



TENNESSEE
STATE BOARD OF EDUCATION

TENNESSEE ACADEMIC STANDARDS FOR MATHEMATICS

DR. STEPHANIE KOLITSCH, UT-MARTIN

CATHERINE JOHNSON, SBE

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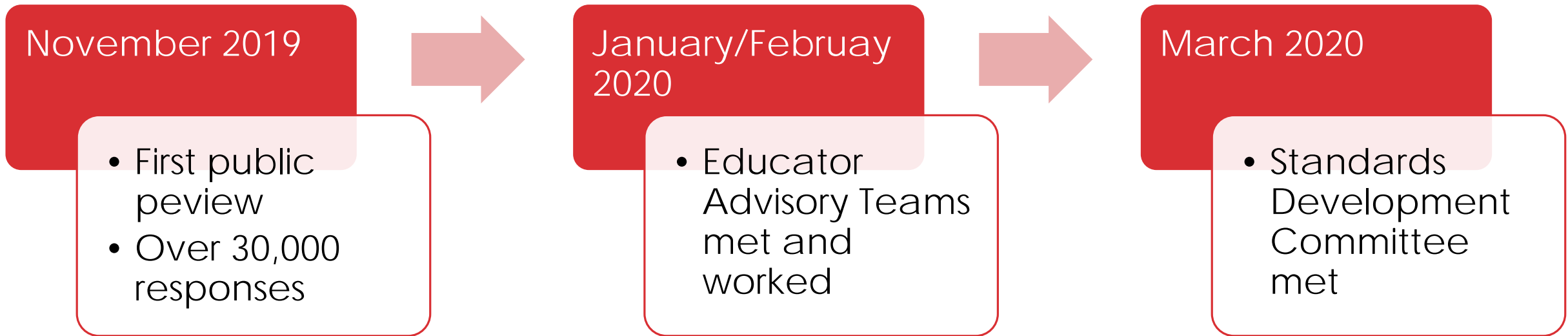
STATUTORY CHARGE

TENNESSEE STANDARDS REVIEW

- The standards review process is laid out in TCA 49-1-310, 311, and 312.
- The State Board is required to review academic standards at a minimum of every 6 years.
- Math standards were last reviewed in 2014/2015.

OVERVIEW OF THE PROCESS

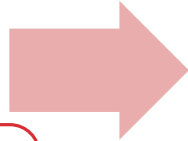
MATH STANDARDS REVIEW CYCLE



MATH STANDARDS REVIEW CYCLE

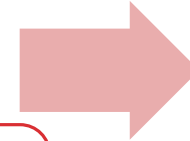
May 2020

- Second public review
- Over 45,000 responses



September 2020

- Standards Recommendation Committee met



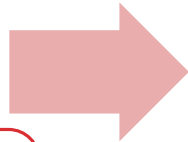
November 2020

- Standards on first reading before the State Board

MATH STANDARDS REVIEW CYCLE

February 2021

- Standards on final reading at the State Board



2021-early 2023

- Textbook adoption cycles (state and local)



2023-24 SY

- Standards implemented in schools

CURRENT MATH STANDARDS

CURRENT MATH STANDARDS

A **standard** is a statement of what a student should know, understand, and be able to do.

CURRENT MATH STANDARDS

Grouped by Grade Level:

- K-5
- 6-8
- High School
 - Traditional Sequence (Algebra I, Geometry, Algebra II)
 - Integrated Sequence (Integrated Math I, II, III)
 - Fourth Year Courses (Precalculus, Calculus, Statistics, Bridge Math, Applied Mathematical Concepts)

CURRENT MATH STANDARDS – LEARNING PROGRESSIONS

Kindergarten	1	2	3	4	5	6	7	8	HS
Counting and Cardinality									Number and Quantity
Number and Operations in Base Ten					Ratios and Proportional Relationships				
	Number and Operations - Fractions				The Number System				
Operations and Algebraic Thinking					Expressions and Equations				Algebra
						Functions			Functions
Geometry					Geometry				Geometry
Measurement and Data					Statistics and Probability				Statistics and Probability

CURRENT MATH STANDARDS - STRUCTURE

Domain

Conceptual Category

(High School Only)

Cluster

Standard

CURRENT MATH STANDARDS

Domains – Large categories or groupings of related mathematical standards

CURRENT MATH STANDARDS – LEARNING PROGRESSIONS (DOMAINS)

