Standards to Students: K-12 Mathematics Standards

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Desired Outcomes

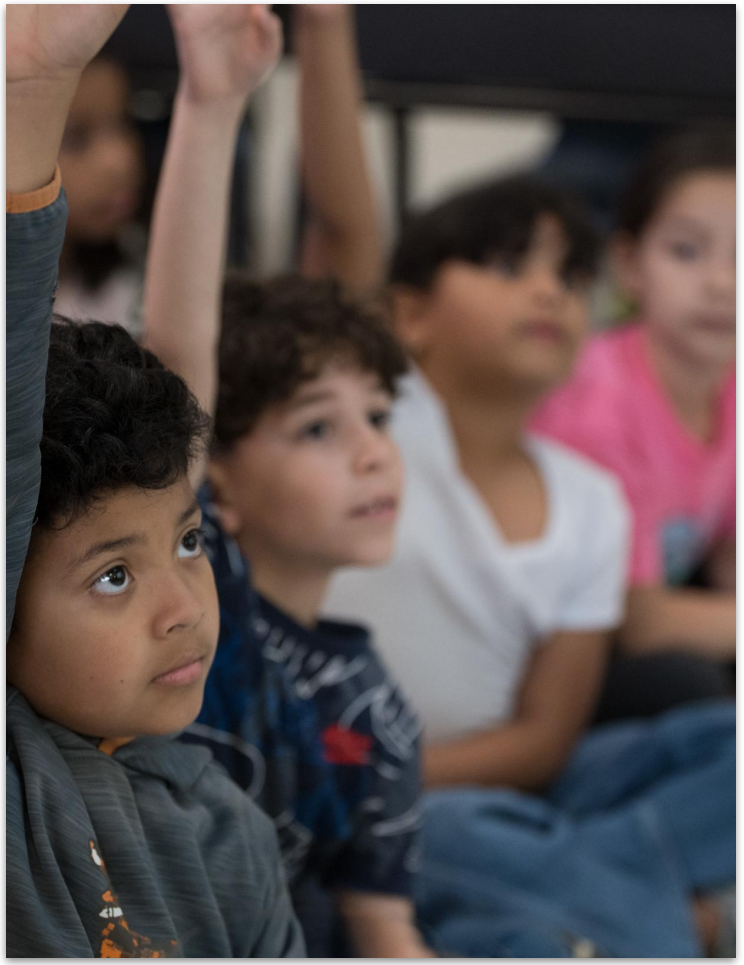
Discuss the Mathematics standards **review** process, data, and timeline

Share the Mathematics standards **revision** process and timeline

Present **major changes** of the draft 1 K-12 Mathematics standards

Highlight **upcoming resources** for draft 1

Share **installation and implementation** timelines



ACHIEVING EDUCATIONAL EXCELLENCE

Prepare Each Student for Their Next Phase in Life

Focus Area 2 | Elevate Teaching and Learning

ACTION 3

Design a **Pre-K–12 Teaching and Learning Framework** with PSUs to set **shared expectations** for **standards-aligned instruction**, integrated supports and **access to high-quality learning** for **all students**.

> **“Clear, coherent standards are the foundation of a unified Teaching and Learning Framework, ensuring every student experiences high-quality learning.”**

