Standards to Students Mathematics in North Carolina

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Desired Outcomes

Share context around the need for Mathematics revisions.

Present thoughts on how to shift mindsets on Mathematics in North Carolina in order to make it more meaningful for students.

Discuss specific changes of the structure and course options of the K-12 Mathematics standards.

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

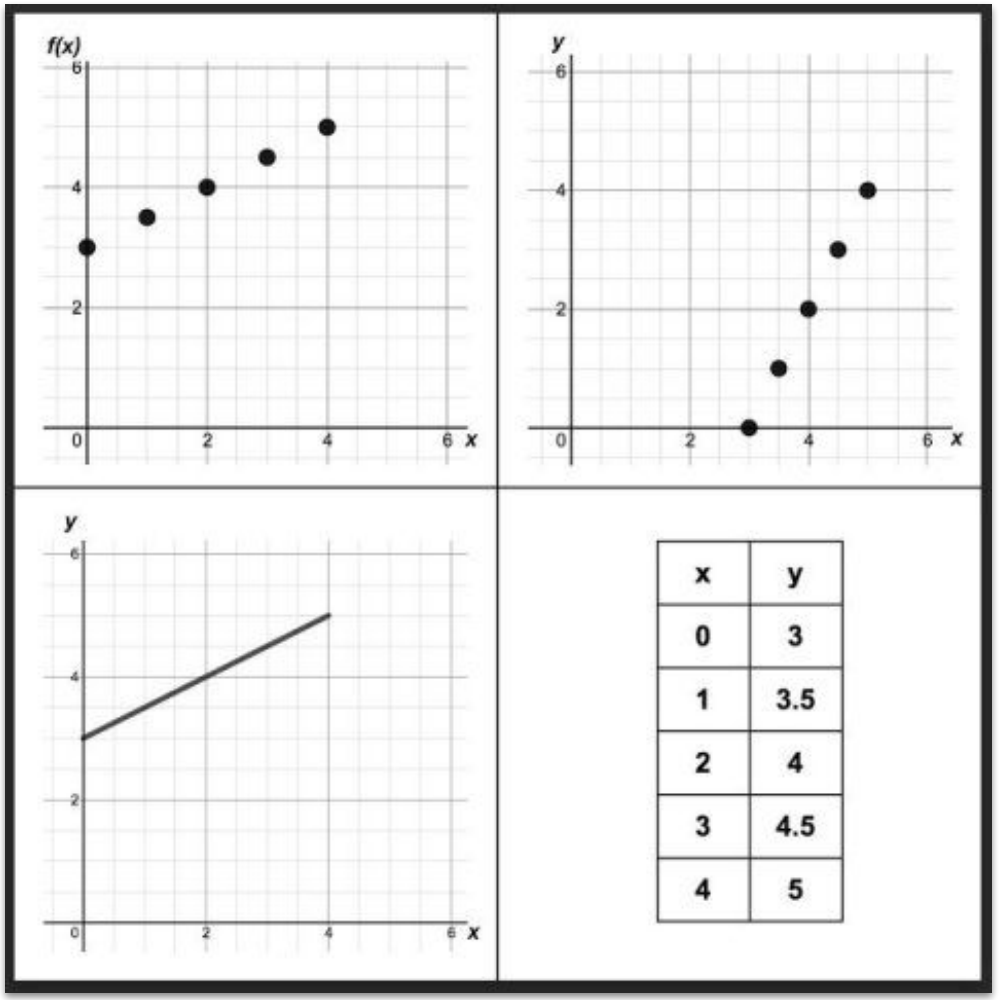
Meaningful Math Experiences

Applied Learning and Problem Solving

Data Literacy

Let's Do Some Math!

