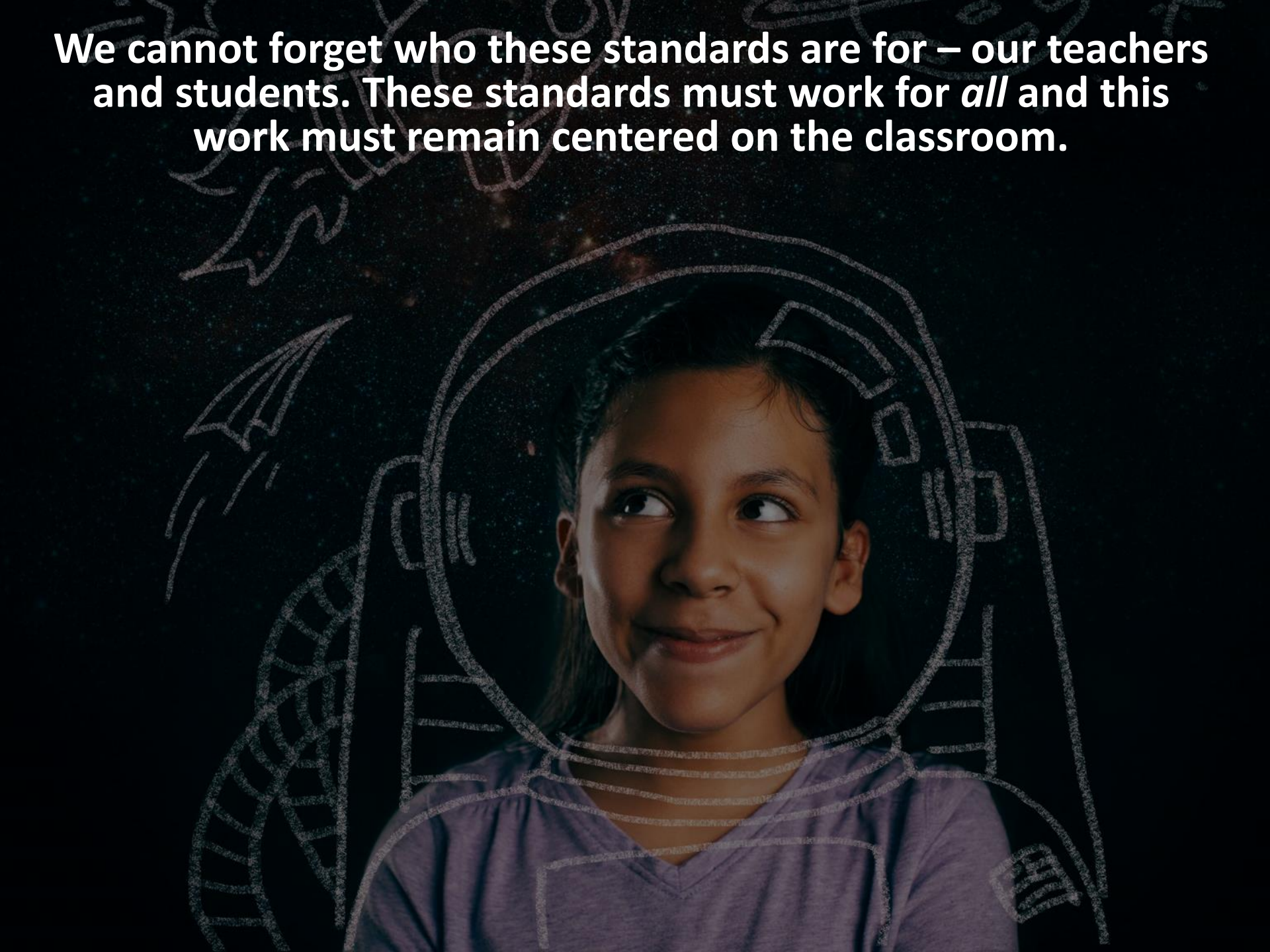
K-12 Mathematics Standards Update

January 2021 SBOE Meeting

We cannot forget who these standards are for – our teachers and students. These standards must work for *all* and this work must remain centered on the classroom.