Standards → Students

Mathematics in North Carolina

Transforming Expectations into Experiences

High Expectations For All

Mathematical Reasoning

Alignment to Workforce

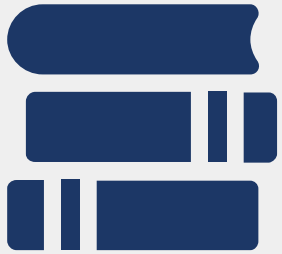
Meaningful Math Experiences

Applied Learning and Problem Solving

Data Literacy

Standards

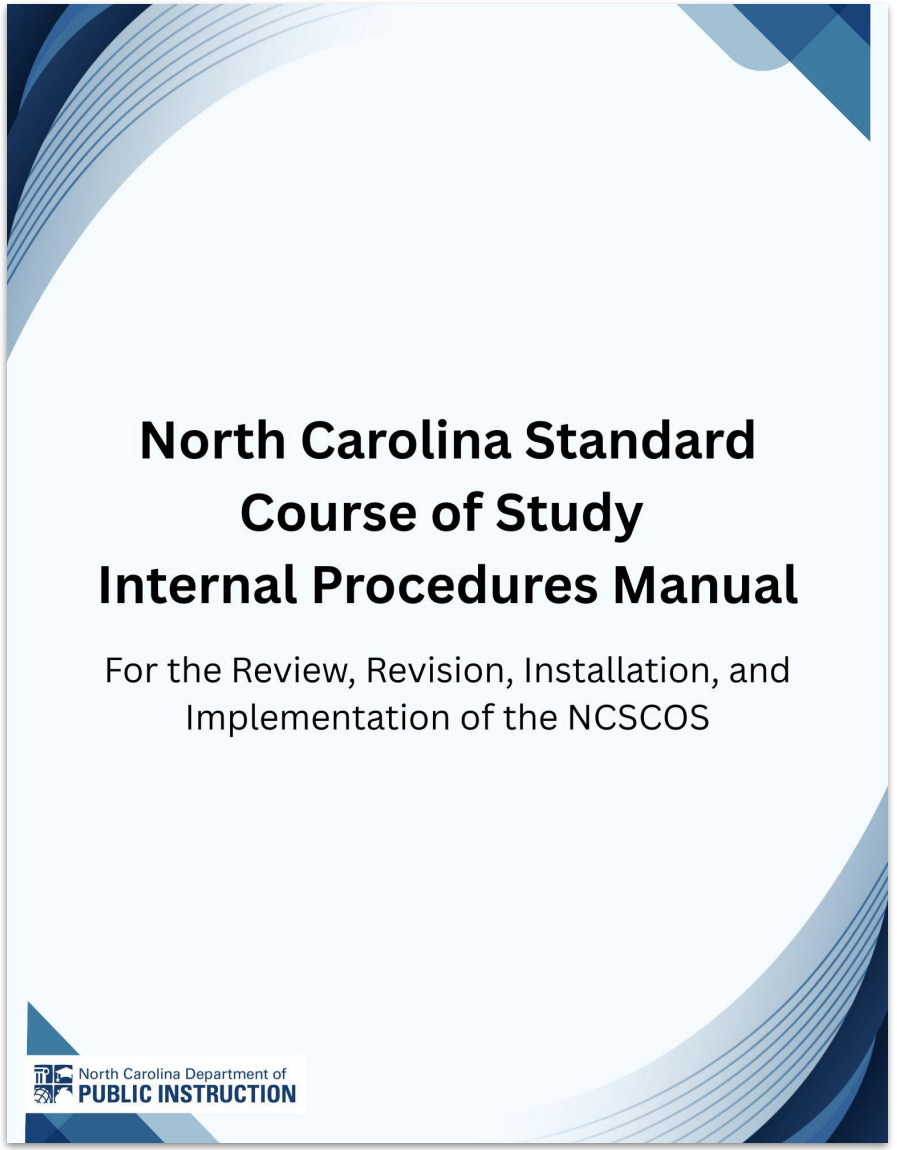
K-12
Mathematics
Standard Course
of Study



Curriculum

Texts
Lessons
Activities & Tasks
Classroom Assessments

Internal Procedures Manual



Review Phase Timeline

January - October 2024

Standards Research & Legislation Review

Surveys Released

Focus Groups & Interviews Completed

November 2024 - December 2025

Surveys Closed

Analysis of all stakeholder feedback completed

DRC applications open and members selected

January - February 2025

DRC Selected & Work Began

February - March 2025

DRC review of research and stakeholder feedback completed

Data Review Committee

- 24 members
- Members from all 8 SBE regions
- Classroom teachers, instructional coaches, school/district administrators, IHE faculty
- Grade span teams

Release application
Establish criteria for knowledge of K-12 math standards, vertical alignment and previous use of data

Blind Selection
Applications reviewed by K-12 Math Consultants and internal agency members