Which one does not belong?



x	y
0	3
1	3.5
2	4
3	4.5
4	5

Why Math Matters

Context for North Carolina's Math Standards Revision

Recent Trends in Math

3rd-8th Grades

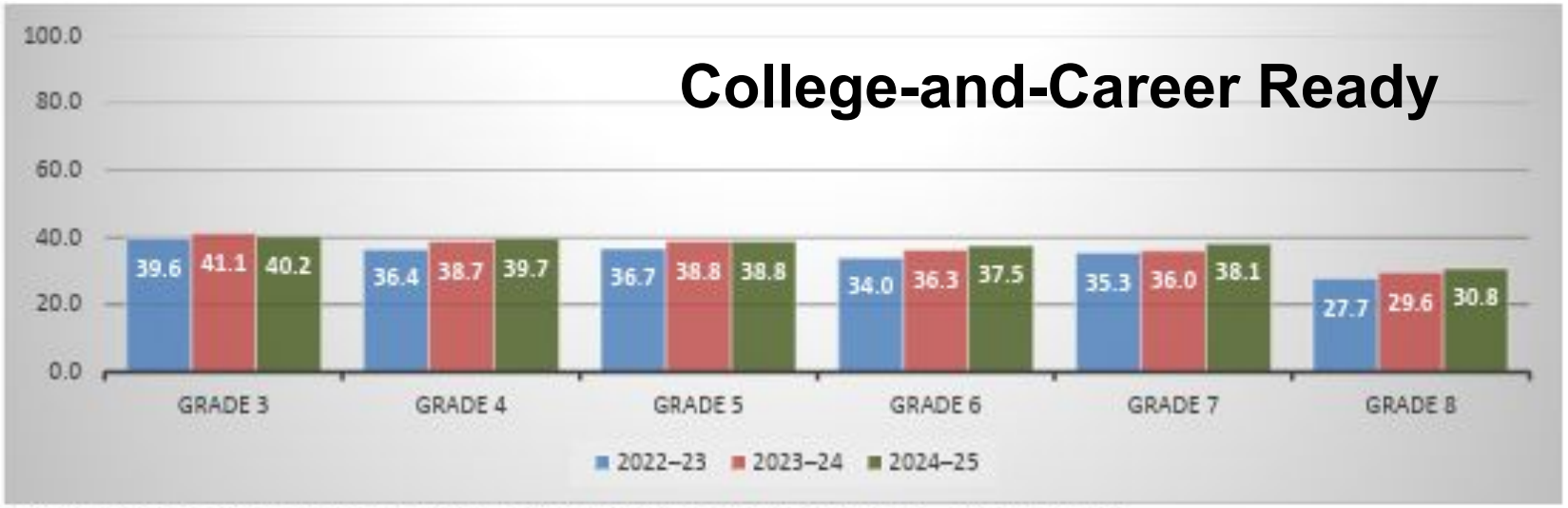


FIGURE 3. End-of-grade mathematics performance by grade (Level 4 and above—CCR Standard).

Year to year grade level outcomes have **improved each of the last 3 years**.

Proficiency over time **drops by approximately 11-15%** from 3rd to 8th grade.

FIGURE 4. End-of-grade mathematics performance by grade (Level 3 and above—GLP Standard).