*Dates are tentative

Standards Review Process

Post Public Feedback Survey
July 16th-Sept 6, 2019

Share Survey Results
September 26, 2019

Convene Citizens Review Committee
October 2019
20 members – 10 members appointed by Governor and 10 appointed by State School Superintendent; Parents, business leaders, taxpayers, etc.; Third party facilitated

Convene Working Committees of Teachers
January & February 2020
teachers for each grade level and geographically representative of the state. Equally appointed by the Governor, State School Superintendent, State Board of Education, and Department.

Convene Academic Review Committee
January 2021
Split appointments by Governor and State School Superintendent with representatives including higher education, State Board of Education, business and industry, Governor's office, and key stakeholder groups.

Convene Citizens Review Committee
January 2021

Post Draft Standards for Public Comment
*February /March 2021**

Adoption of New Mathematics Standards
*March/April 2021**
Recommendation to the State Board

Standards review/revision process paused in March 2020 due to COVID-19

GaDOE.org/standards

Academic Review Committee Members

- **University System of Georgia**
- **Technical College System of Georgia**
- **Governor's Office of Planning and Budget**
- **Department of Early Care and Learning** (DECAL)
- **Scott Sweeney**, State Board of Education Chair
- **Miranda Williams**, Education Policy Advisor
- **Justin Hill**, Associate Superintendent for Curriculum & Instruction – Georgia Department of Education (GaDOE)
- **Tim Crail**, business and industry representative
- **Dr. Trent North**, Superintendent of Douglas County Schools
- **Deborah White**, Executive Director -- Georgia Association of Curriculum and Instructional Supervisors (GACIS)
- **Matt Lee**, business and industry representative (Young Contracting)
- **Dr. Diane W. Bales** – University System of Georgia -- Associate Professor -- child development and learning expert
- **Graham Fletcher**, mathematics representative (Henry County)
- **Dr. Lenisera Barnes-Bodison**, mathematics representative (DeKalb County)
- **Andrew Gibbs**, mathematics/STEM representative (Valdosta City)
- **Fran Blackburn**, Elementary School Principal (Habersham County Schools)
- **Brian Sirmans**, Lanier County Schools and Chair of the Georgia Professional Standards Commission

Standards Review Process *(cont.)*

- All mathematics standards in all courses -- K-12 -- were reviewed

18

Grade/content level teams

200+

Classroom Teachers and Subject Matter Experts convened in January and February

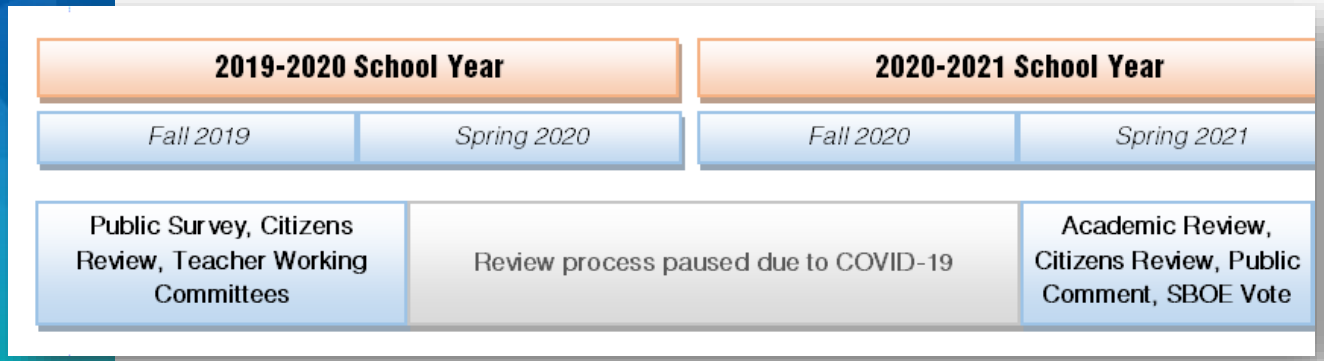
400+

Teachers, Teacher Leaders, and Subject Matter Experts have contributed to the review and revision of the standards