Final Selection
Contact supervisors; select final members

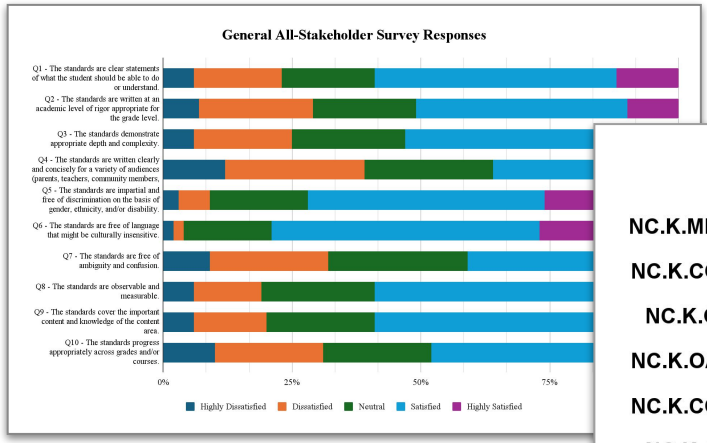
Confirm DRC
Accepted DRC notified

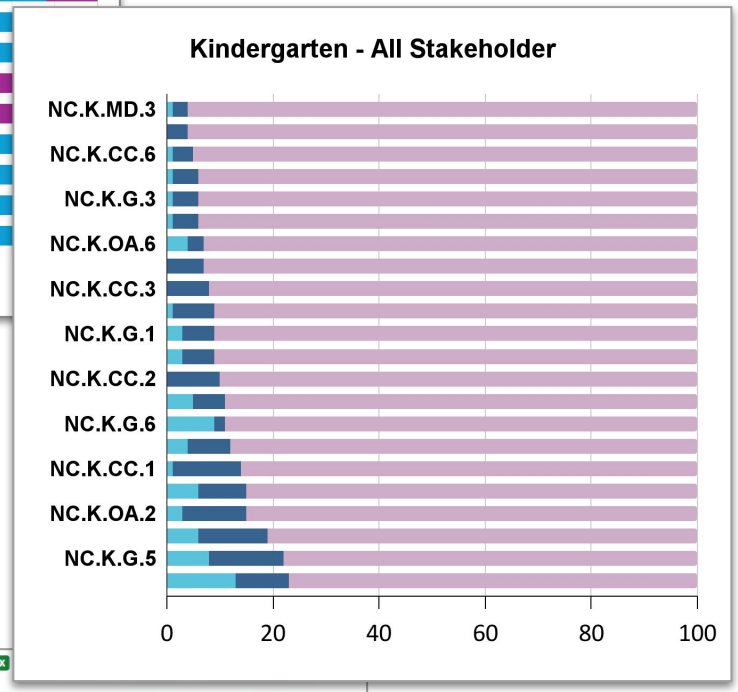
Data Review Committee

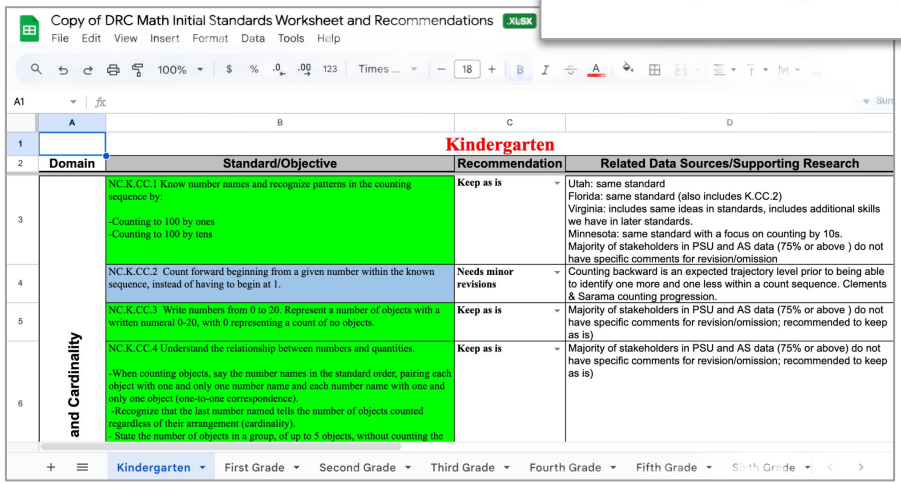
Analyze Data & Research

Complete Spreadsheet

Complete Data Report



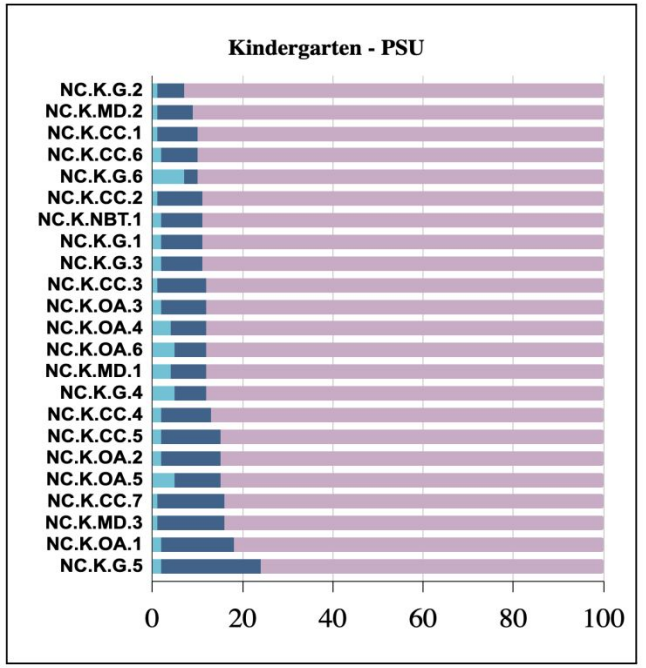




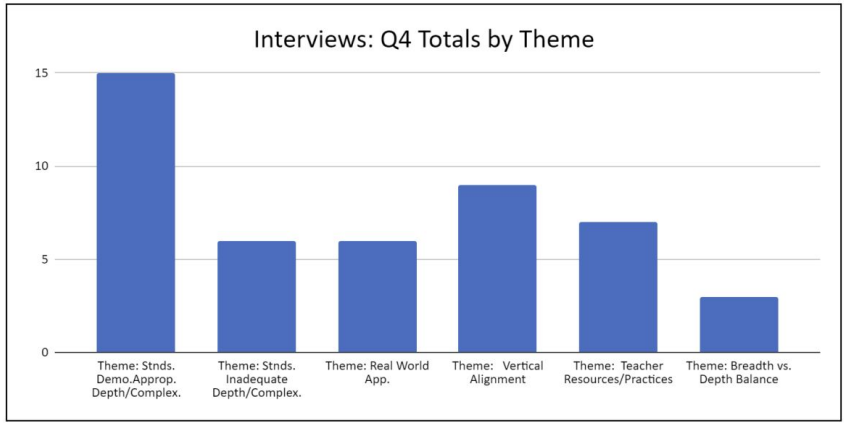
Current Standards Data

79% of LEAs Responded

~5,700 All-Stakeholder Responses



Q4: Do the standards demonstrate appropriate depth and complexity?