Recent Trends in Math High School

29.3%

of 8th grade students took **Math 1** in 2023-2024

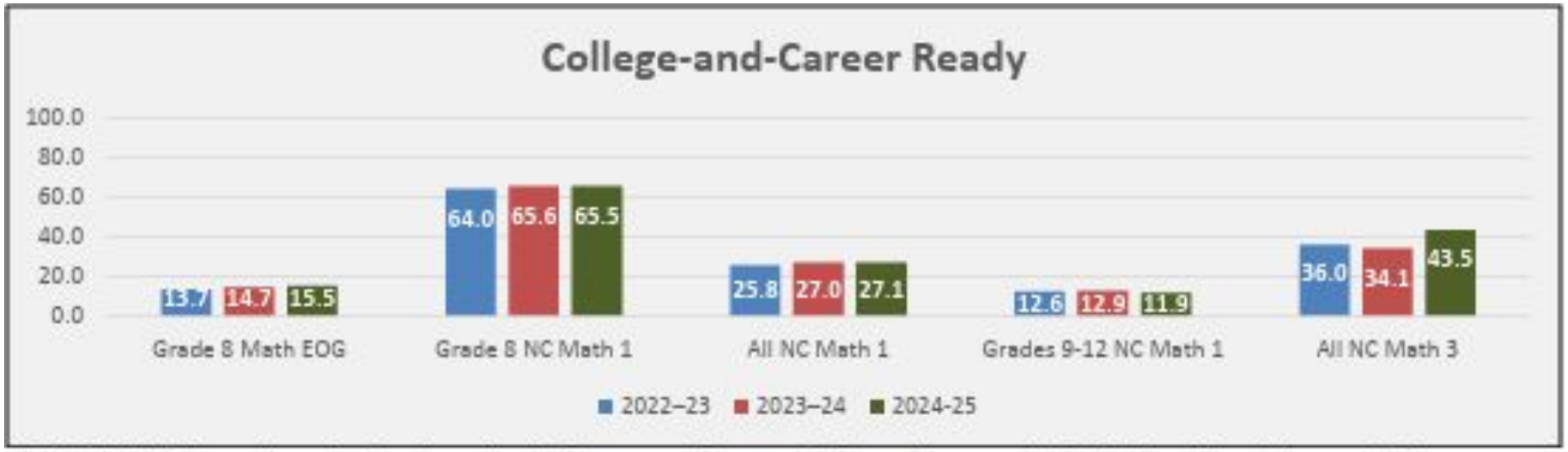


FIGURE 7. Mathematics end-of-grade and end-of-course performance information at grades 8–12 (Level 4 and above—CCR Standard).