Kindergarten	1	2	3	4	5	6	7	8	HS
<u>Counting and Cardinality</u>									Number and Quantity
<u>Number and Operations in Base Ten</u>					<u>Ratios and Proportional Relationships</u>				
			<u>Number and Operations - Fractions</u>		<u>The Number System</u>				
<u>Operations and Algebraic Thinking</u>					<u>Expressions and Equations</u>				Algebra
								<u>Functions</u>	
<u>Geometry</u>					<u>Geometry</u>				Geometry
<u>Measurement and Data</u>					<u>Statistics and Probability</u>				Statistics and Probability

CURRENT MATH STANDARDS

Clusters – Smaller groups of more closely related standards. Cluster headings may be considered as the “big ideas” that the group of standards they represent are addressing.

CURRENT MATH STANDARDS

Measurement and Data (MD)	
Cluster Headings	Content Standards
A. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	<p>3.MD.A.1 Solve contextual problems in time and money.</p> <p>a. Tell and write time to the nearest minute and measure time intervals in minutes. Solve contextual problems involving addition and subtraction of time intervals in minutes.</p> <p>b. Solve one-step contextual problems involving amounts less than one dollar including quarters, dimes, nickels, and pennies using the ¢ symbol appropriately. Solve contextual problems involving whole number dollar amounts up to \$1000 using the \$ symbol appropriately.</p> <p>3.MD.A.2 Measure the mass of objects and liquid volume using standard units of grams (g), kilograms (kg), milliliters (ml), and liters (l). Estimate the mass of objects and liquid volume using benchmarks. <i>For example, a large paper clip is about one gram, so a box of about 100 large clips is about 100 grams.</i></p>

Domain (points to Measurement and Data (MD))

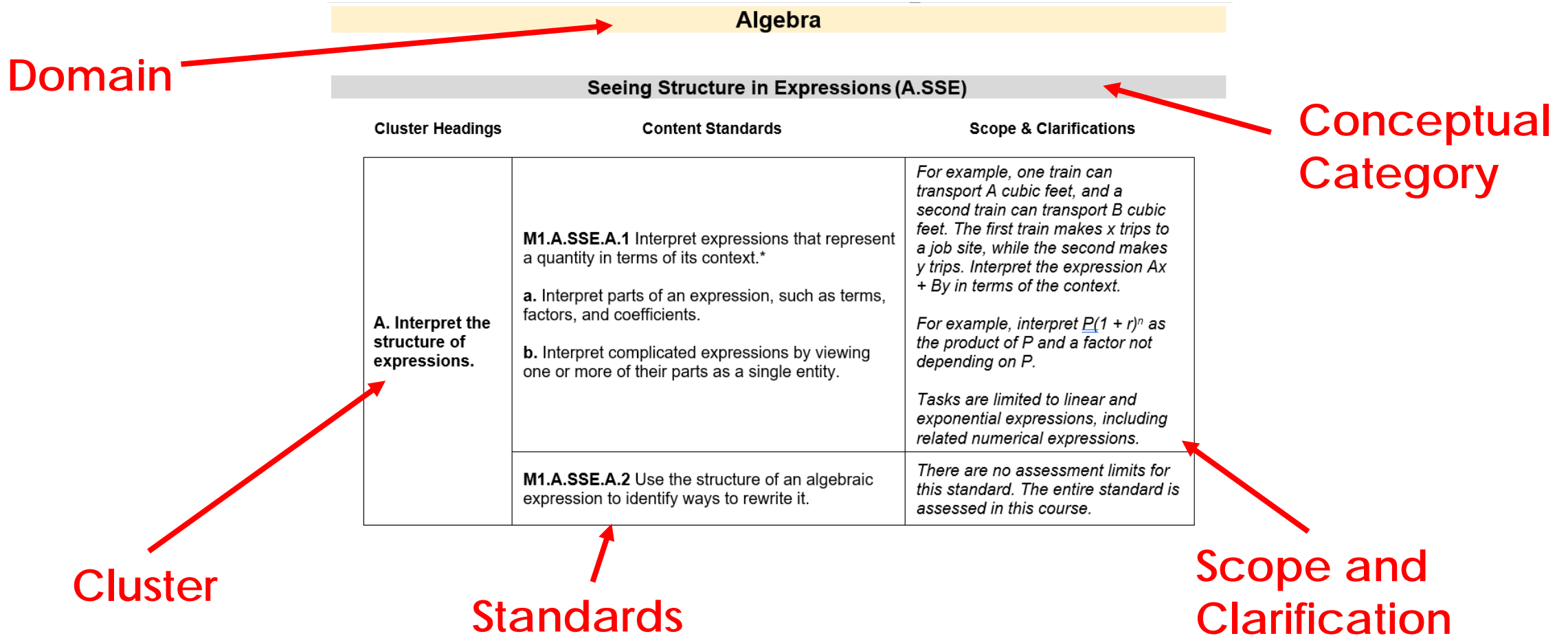
Standards (points to 3.MD.A.1 and 3.MD.A.2)

Cluster (points to A. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.)