Data Review Committee Key Findings

410 out of 474 standards had a 75% or higher **approval** rate on the All-Stakeholder survey

395 out of 474 standards had a 75% or higher **approval** rate on the PSU survey

Standards are viewed to have gaps in **vertical alignment** with some concepts needing greater/lesser weight

Standards are often not clear or **easy to understand**

Breadth of what **all** students are required to learn is too broad

Need to emphasize **foundational math skills** and **career relevance**

Data Review Committee Recommendations

Implement high school **math pathways** to connect student postsecondary aspirations to their math courses

Narrow the scope of standards to distinguish essential knowledge all graduates need from additional concepts connected to postsecondary interest

Maintain **4 credit requirement** with NC Math 1 and NC Math 2

Increase the role of **statistics and data science**

Adopt **AP Precalculus framework** to replace current NC Precalculus standards and significantly **revise NC Math 3 and NC Math 4**

Ensure parity between **procedural fluency, conceptual understanding and application** across all grades and courses

Revision Phase Timeline (tentative)

April - June 2025

Open Standards Writing Team (SWT) Application

SWT Selection

Aug - Nov. 2025

Draft 1 Complete

Draft 1 Released for Feedback

Dec. 2025 - Feb. 2026

DRC analysis of Draft 1 feedback

Feb. - March 2026

SWT review DRC analysis and complete Draft 2

Release Draft 2 for feedback

Standards Writing Team

- 48 members
- Members from all 8 SBE regions
- Classroom teachers, instructional coaches, Community College and UNC-System educators
- Grade span teams

Release application
Establish criteria for knowledge of K-12 math standards, vertical alignment, and math rigor.

Blind Selection
425 fully completed applications reviewed by K-12 Math Consultants and internal agency members

Writing
Began work at the end of July with 3-day in-person convening. Meeting virtually in the evenings and on weekends.

Focus on addressing DRC recommendations and stakeholder feedback.

Major Changes

Draft 1

Major Changes | **Consistent Format**

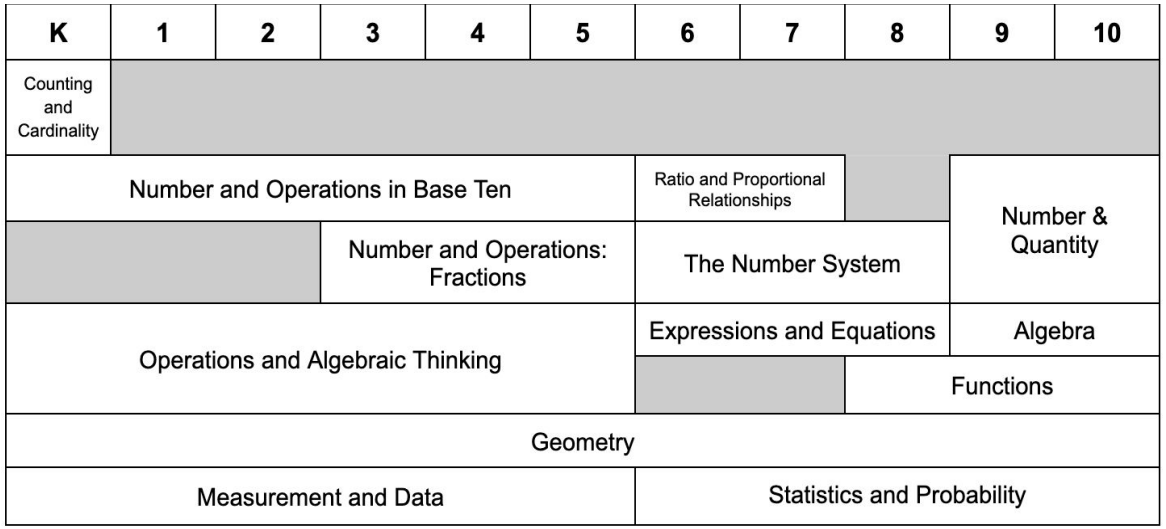
Operations and Algebraic Thinking	
Represent and solve problems involving multiplication and division.	
NC.3.OA.1	For products of whole numbers with two factors up to and including 10: • Interpret the factors as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition, decomposing a factor, and applying the commutative and associative properties.
NC.3.OA.2	For whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient: • Interpret the divisor and quotient in a division equation as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition or subtraction, and decomposing a factor.
NC.3.OA.3	Represent, interpret, and solve one-step problems involving multiplication and division. • Solve multiplication word problems with factors up to and including 10. Represent the problem using arrays, pictures, and/or equations with a symbol for the unknown number to represent the problem. • Solve division word problems with a divisor and quotient up to and including 10. Represent the problem using arrays, pictures, repeated subtraction and/or equations with a symbol for the unknown number to represent the problem.
Understand properties of multiplication and the relationship between multiplication and division.	
NC.3.OA.6	Solve an unknown-factor problem, by using division strategies and/or changing it to a multiplication problem.
Multiply and divide within 100.	
NC.3.OA.7	Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10.