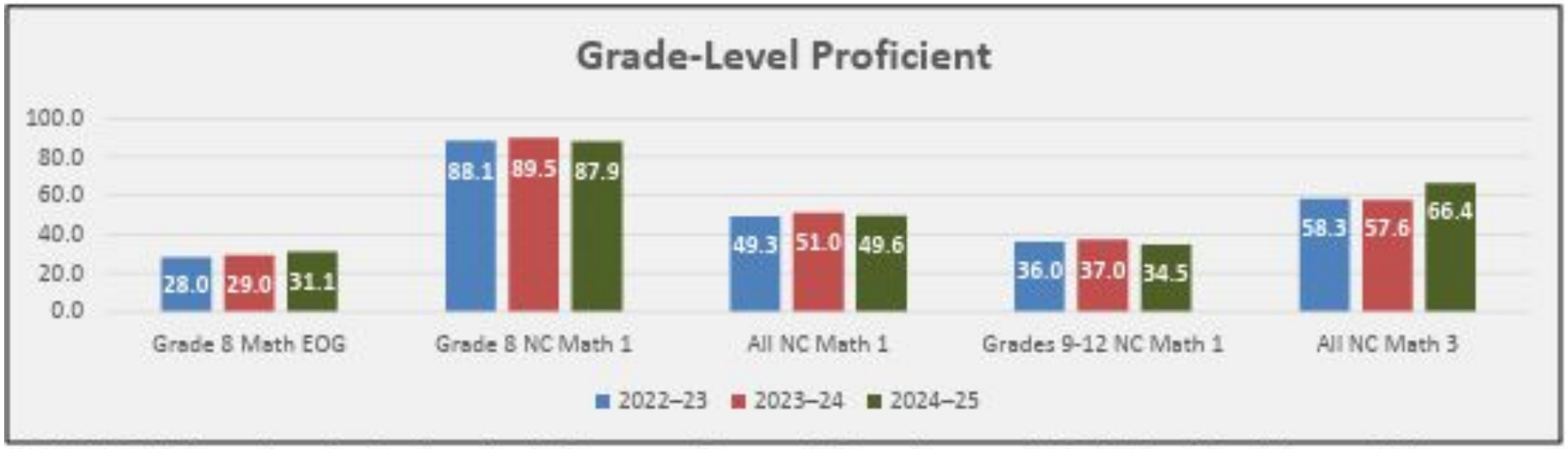
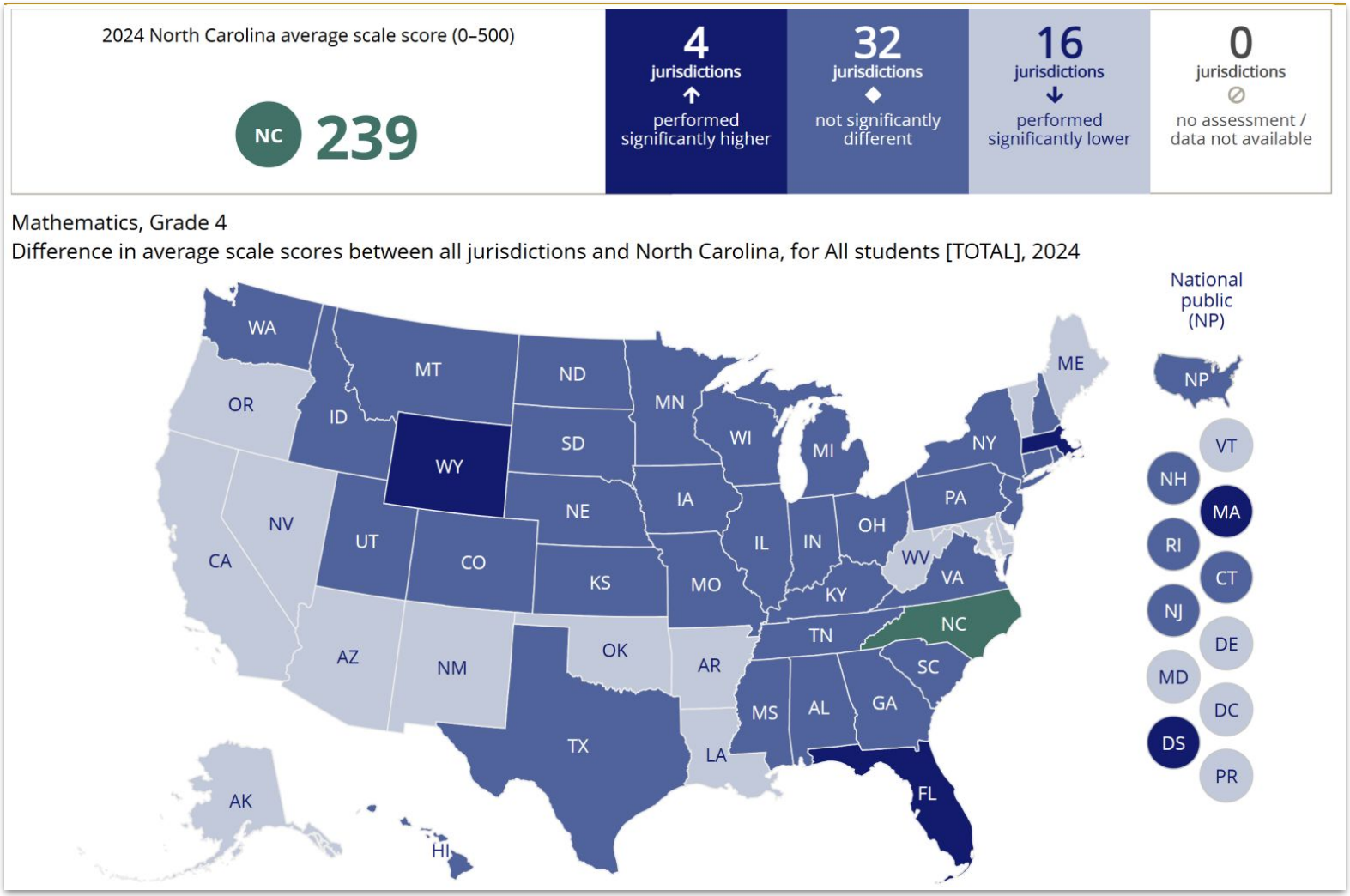


FIGURE 8. Mathematics end-of-grade and end-of-course performance information at grades 8–12 (Level 3 and above—GLP Standard).