CURRENT MATH STANDARDS

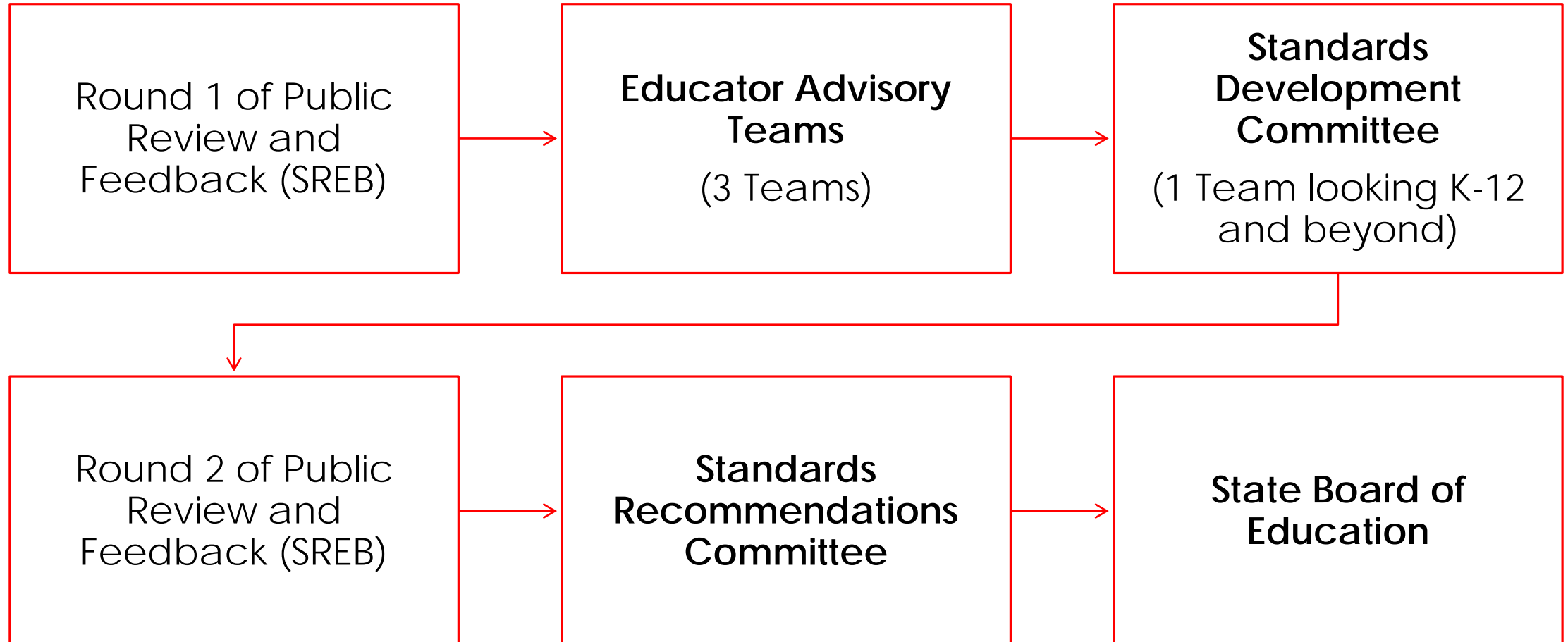
In High School, we also have **Conceptual Categories** – this is a sub-heading within a domain that groups together related clusters.