Current

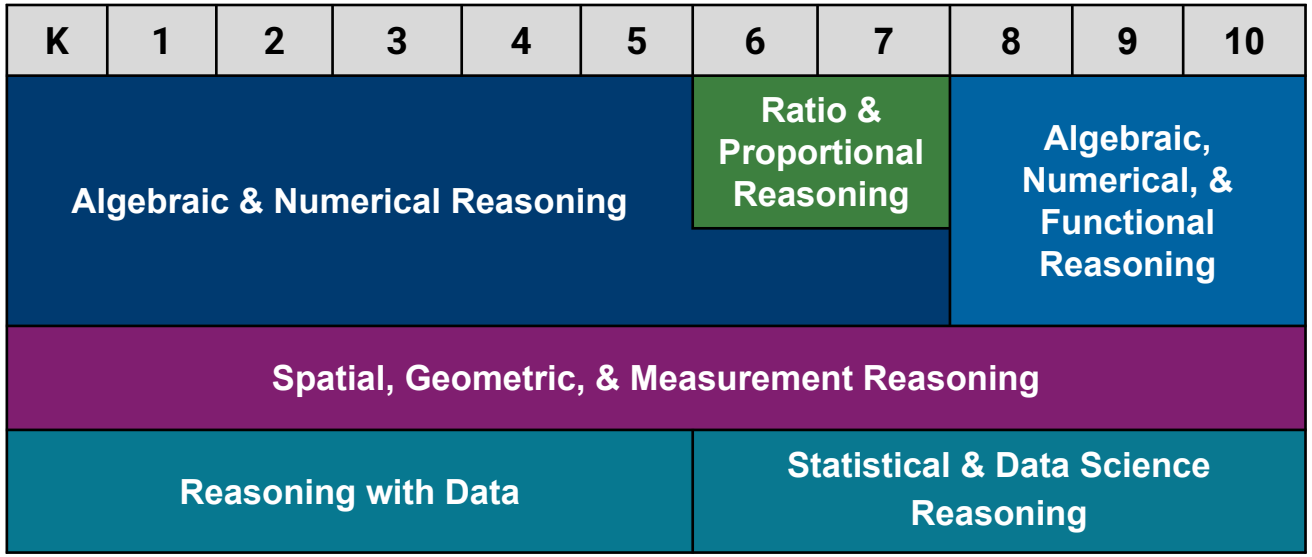
3rd Grade	
Standards and Objectives	
Algebraic and Numerical Reasoning	
Standard 1	**Develop an understanding of multiplication with whole numbers.**
Objective 1	Interpret factors as representing the number of equal groups and the number of objects in each group for products of whole numbers with two factors up to and including 10.
Objective 2	Model strategies including repeated addition, skip-counting, decomposing a factor, and commutative property with representations for products of whole numbers with two factors up to and including 10.
Objective 3	Interpret patterns of multiplication using visual tools.
Objective 4	Represent to solve one-step contextual problems involving multiplication with factors up to and including 10.
Objective 5	Connect multiplication contextual situations with equations using a symbol for the unknown number.
Objective 6	Find the product of a one-digit whole number by a multiple of 10 in the range 10–90 by using representations, based on place value and the properties of operations.
Standard 2	**Develop an understanding of division with whole numbers.**
Objective 1	Interpret the divisor and quotient in a division equation as representing the number of equal groups and the number of objects in each group for whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient.