Recent Trends in Math State Comparisons

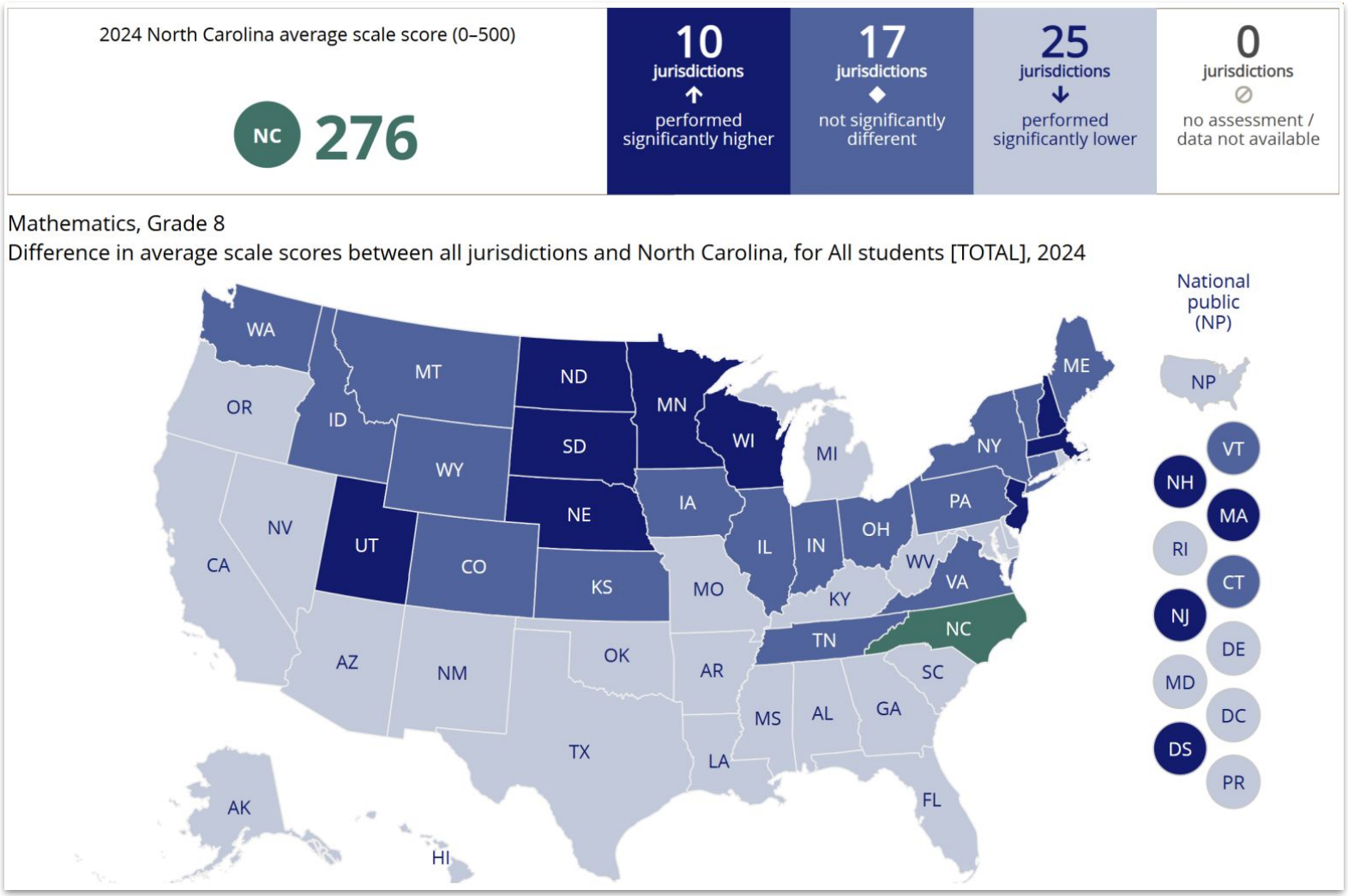
NAEP 4th Grade



Grade 4	2022	2024
Scale Score	236	239=
At or Above Basic	75%	77%=
At or Above Proficient	35%	41%

Recent Trends in Math State Comparisons

NAEP 8th Grade



Grade 8	2022	2024
Scale Score	274	276 =
At or above Basic	61%	62%=
At or above Proficient	25%	31%

Math Standards Revision Preparation

- **Research Portfolio**
  Comparison of state, national, and advanced frameworks to guide revisions.
- **Active Member of the Launch Years Initiative**
  National effort with 20+ states *(TX, GA, OK, UT, WA, MD, OH)* to strengthen math outcomes.
  - Formed a **joint task force** between NCDPI, UNC System, and NCCCS (since Oct 2022).
  - Developed **7 recommendations** on advising, teacher training, new course options, and communication.
- **Data Review Committee**
  Analyzed feedback from over **5,700 survey responses** and **188 focus group/interview participants**.

