CCSS Mathematics Instructional Shifts

2nd Grade Overview

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Overview of the CCSS

- William McCallum and Jason Zimba discuss the Mathematial Common Core State Standards
  - How they were developed
  - Who was involved

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Rationale for the CCSS

- Declining US competitiveness with other developed countries
- NAEP performance:
  - Slight improvement at the 4th grade level
  - Largely flat over the past 40 years in 8th grade
  - Slight decline at the high school level
- High rates of college remediation

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The Background of the Common Core

Initiated by the National Governors Association (NGA) and Council of Chief State School Officers (CCSSO) with the following design principles:

- Result in College and Career Readiness
- Based on solid research and practice evidence
- Fewer standards, greater depth of knowledge and clearer

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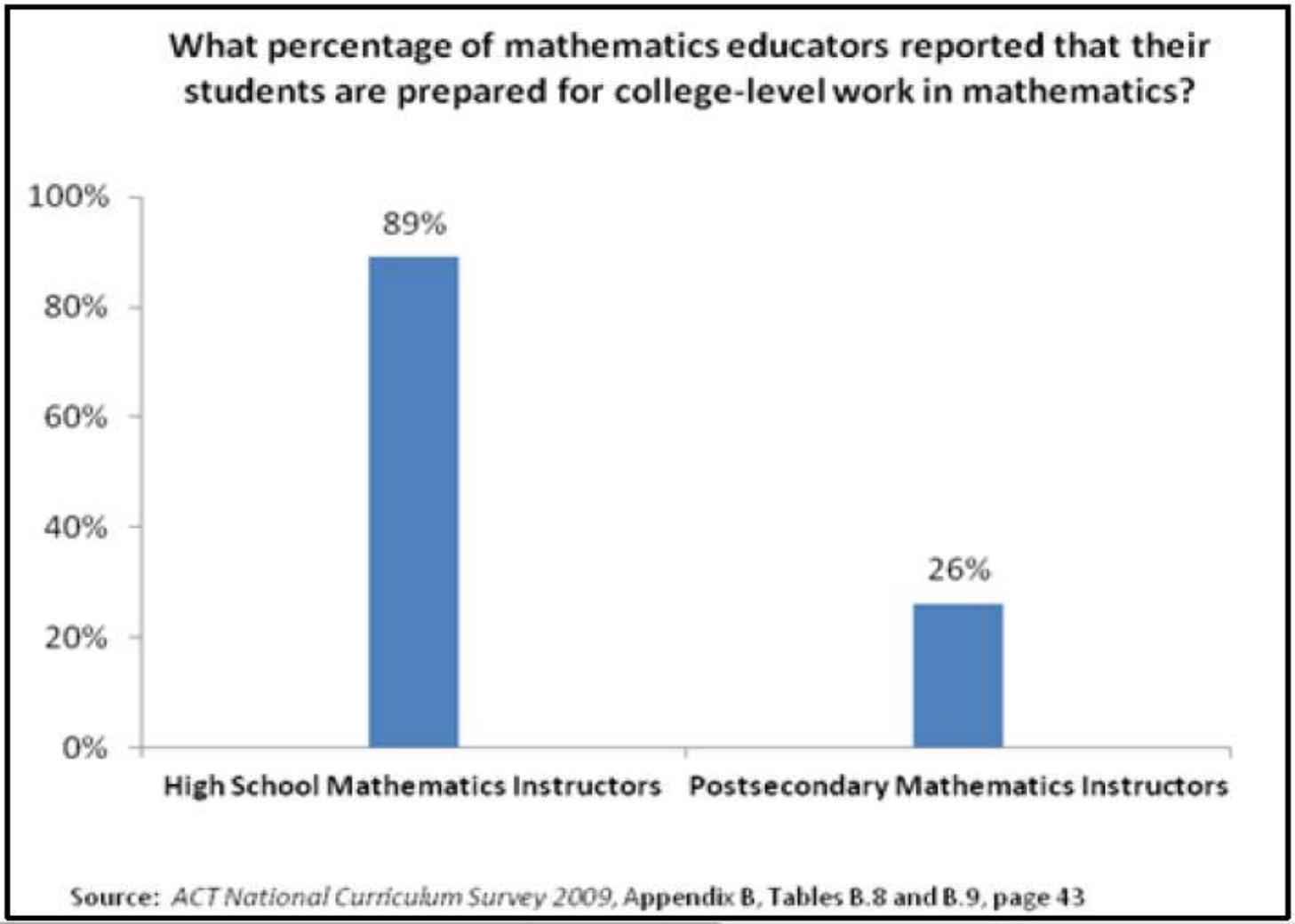
College Math Professors Feel HS students Today are Not Prepared for College Math