Draft 1

Major Changes | **Domains**



Current



Draft 1

Major Changes | **Pre-calculus**

Functions	
PC.F.1 Understand key features of sine, cosine, tangent, cotangent, secant and cosecant functions.	
PC.F.1.1	Interpret algebraic and graphical representations to determine key features of transformed sine and cosine functions. *Key features include: amplitude, domain, midline, phase shift, frequency, period, intervals where the function is increasing, decreasing, positive or negative, relative maximums and minimums.*
PC.F.1.2	Interpret algebraic and graphical representations to determine key features of tangent, cotangent, secant, and cosecant. *Key features include: domain, frequency, period, intervals where the function is increasing, decreasing, positive or negative, relative maximums and minimums, and asymptotes.*
PC.F.1.3	Integrate information to build trigonometric functions with specified amplitude, frequency, period, phase shift, or midline with or without context.
PC.F.1.4	Implement graphical and algebraic methods to solve trigonometric equations and inequalities in context with support from technology.
PC.F.2 Apply properties of a unit circle with center (0,0) to determine the values of sine, cosine, tangent, cotangent, secant, and cosecant.	
PC.F.2.1	Use a unit circle to find values of sine, cosine, and tangent for angles in terms of reference angles.
PC.F.2.2	Explain the relationship between the symmetry of a unit circle and the periodicity of trigonometric functions.
PC.F.3 Apply properties of trigonometry to solve problems involving all types of triangles.	
PC.F.3.1	Implement a strategy to solve equations using inverse trigonometric functions.
PC.F.3.2	Implement the Law of Sines and the Law of Cosines to solve problems.
PC.F.3.3	Implement the Pythagorean identity to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
PC.F.4 Understand the relationship of algebraic and graphical representations of exponential, logarithmic, rational, power functions, and conic sections to their key features.	
PC.F.4.1	Interpret algebraic and graphical representations to determine key features of exponential functions. *Key features include: domain, range, intercepts, intervals where the function is increasing, decreasing, positive or negative, concavity, end behavior, limits, and asymptotes.*

Current - NC framework

Topic	Instructional Periods	Suggested Skill Focus
2.1 Change in Arithmetic and Geometric Sequences	2	1.B Express functions, equations, or expressions in analytically equivalent forms that are useful in a given mathematical or applied context. 3.A Describe the characteristics of a function with varying levels of precision, depending on the function representation and available mathematical tools.
2.2 Change in Linear and Exponential Functions	2	1.C Construct new functions, using transformations, compositions, inverses, or regressions, that may be useful in modeling contexts, criteria, or data, with and without technology. 3.B Apply numerical results in a given mathematical or applied context.
2.3 Exponential Functions	1–2	3.A Describe the characteristics of a function with varying levels of precision, depending on the function representation and available mathematical tools.
2.4 Exponential Function Manipulation	2	1.B Express functions, equations, or expressions in analytically equivalent forms that are useful in a given mathematical or applied context. 3.A Describe the characteristics of a function with varying levels of precision, depending on the function representation and available mathematical tools.
2.5 Exponential Function Context and Data Modeling	2–3	1.C Construct new functions, using transformations, compositions, inverses, or regressions, that may be useful in modeling contexts, criteria, or data, with and without technology. 3.B Apply numerical results in a given mathematical or applied context.
2.6 Competing Function Model Validation	2–3	2.A Identify information from graphical, numerical, analytical, and verbal representations to answer a question or construct a model, with and without technology. 3.C Support conclusions or choices with a logical rationale or appropriate data.
2.7 Composition of Functions	2–3	1.C Construct new functions, using transformations, compositions, inverses, or regressions, that may be useful in modeling contexts, criteria, or data, with and without technology. 2.B Construct equivalent graphical, numerical, analytical, and verbal representations of functions that are useful in a given mathematical or applied context, with and without technology.
2.8 Inverse Functions	2–3	1.A Solve equations and inequalities represented analytically, with and without technology. 2.B Construct equivalent graphical, numerical, analytical, and verbal representations of functions that are useful in a given mathematical or applied context, with and without technology.