CURRENT MATH STANDARDS



THE WORK OF THE TEAMS AT EACH REVIEW LEVEL

LEVELS OF REVIEW



EDUCATOR ADVISORY TEAMS

EDUCATOR ADVISORY TEAMS

- Met January – March
- Three teams: K-5, 6-8, and 9-12
- Information provided by State Board of Education:
 - First round of SREB public feedback on each standard (overview + notebooks with details)
 - Report on 6-12 alignment

EDUCATOR ADVISORY TEAMS

- Major focus areas:
 - Clarity of wording
 - Identify gaps
 - Check vertical alignment (especially 6-8 and 9-12)
 - Revise existing examples and provide additional examples as necessary
 - “Balance load” by easing burden on courses packed with standards (especially in high school)
 - High School Team: Also focused on college and career alignment

EDUCATOR ADVISORY TEAMS (K-8)

- No major overhaul/revisions
- Primarily filled gaps, clarified wording, and provided additional examples
- Moved a few standards to different grade levels for better fit

EDUCATOR ADVISORY TEAMS (HIGH SCHOOL)

- Focused on first three years (Algebra I, Algebra II, Geometry and Integrated Math I, II, III)
- Focused on mathematical knowledge that *every* student needs by the end of the required coursework in order to be considered “mathematically literate”
- Increased attention to statistical knowledge meant having to move some traditionally-included topics to fourth year courses

EDUCATOR ADVISORY TEAMS (HIGH SCHOOL)

- Some members also serving on Tennessee Higher Education Commission's "Tennessee Mathematics Alignment Group"
- Informed by reports from MAA, ASA, NCTM, Dana Center, etc.
- Reports advocate including more statistics and modeling, and building better connections and greater understanding in first three years of high school courses—but this necessitates removing some "traditional" topics to make room in the course

EDUCATOR ADVISORY TEAMS (HIGH SCHOOL)

- Major revisions:
 - Increase coursework in basic statistics, understanding and using data
 - Decrease coursework that prepared students for limited career choices
 - Increase understanding of the relationship between geometry and algebra
 - Increase opportunities to explain and justify mathematical thinking and to solve more complex problems

STANDARDS DEVELOPMENT COMMITTEE

STANDARDS DEVELOPMENT COMMITTEE

- Members from all three Educator Advisory Teams
- Bulk of work in March
- Reviewed standards by domain rather than by grade level
- Focus:
 - Review clarity and consistency of wording
 - Identify remaining gaps
 - Examine vertical alignment (especially in 6-8 and high school)

STANDARDS DEVELOPMENT COMMITTEE

- Some changes made (mostly in wording, notation, or examples)
- Introductions rewritten to better capture scope of grade/course
- Recommended removing “Major Work of the Grade” from all mathematics standards

STANDARDS RECOMMENDATIONS COMMITTEE

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- The Standards Recommendation Committee was made up of nine individuals selected by the Governor, Lt. Governor, and the Speaker of the House.
- They met on three consecutive Fridays in September via WebEx, considered public feedback from the second survey, and made additional revisions to the standards.
- On September 25th they voted to approve the recommendations to go before the State Board.

SUMMARY OF CHANGES TO HIGH SCHOOL STANDARDS

MAJOR CHANGES TO HIGH SCHOOL STANDARDS

- Removed Topics:
 - Finding zeroes of polynomials with degree greater than 3
 - Formal proofs
 - Complex numbers
 - Series
 - Rational functions
 - Radians and unit circle trigonometry
 - Trigonometric identities
 - A few other minor topics were also removed

MAJOR CHANGES TO HIGH SCHOOL STANDARDS

- Added Topics:
 - Understanding geometric formulas as functions
 - Matrices
 - Composition of functions
 - Using geometric constructions to solve problems
 - Greater emphasis on relationship between algebra and geometry

MAJOR CHANGES TO HIGH SCHOOL STANDARDS

- Added Topics in Statistics and Probability:
 - Using measures of center to compare data sets
 - Z-scores
 - Identifying potential sources of bias in statistical studies
 - Comparing measures of center/spread in two data sets
 - Counting techniques
 - Probability from a visual/geometric perspective

NEXT STEPS

- By law, the proposed revisions will be sent to the education committees of the state legislature at least 60 days before final reading.
- If the State Board approves the standards on final reading, the standards will be the basis of:
 - State and local textbook adoption cycles;
 - Revisions to state assessments to ensure alignment with the revised standards; and
 - The provision of educator training and/or resources on the revisions by the Department and/or LEAs.
- The revised standards will be implemented in the 2023-24 school year.
- Standards for fourth-year math courses, such as pre-Calculus, Statistics, etc., will go through the standards review process over the next year. They went through an initial process of alignment with higher education this year.

QUESTIONS?

- Contact information:
- Catherine Johnson, SBE: Catherine.Johnson@tn.gov
- Stephanie Kolitsch, UT-M: skolitsc@utm.edu
- TNStandards.Review@tn.gov