Standards Review Process *(cont.)*

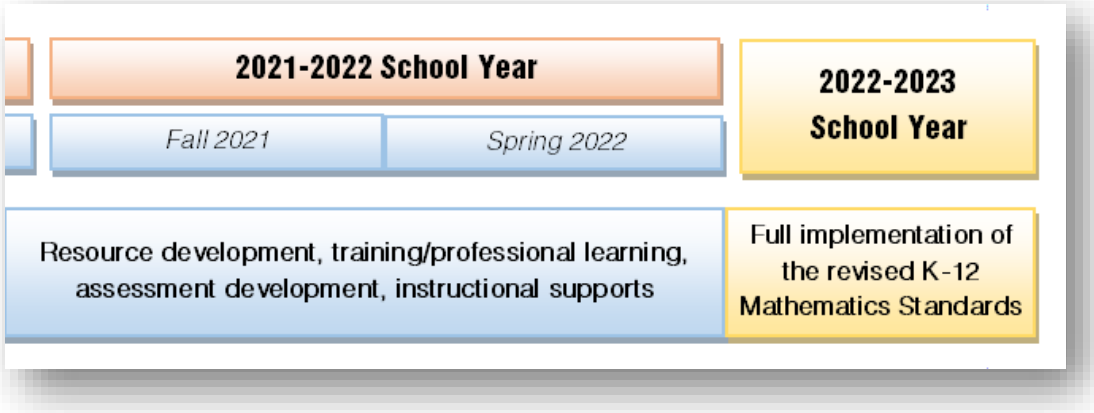
- **Mathematics Standards Document**
  - **A public document** – clear and accessible language; supports engagement from families, parents, and citizens ← survey results, Citizens Review, novice teachers, public comment period
  - **An instructional document** – expectations for students and educators; instructional design (learning progressions, competencies, etc.) and supports (terminology, how far to go, examples, etc.) ← Teacher Working Groups & Academic Review
    - Last review: instructional supports an afterthought *vs.* This review: instructional supports planned 'in-the-room'
    - Strong coordination with assessment; tests to match standards updates

Timeline & Implementation



- Launched Fall 2019; completed survey, Citizens Review and Teacher committees
- Paused with COVID

- Restarted January 2021
- Adopted late Spring 2021
- 2021-2022 school year – training
- 2022-2023 – implementation; students assessed



Standards Structure

Kindergarten

***NUMERICAL REASONING** – counting, money, place value, numbers to 20, addition, subtraction and fluency*		
K.1: Demonstrate and explain the relationship between numbers and quantities up to 20; connect counting to cardinality (the last number counted represents the total quantity in a set).		
	Expectations	**Evidence of Student Learning**
K.1.1	Given a number from 1-20, count out that many objects.	*Fundamentals* Students should count objects using one-to-one correspondence saying the number names in the standard order and communicate quantities for authentic purposes. "Authentic purposes" refers to experiences students have in their everyday lives.
K.1.2	When counting objects, explain that the last number counted represents the total quantity in a set, regardless of the arrangement and order.	*Fundamentals* • Students should know that the last number counted represents the total quantity in a set (cardinality), when counting objects regardless of the arrangement and order. • Students should instantly see how many objects are in a group without counting (subitizing). *Strategies and Methods* • Dot cards, five-frames, ten-frames, and rekenreks can be used for subitizing.
K.1.3	Given a number from 1-20, identify the number that is one more or one less.	*Fundamentals* • Students should be able to understand that each successive number name refers to a quantity that is one larger and the previous number name is one less.
K.1.4	Count up to 20 objects arranged in a line, a rectangle, or a circle, or up to 10 objects in a scattered arrangement.	*Relevance and Application* • Students should be able to count to answer "how many?" questions with up to 20 objects arranged in a variety of ways (a line, a rectangular array, or a circle), or up to 10 objects arranged in a scattered configuration. *Strategies and Methods* • Dot cards, five-frames, ten-frames, and rekenreks can be used for subitizing.