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What The Disconnect Means for Students

- Nationwide, many students in two-year and four-year colleges need remediation in math.
- Remedial classes lower the odds of finishing the degree or program.
- Need to set the agenda in high school math to prepare more students for postsecondary education and training.

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Common Core State Standards for Mathematics: *Key Shifts*

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The CCSS Requires Three Shifts in Mathematics

1. **Focus:** Focus strongly where the standards focus.
2. **Coherence**: *Think* across grades, and *link* to major topics
3. **Rigor:** In major topics, pursue *conceptual* **understanding,** procedural skill and *fluency*, and *application*

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Shift #1: Focus Strongly where the Standards Focus

- Significantly narrow the scope of content and deepen how time and energy is spent in the math classroom.
- Focus deeply on what is emphasized in the standards, so that students gain strong foundations.

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Focus

- Move away from **"mile wide, inch deep"** curricula identified in TIMSS.
- Learn from international comparisons.
- Teach less, learn more.

"Less topic coverage can be associated with higher scores on those topics covered because students have more time to master the content that is taught."

– Ginsburg et al., 2005

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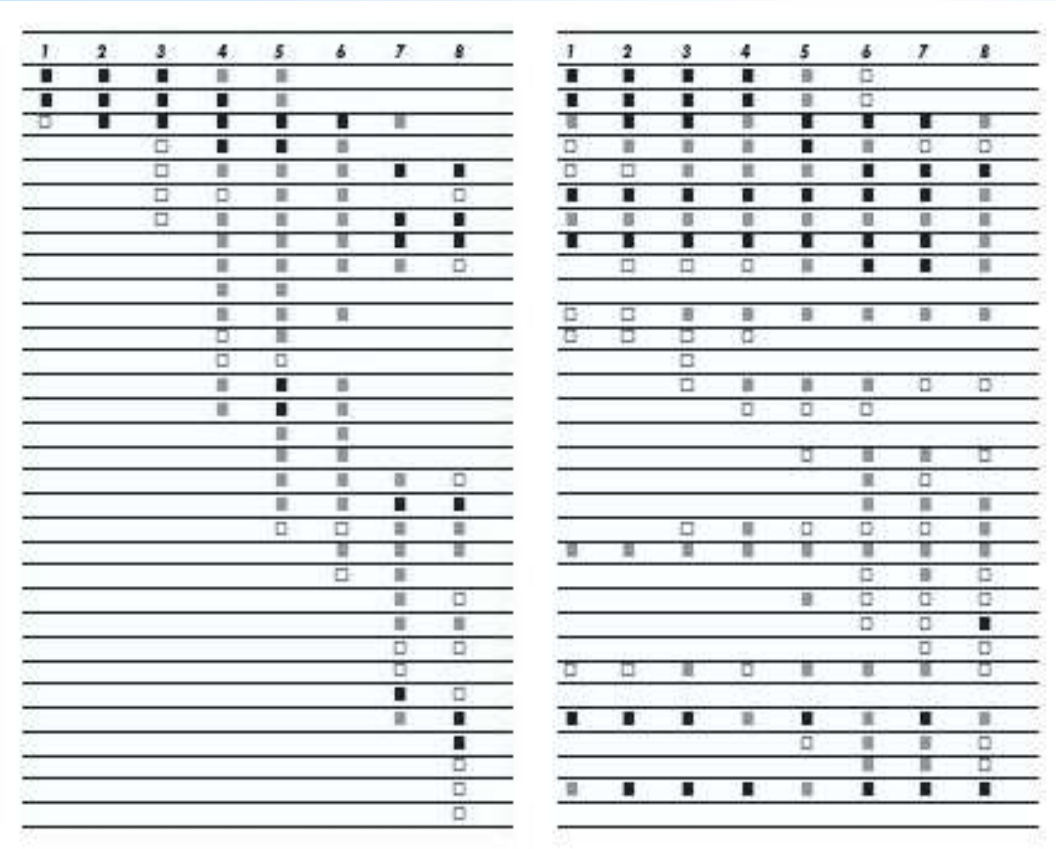
The Shape of Math in A+ countries

