to the ones North Carolina already provides, and nationally vetted.

If it is decided that a North Carolina written Precalculus course should be offered, the committee highlights the findings made below.

- Keep as Is (31 standards)
 - These standards align with data from PSUs and stakeholders.
 - While no major changes are needed, improving flow across domains and ensuring consistent language is recommended for clarity and ensuring vertical articulation with previous math courses.
- Remove (7 standards)
 - PC.N.2.1-PC.N.2.5: These standards are not relevant to the Precalculus course, and survey data suggests either no issue with the standard or to remove it.
 - PC.F.6.1-PC.F.6.2: PSU data has a high rate of interest in these standards being removed.
- Needs minor revisions (6 standards)
 - PC.A.2.3 A.2.3, F.1.4, and F.3.1 are all very similar. These standards either need additional clarification to describe the distinction between them or they may need to be combined under the same standard strand.
 - PC.A.2.4: This standard may need to be moved to the Function strand. Survey data indicate that this standard needs to be removed or changed.

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- PC.F.1.2: The verb/action should be changed to reflect more of an examination/recognition/description of what the graphs show more than interpreting the key features.
- PC.F.1.3: This standard should be specific to sine and cosine.
- PC.F.1.4, A.2.3, F.1.4, and F.3.1 are all very similar. These standards either need additional clarification to describe the distinction between them or they may need to be combined under the same standard strand.
- PC.F.3.1: These standards either need additional clarification to describe the distinction between them or they may need to be combined under the same standard strand.

Data Review Committee Conclusions

Following a detailed review of the national research, comparisons with math standards from other states, international frameworks, stakeholder survey data, and comments collected through focus groups and interviews, several key themes emerged regarding possible revisions to the current North Carolina Math standards.

- 1. High School Pathways & Course Structure** - Based on current research, survey data, and feedback collected from focus groups and interviews, there is a clear need to distinguish between essential mathematical knowledge all high school graduates must have and the additional concepts they should have opportunities to explore.

Research highlights the importance of ensuring that every student builds a strong foundation in core mathematical content vital for success in both everyday life and future careers.

The standards should prioritize universally applicable skills, equipping all students with the mathematical knowledge essential for informed decision-making, problem-solving, and analytical thinking, regardless of their post-secondary plans. Stakeholder feedback supports this view, as ensuring students' fundamental skills and career relevance emerged as recurring themes when stakeholders discussed the mathematical skills, concepts, or knowledge that all North Carolina graduates should possess. Specifically, the DRC concludes that the standards revision process should consider:

- Implementing a flexible pathways approach in which all students complete two high school level math courses (currently NC Math 1 and NC Math 2), followed by student-selected courses based on college, workforce, or other post-secondary aspirations.
- Clearly distinguish between essential knowledge for all graduates and optional advanced concepts for deeper exploration.

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- 2. Increase role of Statistics and Data Science** - Current research, survey data, and feedback collected from focus groups and interviews indicate a clear need to increase the weight given to the role of standards addressing statistics and probability as well as data science across K-12. This may include adding an additional high school level course specific to these concepts before AP Statistics. Specifically, the DRC concludes that revisions to the current standards need to:
- Align Statistics and Probability (SP) across K-12, ensuring a progressive development of data literacy.
 - Strengthen Statistics and Probability to build real-world problem-solving and analytical skills needed for career readiness.
- 3. Consistency & Alignment Across K-12** - In reviewing the comments obtained through the PSU and All-Stakeholder surveys as well as data obtained from focus groups and interviews, some additional areas were consistently identified for improvement across the K-12 standard course of study. These include:
- Establishing a **consistent structure** in nomenclature, domain names, and numbering across all grade levels.
 - Addressing **discrepancies in Number Sense**, particularly in how fractions are introduced in the elementary and middle school grade levels.
 - Ensuring a **balance between conceptual understanding and application**, avoiding “catch-all” standards that mix both without progression.

Appendices

Appendix A: Copy of Survey Questions with Raw Data

1. [PSU Standard-by-Standard Survey Questions](#)
2. [PSU Standard-by-Standard Survey Data](#)
3. [All Stakeholder Standard-by-Standard Survey Questions](#)
4. [All Stakeholder Standard-by-Standard Survey Data](#)
5. [General All Stakeholder Survey Questions](#)
6. [General All Stakeholder Survey Data](#)

Appendix B: Copy of Focus Group Questions with Raw Data

1. [Focus Group Questions](#)
2. [Focus Group Raw Data](#)

Appendix C: Copy of Interview Questions with Raw Data

1. [Interview Questions](#)
2. [Interview Raw Data](#)

Appendix D: [Copy of Focus Group and Interview Codebook](#)