Big Idea and **summary of concepts** in this section

Standard

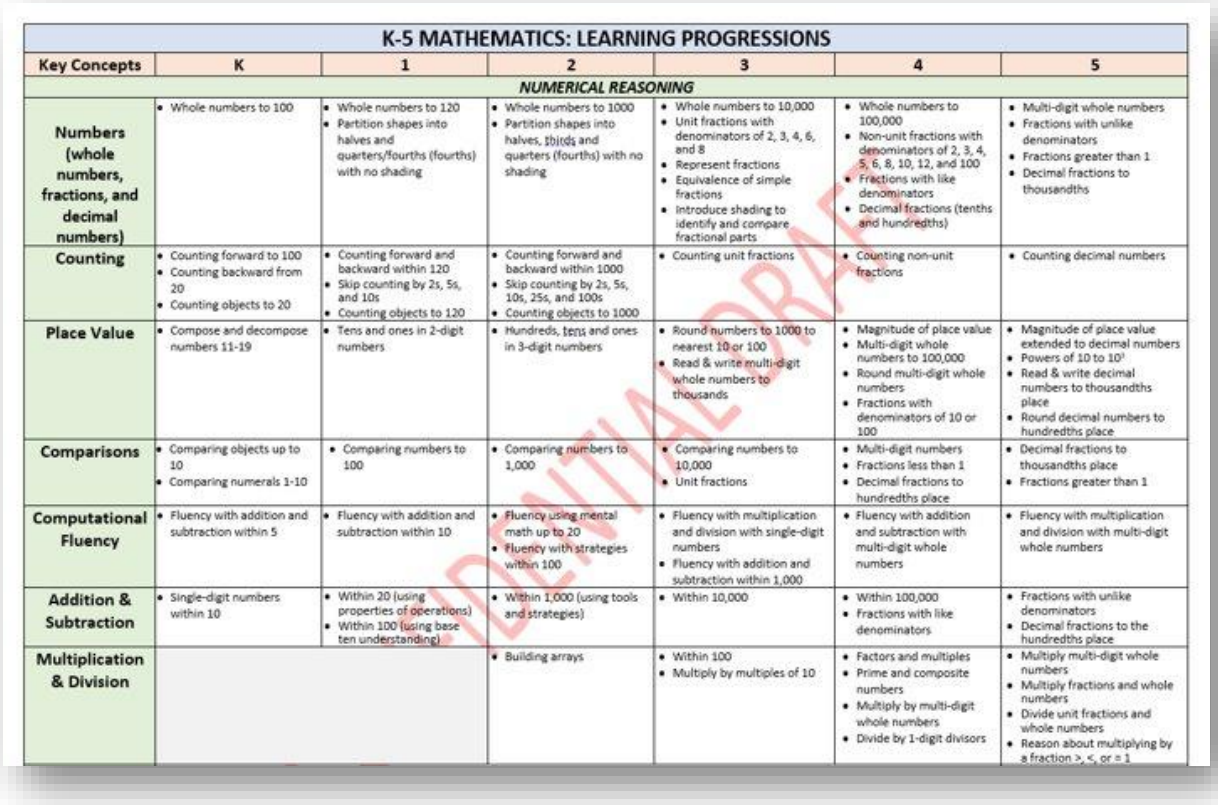
Expectations – 'breaks down' the standard in an instructional progression