Mathematics topics intended at each grade by at least two-thirds of A+ countries



Mathematics topics intended at each grade by at least two-thirds of 21 U.S. states

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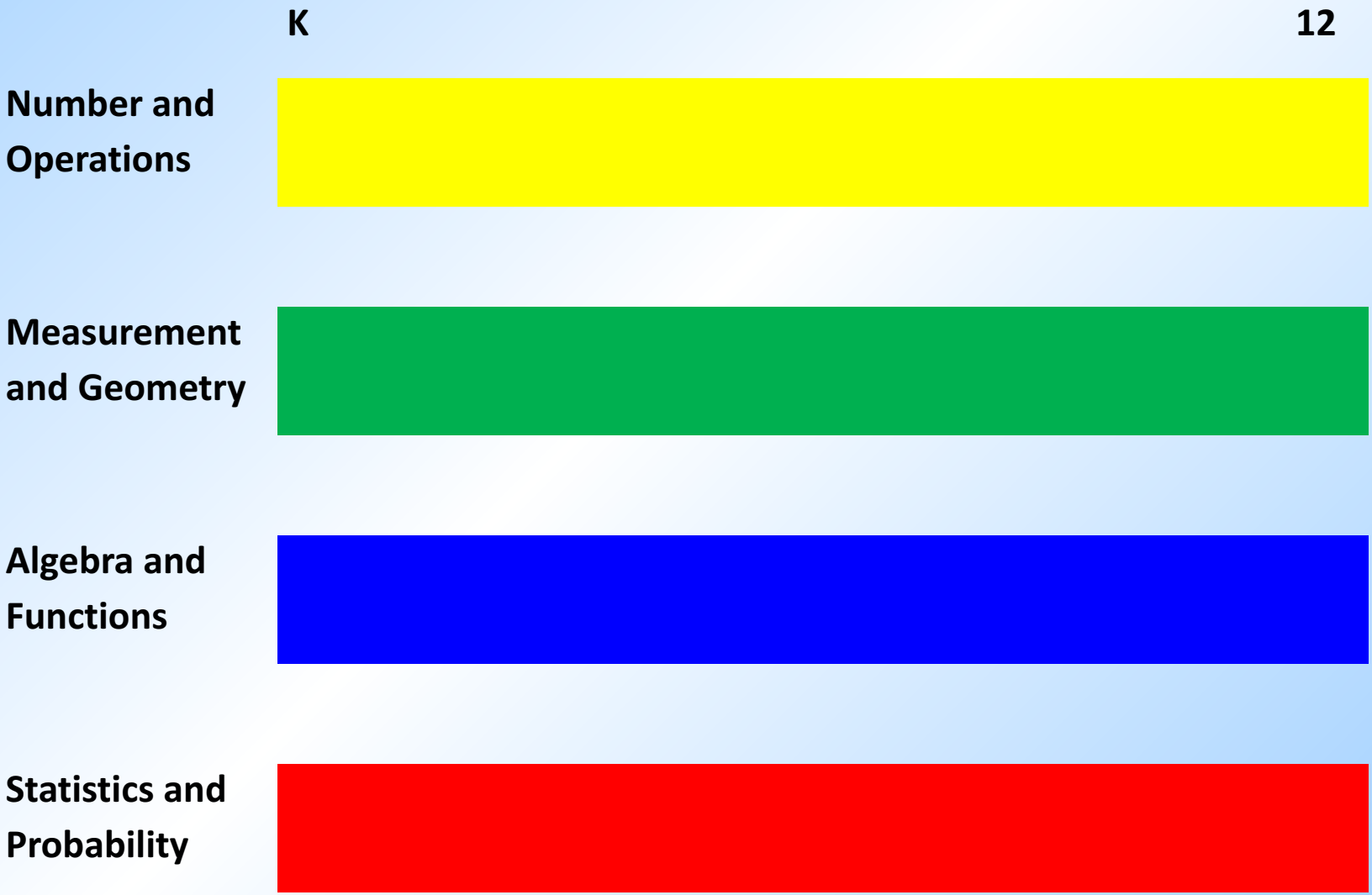
[1] *Schmidt, Houang, & Cogan, "A Coherent Curriculum: The Case of Mathematics." (2002).*