Listening to Our Stakeholders

Insights That Are Shaping Math Standards Revision

"I'm not a math person"

"It's okay - math is hard."

"Why do I need to learn this?

What do all graduates need to know—and have the opportunity to learn?

How can we increase **proficiency** for all students?

How can we increase **real-world application** of math?

How can we increase **student interest and engagement**?

Current NC Student Experience

Focus	Future Ready/UNC System Institution Minimum Admission Requirements	Admission into a Community College or Entering the Workforce Directly after Graduation
Required for all students*	NC Math 1	NC Math 1
	NC Math 2	NC Math 2
	NC Math 3	NC Math 3
Options Available For 4th Math credit	• NC Math 4 • Precalculus/AP Precalculus • AP Calculus • AP Statistics • Discrete Mathematics for Computer Science • Approved IB courses • Approved dual enrollment course	• AP/IB Computer Science • NCDPI - CTE course or course pairing
Example Careers	All post-secondary careers and majors requiring university level admission.	• Credentials and certifications for trades, vocations • Immediate workforce entry • Community college

NC Math 3 Question

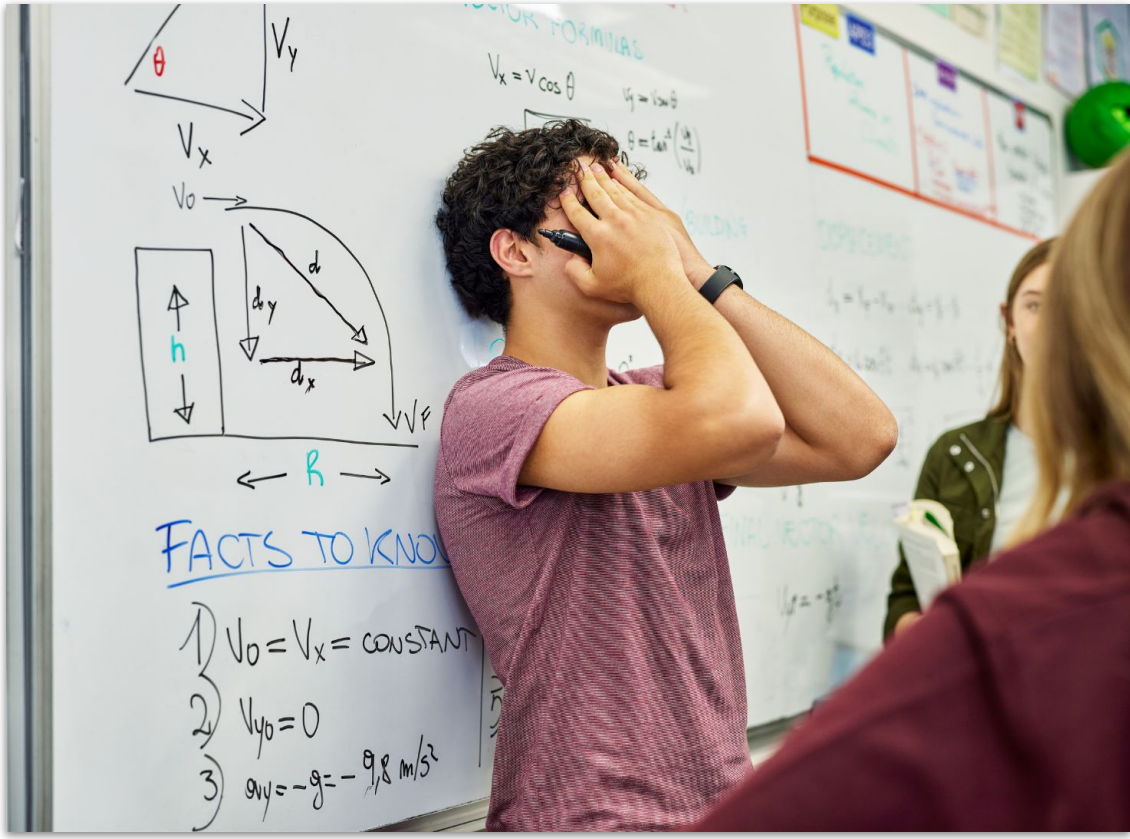
A function is shown below.

$$H(x) = 4x^3 - 5x^2 - 23x + 6$$

What is the distance, to the nearest hundredth of a unit, between the two zeros that are closest to each other?