Evidence of Student Learning – instructional supports

Instructional Supports

- **Developed by the same group of teachers** who reviewed and made recommended revisions to the standards
- **Full package** with built-in instructional supports that are part of the over Mathematics standards document
- **'Unpacks' the standards** – takes out the guesswork from teachers, removes the heavy lift from districts, aligns with the assessments, and allows the focus to be on instructional delivery

Instructional Supports



K-5 MATHEMATICS: LEARNING PROGRESSIONS

Key Concepts	K	1	2	3	4	5
			NUMERICAL REASONING			
Numbers (whole numbers, fractions, and decimal numbers)	• Whole numbers to 100	• Whole numbers to 120 • Partition shapes into halves and quarters/fourths (fourths) with no shading	• Whole numbers to 1000 • Partition shapes into halves, thirds and quarters (fourths) with no shading	• Whole numbers to 10,000 • Unit fractions with denominators of 2, 3, 4, 6, and 8 • Represent fractions • Equivalence of simple fractions • Introduce shading to identify and compare fractional parts	• Whole numbers to 100,000 • Non-unit fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100 • Fractions with like denominators • Decimal fractions (tenths and hundredths)	• Multi-digit whole numbers • Fractions with unlike denominators • Fractions greater than 1 • Decimal fractions to thousandths
Counting	• Counting forward to 100 • Counting backward from 20 • Counting objects to 20	• Counting forward and backward within 120 • Skip counting by 2s, 5s, and 10s • Counting objects to 120	• Counting forward and backward within 1000 • Skip counting by 2s, 5s, 10s, 25s, and 100s • Counting objects to 1000	• Counting unit fractions	• Counting non-unit fractions	• Counting decimal numbers
Place Value	• Compose and decompose numbers 11-19	• Tens and ones in 2-digit numbers	• Hundreds, tens and ones in 3-digit numbers	• Round numbers to 1000 to nearest 10 or 100 • Read & write multi-digit whole numbers to thousands	• Magnitude of place value • Multi-digit whole numbers to 100,000 • Round multi-digit whole numbers • Fractions with denominators of 10 or 100	• Magnitude of place value extended to decimal numbers • Powers of 10 to 10^3 • Read & write decimal numbers to thousandths place • Round decimal numbers to hundredths place
Comparisons	• Comparing objects up to 10 • Comparing numerals 1-10	• Comparing numbers to 100	• Comparing numbers to 1,000	• Comparing numbers to 10,000 • Unit fractions	• Multi-digit numbers • Fractions less than 1 • Decimal fractions to hundredths place	• Decimal fractions to thousandths place • Fractions greater than 1
Computational Fluency	• Fluency with addition and subtraction within 5	• Fluency with addition and subtraction within 10	• Fluency using mental math up to 20 • Fluency with strategies within 100	• Fluency with multiplication and division with single-digit numbers • Fluency with addition and subtraction within 1,000	• Fluency with addition and subtraction with multi-digit whole numbers	• Fluency with multiplication and division with multi-digit whole numbers
Addition & Subtraction	• Single-digit numbers within 10	• Within 20 (using properties of operations) • Within 100 (using base ten understanding)	• Within 1,000 (using tools and strategies)	• Within 10,000	• Within 100,000 • Fractions with like denominators	• Fractions with unlike denominators • Decimal fractions to the hundredths place
Multiplication & Division			• Building arrays	• Within 100 • Multiply by multiples of 10	• Factors and multiples • Prime and composite numbers • Multiply by multi-digit whole numbers • Divide by 1-digit divisors	• Multiply multi-digit whole numbers • Multiply fractions and whole numbers • Divide unit fractions and whole numbers • Reason about multiplying by a fraction >, <, or = 1

K-12 Learning Progressions

- When big ideas/concepts are introduced and how they progress across grade levels
- When a student is struggling, allows teachers to trace back to foundational concepts/skills
- Powerful tool for both parents and educators – expectations for each grade