Traditional U.S. Approach



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FOCUS

- 1st Grade CCSS: 21 Standards
- 1st Grade G.L.E.'s: 30 Standards

- 2nd Grade CCSS 26 Standards
- 2nd Grade G.L.E.'s: 34 Standards

- 3rd Grade CCSS: 25 Standards
- 3rd Grade G.L.E.'s: 36 Standards

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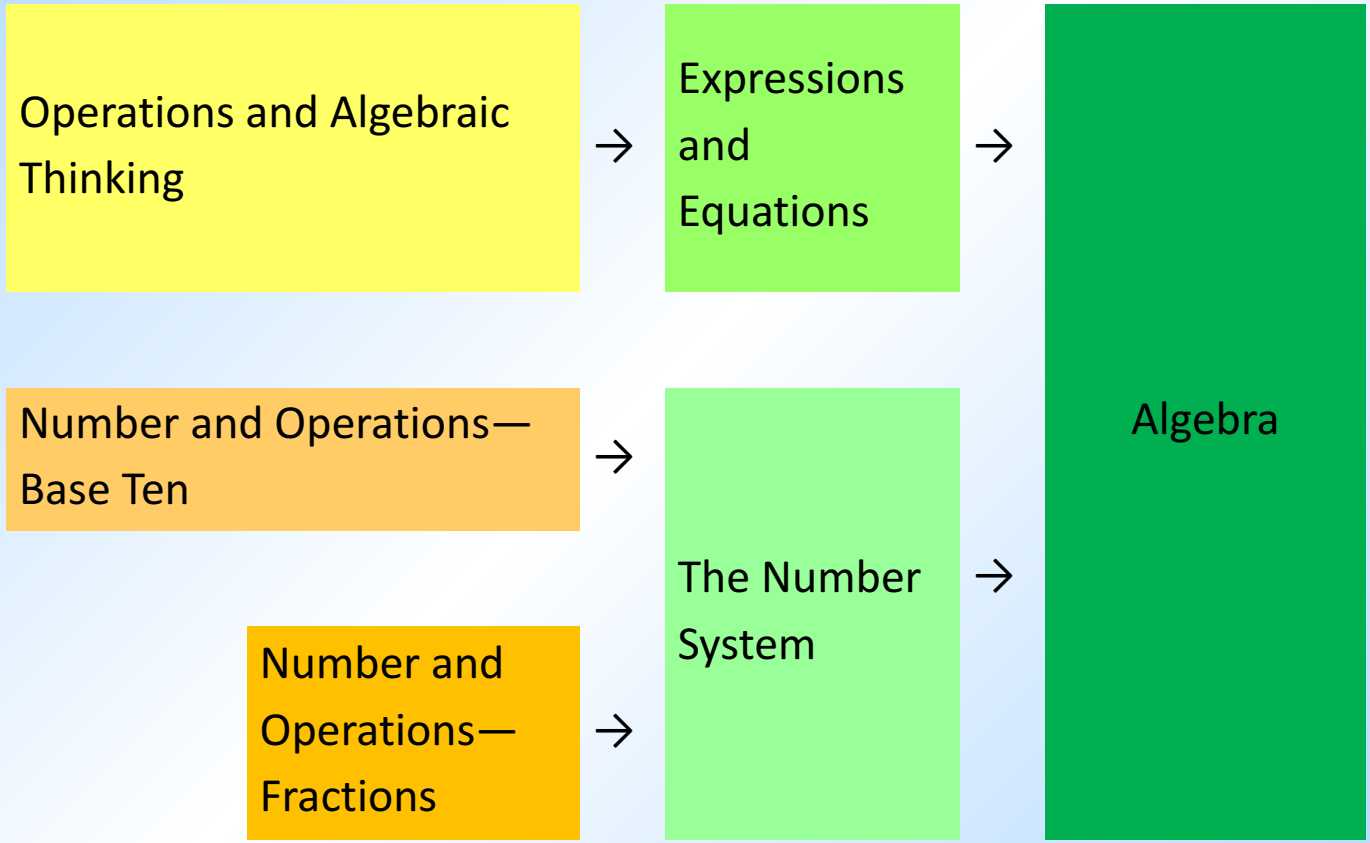
Focusing Attention Within Number and Operations