Impact: Why Change Is Needed

- A **one-size fits all** approach to math content
- Math viewed as **something to study**, not as something to use
- Teachers report **steady decline in student engagement**
- Data show a **steady decrease in student outcomes** for a majority of students



Math needs to be more meaningful for all stakeholders.

Guiding Principles

Principles guiding the standards writers to make math meaningful

- **Math Literacy** is a necessity.
- The **climate and culture around math** needs to change to increase student interest, engagement and outcomes.
- To use math successfully, a student must know **how to do it, why, and when**.
- Math is more than numbers, it includes **critical thinking, creativity, resilience, collaboration, and other durable skills**.
- **All students deserve** to have access to the same **rigorous opportunities with math**.

Making Math Meaningful

Data Review Committee report provided two overarching sets of recommendations:

1. Maintain high expectations and rigorous course options but allow for greater alignment to student post-secondary interest.
2. Improve the structure, content, and clarity of the standards themselves

The first set of recommendations included:

- **Keep NC's high expectations by maintaining the 4 credit graduation requirement**
- **Implement high school math pathways** to emphasize career relevance and connect student postsecondary aspirations to their math courses
- Distinguish **essential knowledge all graduates need from additional concepts** connected to postsecondary interest
- **Increase the role** of statistics and data science
- **Revise** NC Math 3 and NC Math 4

Course Options

To address the first set of recommendations the writers considered several questions:

How to implement pathways for student choice if 3 of the 4 required credits are specified?

- Do students need 4 high school math courses?
- Is everything in the 3 required courses necessary for all students?
- Are there important skills and concepts students may need depending on their future interests in these 3 courses?
- Do students have meaningful choice if they only choose once?

How to increase the role of statistics and data science?

- Is the importance of statistics and data science increasing?
- Are there currently standards regarding statistics and data science?
- Can we increase the role of statistics and data science within the current courses?

Course Options

The answers they arrived at…

How to implement pathways for student choice if 3 of the 4 required credits are specified?

- Do students need 4 high school math courses? - **YES**
- Is everything in the 3 required courses necessary for all students? - **NO**
- Are there important skills and concepts students may need depending on their future interests in these 3 courses? - **YES**
- Do students have meaningful choice if they only choose once? - **NO**

How to increase the role of statistics and data science?

- Is the importance of statistics and data science increasing? - **YES**
- Are there currently standards regarding statistics and data science? - **YES**
- Can we increase the role of statistics and data science within the current courses? - **YES and NO**

Course Options

Draft 1 Proposal

✓ **Maintains** the 4 high school math credit requirement for graduation.

- Require NC Math 1 and NC Math 2 for all students
- Require two additional math courses aligned to student post-secondary interests

✓ Addresses the **skills and concepts all graduates need** by revising NC Math 1 and NC Math 2

✓ Addresses the **increasing need for Statistics and Data Science** standards and provides high level math **courses aligned to student post-secondary interests** by:

- Implementing high school math pathways
- Restructuring NC Math 3 and NC Math 4
- Revising Discrete Mathematics for Computer Science