Summary of Changes: K-5

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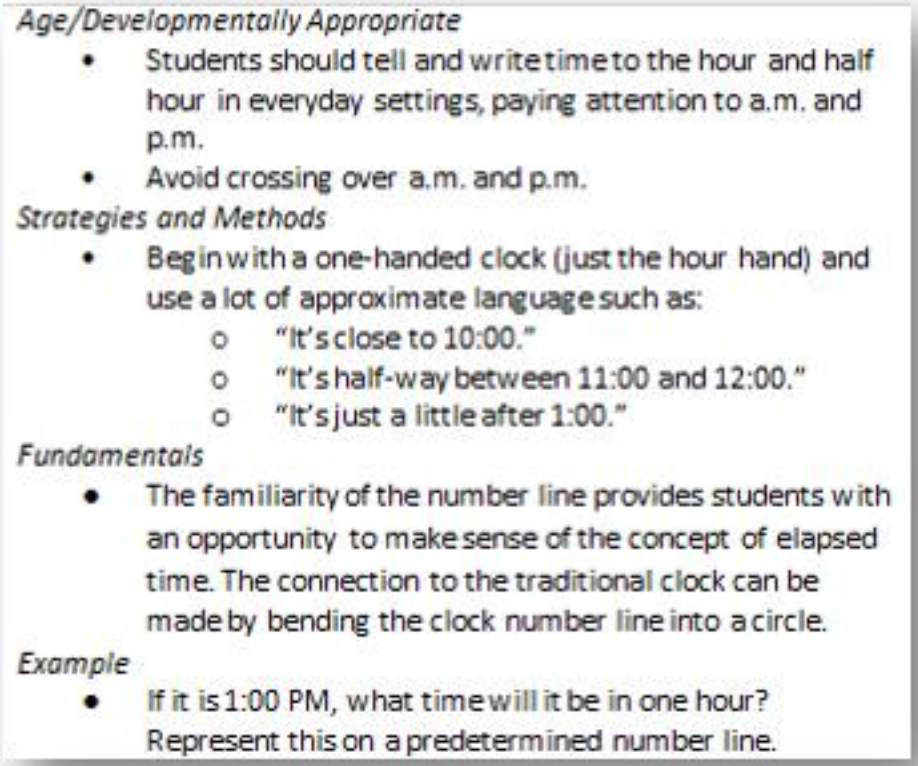
Instructional Supports



Age/Developmentally Appropriate

- Students should tell and write time to the hour and half hour in everyday settings, paying attention to a.m. and p.m.
- Avoid crossing over a.m. and p.m.

Strategies and Methods

- Begin with a one-handed clock (just the hour hand) and use a lot of approximate language such as:
  - "It's close to 10:00."
  - "It's half-way between 11:00 and 12:00."
  - "It's just a little after 1:00."

Fundamentals

- The familiarity of the number line provides students with an opportunity to make sense of the concept of elapsed time. The connection to the traditional clock can be made by bending the clock number line into a circle.

Example

- If it is 1:00 PM, what time will it be in one hour? Represent this on a predetermined number line.

Evidence of Student Learning

- Built in instructional supports and guidance
- *How far to go with this concept/skill?*
- *What is age/ developmentally appropriate?*
- *What are some examples?*
- *What strategies and methods can students use?*
- *What does the academic jargon mean?*

Implementation: Links to videos and lessons – *What does this look like in Georgia classrooms?*

Response to Stakeholder Feedback

Key Stakeholder Feedback	Response to Feedback
Accessible Language (especially for parents and the public; Mathematics teachers agreed)	• Focus on wording; academic jargon moved/defined under 'Evidence of Student Learning' column • Focus on key skills/concepts over terminology in wording of standards • Clarified that focus is on mastering key skills and concepts, not vocabulary
Number of standards/amount of content (too little time to teach all that's expected).	• Ensured grade-levels are balanced out • Overall reduction of standards/expectations but balanced out by breaking down complex concepts