Draft 1 - AP framework

Major Changes | **Clarity & Ease of Use**

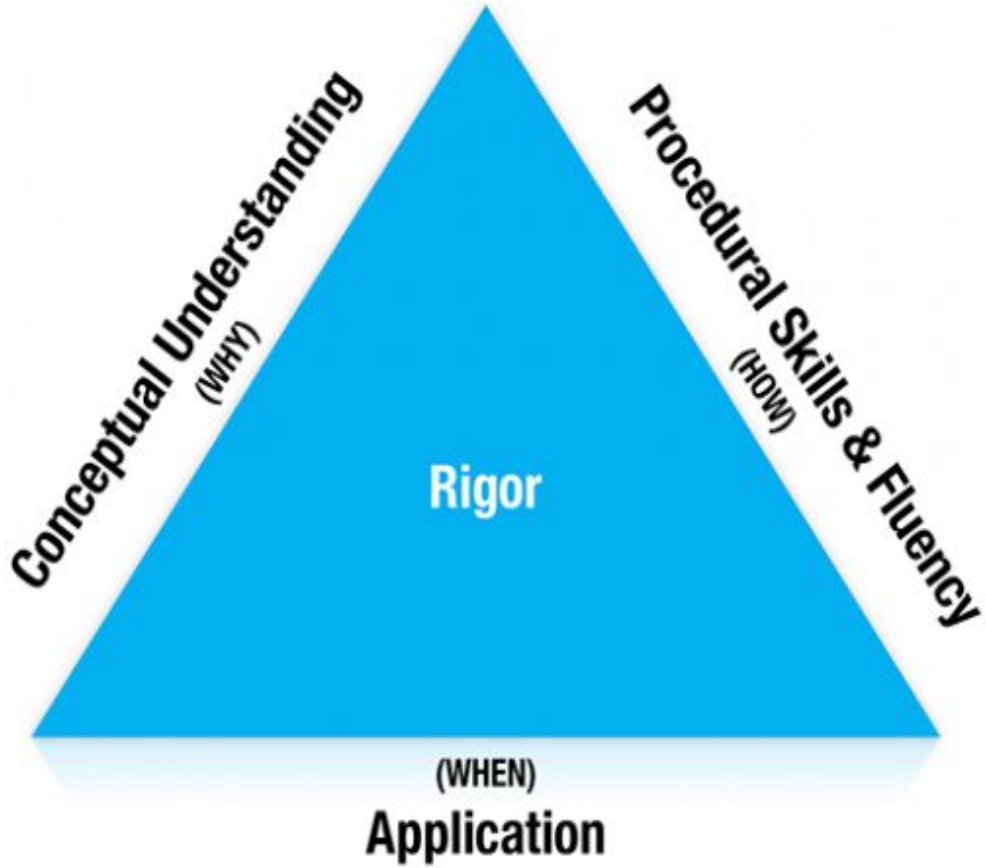
8th Grade	
Domain: Algebraic, Numerical, & Functional Reasoning	
Standard 1	**Apply properties of operations to solve real-world and mathematical problems using equations and inequalities in one variable.**
Objective 1	Construct linear equations with the same variable on both sides of the equation to represent quantities and relationships from a given context.
Objective 2	Make use of structure and properties of equality to solve linear equations with the same variable on both sides of the equation.
Objective 3	Justify whether one-variable equations have one solution, infinitely many solutions, or no solutions in a real-world context.
Objective 4	Construct linear inequalities with the same variable on both sides of the inequality to represent quantities and relationships from given context.
Objective 5	Make use of structure and properties of equality to solve linear inequalities with the same variable on both sides of the inequality.
Standard 2	**Investigate functions to describe and represent relationships between quantities.**
Objective 1	Recognize a function from a graph, a table, or a set of ordered pairs.
Objective 2	Represent statements describing contextual situations using function notation.
Objective 3	Make use of structure to determine where a function is increasing or decreasing; linear or non-linear.
Objective 4	Represent the qualitative features of a real-world function on a coordinate plane.

Revised Bloom's Taxonomy for All Grades/Courses

Major Changes | **Vertical Alignment**

K	1	2	3
Identify and describe shapes.	**Describe and create shapes based on their defining attributes.**	**Reason with 2-D and 3-D shapes and their attributes.**	**Reason with quadrilaterals and their attributes.**
Name triangles, squares, rectangles, hexagons, circles, cubes, cones, cylinders, and spheres regardless of their orientations or overall size.	Distinguish between defining and non-defining attributes of shapes.	Compare the defining attributes of triangles, quadrilaterals, pentagons, hexagons, octagons and circles using the number of sides, vertices and angles.	Construct points, lines, line segments, and perpendicular and parallel lines.
Identify triangles, squares, rectangles, hexagons, circles, cubes, cones, cylinders, and spheres as two-dimensional or three-dimensional.	Describe the defining attributes of triangles, squares, rectangles, hexagons, and circles including the number of sides,vertices and angles.	Describe the defining attributes of cubes, rectangular prisms, pyramids, spheres, cones, and cylinders using the number of faces, edges and vertices.	Construct examples and non-examples of types of quadrilaterals including rhombuses, rectangles, squares, parallelograms, and trapezoids.
Compare two-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, attributes and other properties.	Describe the defining attributes of cubes, cones, cylinders, and rectangular prisms, including the number of faces, edges, and vertices.	Compare attributes of similar 2D and 3D shapes.	Name types of quadrilaterals including rhombuses, rectangles, squares, parallelograms, and trapezoids.
Create shapes based on their defining attributes.	Draw triangles, rectangles, squares, hexagons, and circles.		Identify points, lines, line segments, and perpendicular and parallel lines within two-dimensional figures and contextualized situations.
Draw triangles, rectangles, squares, and circles.	Build triangles, rectangles, squares, hexagons, circles, cubes, cones, cylinders, and rectangular prisms.		
Build triangles, rectangles, squares, circles, cubes, cones, spheres, and cylinders.	Compose 2D figures by combining two or more simple shapes (triangles, squares, rectangles, and/or hexagons).		
Compose larger plane figures by combining two or more simple plane figures (triangles, rectangles and/or squares).			