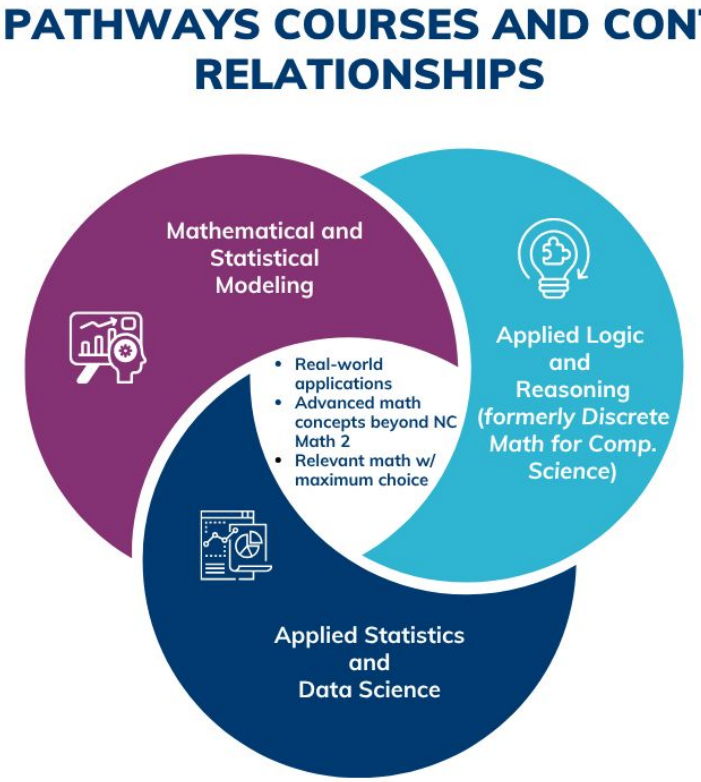
Course Options

Reorganize existing standards into two new courses replacing NC Math 3 and NC Math 4:

- **Applied Statistics and Data Science**
  Students pose questions, collect and visualize data, problem solve to draw relevant conclusions from data and communicate findings to various audiences.
- **Mathematical and Statistical Modeling**
  The course bridges between statistics and applied mathematics through research, reasoning, and evidence-based justification. Students use reasoning and probability to quantify, evaluate and make informed decisions based on data.

Applied Logic and Reasoning

- Renamed from Discrete Mathematics for Computer Science
- Increased emphasis on using reasoning to think like a computer scientist or mathematician- precisely, logically, and creatively.



Course Options

	Future Ready/UNC System Institution Minimum Admission Requirements			
Student Career Interests	Biological & Physical Sciences Engineering Mathematics Scientist Financial Management	Database Administrator Business Marketing Cybersecurity Social Sciences	Social Sciences Fine Arts Humanities Performing Arts Criminal Justice	**Admission to Community College or Entering the Workforce Directly After Graduation**
Required for All Students	NC Math 1 NC Math 2	NC Math 1 NC Math 2	NC Math 1 NC Math 2	NC Math 1 NC Math 2
Students Must Earn TWO Credits from These Courses	Mathematical & Statistical Modeling Applied Statistics & Data Science Applied Logic and Reasoning (*Formerly Discrete Math*) AP Precalculus AP Statistics AP Calculus* Approved IB/Dual Enrollment course*			**Students Must Earn ONE Credit from These Courses** Mathematical & Statistical Modeling Applied Statistics & Data Science Applied Logic and Reasoning *AP/IB Computer Science*** **AND** ONE CTE Course or Course Pairing
Example Pairings	AP Precalculus AP Calculus* **OR** Mathematical & Statistical Modeling AP Precalculus	Applied Statistics & Data Science AP Statistics **OR** Mathematical & Statistical Modeling Applied Logic and Reasoning	Mathematical & Statistical Modeling Applied Logic and Reasoning **OR** Applied Statistics & Data Science Applied Logic and Reasoning	

- AP Calculus and some IB/ Dual Enrollment courses may have prerequisites.
- PSUs could establish honors sections.
- AP/IB Computer Science courses may not count in the future for math credit due to the Computer Science graduation requirement.

Summary

✓ **Maintains** the 4 high school math credit requirement for graduation.

- Continue requiring NC Math 1 and NC Math 2 for all students
- Continue requiring two additional math courses aligned to student post-secondary interests

✓ Addresses the **skills and concepts all graduates need** by revising NC Math 1 and NC Math 2

✓ Addresses the **increasing need for Statistics and Data Science** standards and provides high level math **courses aligned to student post-secondary interests** by:

- Implementing high school math pathways
- Restructuring NC Math 3 and NC Math 4
- Revising Discrete Mathematics for Computer Science

Your Perspective Matters

What resonated most with you today?

Questions?

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