Response to Stakeholder Feedback *(cont.)*

Key Stakeholder Feedback	Response to Feedback
Age/developmental appropriateness of skills/concepts (especially in K-5)	• Age/developmental appropriateness statements added in 'Evidence of Student Learning' column • *How far to go? What are appropriate instructional methods/strategies?*
Parents overall concerns concentrated mostly in K-5, slightly less in 6-8, and very little in high school	• Overall focus on making standards and expectations accessible, clear, and understandable • Moved academic jargon and unpacking to 'Evidence of Student Learning' column • Balance between public document and instructional document

Response to Stakeholder Feedback *(cont.)*

Key Stakeholder Feedback	Response to Feedback
Clarity, cohesion, and sequencing (especially requested in grades 6-8 and high school)	• Unpacking of standards and expectations in the 'Evidence of Student Learning' column to provide clarity • K-12 learning progressions created by those 'in-the-room' to ensure sequencing and cohesion
Creativity and autonomy (too little time to teach all that's expected); **Ready for life** – not just college or careers	• Reinforced that strategies, methods, and approaches are up to the teacher and should be what works best for each student • Encouraged real-life, engaging examples, activities, and applications

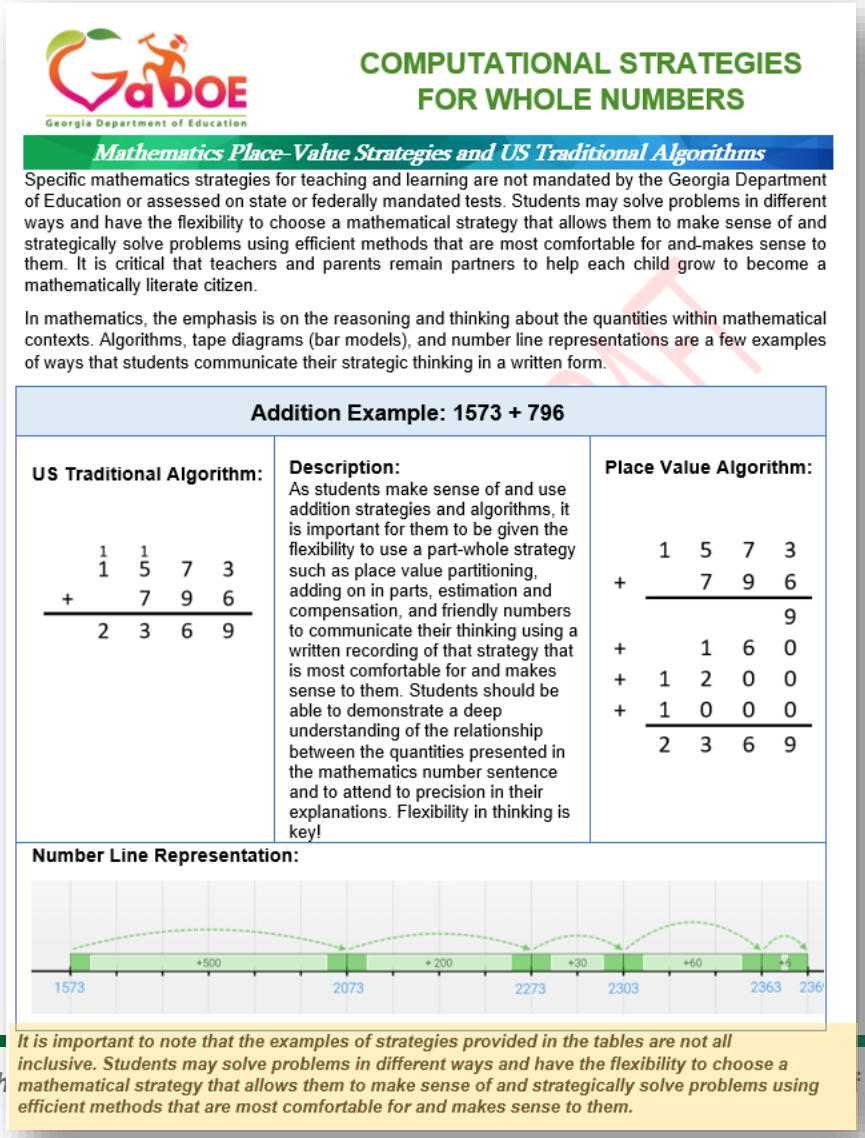
Response to Stakeholder Feedback *(cont.)*