Recommendation | **Emphasizing Parity**

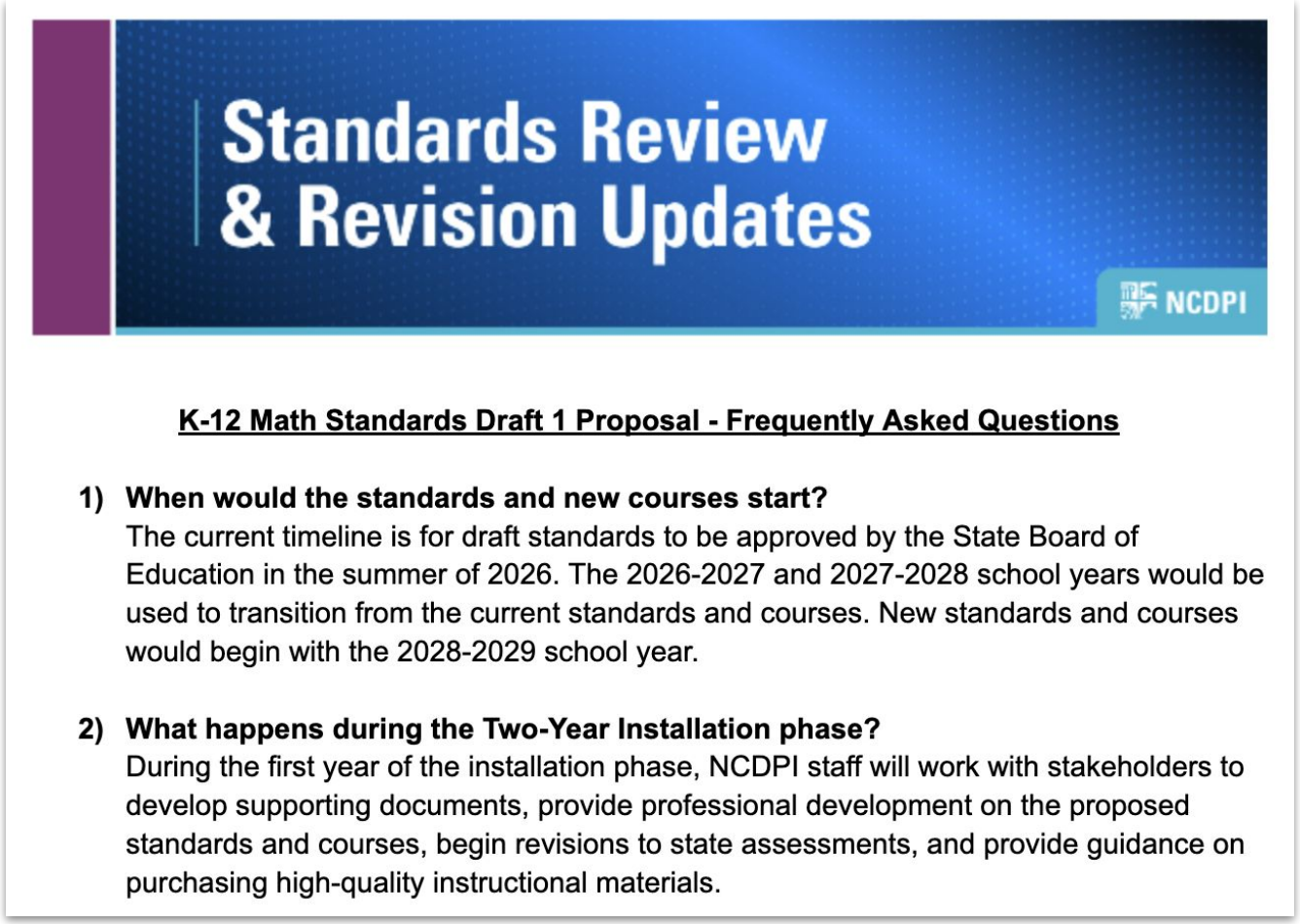


Math Standards: More Than Just Content

NC K-12 Standards for Mathematical Practice			
	Make sense of problems and persevere in solving them.		Use appropriate tools strategically.
	Reason abstractly and quantitatively.		Attend to precision.
	Construct viable arguments and critique the reasoning of others.		Look for and make use of structure.
	Model with mathematics.		Look for and express regularity in repeated reasoning.

Resources with Draft 1 Release

- FAQ
- Progression chart
- AP Precalculus Framework
- Pathways chart



Installation Phase

26-27 & 27-28 school years (tentative)

- **Communication**
  - PSU leadership
  - Educators
  - Parents
  - Other Stakeholders
- **Professional Learning**
  - Regional PD
  - Virtual
  - TBD
- **Support Documents**
  - Unpacking
  - Glossary
  - Crosswalk
  - Parent Guides
  - TBD
- **Data Collection**
  - Needs assessment
  - Quality Assurance Roundtable

Implementation Phase

28-29 school year (tentative)

- **Communication**
  - PSU leadership
  - Educators
  - Parents
  - Other Stakeholders
- **Professional Learning**
  - Regional PD
  - Virtual
  - TBD
- **Support Documents**
  - Based on data from the field
- **Data Collection**
  - Needs assessment
  - Quality Assurance Roundtable

State assessments aligned to the new standards

Questions?