Key Stakeholder Feedback	Response to Feedback
Assessments must be aligned to revised standards	• GaDOE's assessment team was in the room throughout the process not to drive conversations, but to gain a perspective of teacher and stakeholder input • Assessments (i.e. Georgia Milestones, GAA, GKIDS 2.0, etc.) will be revised to align to the revised standards

Alignment to GKIDS 2.0 and GELDS

- **GELDS (pre-k standards)** that directly align with the draft kindergarten standards have been identified – assisting kindergarten math teachers will identifying and addressing any gaps
- **GKIDS 2.0** – big ideas assess on Georgia's kindergarten readiness check that directly align with the draft kindergarten standards will been identified once GKIDS is updated – ensuring kindergarten math teachers enforce key skills/concepts for success in 1st grade

Strategies



COMPUTATIONAL STRATEGIES FOR WHOLE NUMBERS

Mathematics Place-Value Strategies and US Traditional Algorithms

Specific mathematics strategies for teaching and learning are not mandated by the Georgia Department of Education or assessed on state or federally mandated tests. Students may solve problems in different ways and have the flexibility to choose a mathematical strategy that allows them to make sense of and strategically solve problems using efficient methods that are most comfortable for and-makes sense to them. It is critical that teachers and parents remain partners to help each child grow to become a mathematically literate citizen.

In mathematics, the emphasis is on the reasoning and thinking about the quantities within mathematical contexts. Algorithms, tape diagrams (bar models), and number line representations are a few examples of ways that students communicate their strategic thinking in a written form.

Addition Example: 1573 + 796

US Traditional Algorithm:

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ \ \ } \\ 1\ 5\ 7\ 3 \\ +\quad 7\ 9\ 6 \\ \hline 2\ 3\ 6\ 9 \end{array}$$

Description:
As students make sense of and use addition strategies and algorithms, it is important for them to be given the flexibility to use a part-whole strategy such as place value partitioning, adding on in parts, estimation and compensation, and friendly numbers to communicate their thinking using a written recording of that strategy that is most comfortable for and makes sense to them. Students should be able to demonstrate a deep understanding of the relationship between the quantities presented in the mathematics number sentence and to attend to precision in their explanations. Flexibility in thinking is key!

Place Value Algorithm:

$$\begin{array}{rrrr} & 1 & 5 & 7 & 3 \\ + & & 7 & 9 & 6 \\ \hline & & & & 9 \\ + & & 1 & 6 & 0 \\ + & 1 & 2 & 0 & 0 \\ + & 1 & 0 & 0 & 0 \\ \hline & 2 & 3 & 6 & 9 \end{array}$$

Number Line Representation:

It is important to note that the examples of strategies provided in the tables are not all inclusive. Students may solve problems in different ways and have the flexibility to choose a mathematical strategy that allows them to make sense of and strategically solve problems using efficient methods that are most comfortable for and makes sense to them.

Student-centered Flexibility

- Reinforce that strategies and methods for solving mathematical problems are classroom decisions -- not state decisions -- and should be made with the best interest of the individual child in mind.

"It is important to note that the examples of strategies provided in the tables are not all inclusive. ***Students may solve problems in different ways and have the flexibility to choose a mathematical strategy*** *that allows them to make sense of and strategically solve problems using efficient methods that are most comfortable for and makes sense to them."*

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