K 1 2 3 4 5 6 7 8 High School

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The Importance of Focus in Mathematics

Jason Zimba – YouTube Video

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Key Areas of Focus in Mathematics

Grade	Focus Areas in Support of Rich Instruction and Expectations of Fluency and Conceptual Understanding
K–2	Addition and subtraction – concepts, skills, and problem solving and place value
3–5	Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

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Content Emphases by Cluster--Grade 1*

Not all of the content in a given grade is emphasized equally in the standards. Some clusters require greater emphasis than the others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. In addition, an intense focus on the most critical material at each grade allows depth in learning, which is carried out through the Standards for Mathematical Practice.

To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade. The following table identifies the Major Clusters, Additional Clusters, and Supporting Clusters for this grade.

Key: Major Clusters; Supporting Clusters; Additional Clusters

Operations and Algebraic Thinking
- Represent and solve problems involving addition and subtraction.
- Understand and apply properties of operations and the relationship between addition and subtraction.
- Add and subtract within 20.
- Work with addition and subtraction equations.

Number and Operations in Base Ten
- Extending the counting sequence.
- Understand place value.
- Use place value understanding and properties of operations to add and subtract.

Measurement and Data
- Measure lengths indirectly and by iterating length units.
- Tell and write time.
- Represent and interpret data.

Geometry
- Reason with shapes and their attributes.

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Content Emphases by Cluster--Grade 2*

Not all of the content in a given grade is emphasized equally in the standards. Some clusters require greater emphasis than the others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. In addition, an intense focus on the most critical material at each grade allows depth in learning, which is carried out through the Standards for Mathematical Practice.

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Key: Major Clusters; Supporting Clusters; Additional Clusters

Operations and Algebraic Thinking
- **Represent and solve problems involving addition and subtraction.**
- **Add and subtract within 20.**
- **Work with equal groups of objects to gain foundations for multiplication.**

Number and Operations in Base Ten
- **Understand place value.**
- **Use place value understanding and properties of operations to add and subtract.**

Measurement and Data
- **Measure and estimate lengths in standard units.**
- **Relate addition and subtraction to length.**
- **Work with time and money.**
- **Represent and interpret data.**

Geometry
- **Reason with shapes and their attributes.**

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Content Emphases by Cluster--Grade 3*

Not all of the content in a given grade is emphasized equally in the standards. Some clusters require greater emphasis than the others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. In addition, an intense focus on the most critical material at each grade allows depth in learning, which is carried out through the Standards for Mathematical Practice.

To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade. The following table identifies the Major Clusters, Additional Clusters, and Supporting Clusters for this grade.

Key: Major Clusters; Supporting Clusters; Additional Clusters

Operations and Algebraic Thinking
Represent and solve problems involving multiplication and division.
Understand properties of multiplication and the relationship between multiplication and division.
Multiply and divide within 100.
Solve problems involving the four operations, and identify and explain patterns in arithmetic.
Number and Operations in Base Ten
Use place value understanding and properties of operations to perform multi-digit arithmetic.
Number and Operations—Fractions
Develop understanding of fractions as numbers.
Measurement and Data
Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
Represent and interpret data.
Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.
Geometry
Reason with shapes and their attributes.

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Engaging with the shift: What do you think belongs in the major work of each grade?

Grade	Which two of the following represent areas of major focus for the indicated grade?		
1	Add and subtract within 20	Measure lengths indirectly and by iterating length units	Create and extend patterns and sequences
2	Work with equal groups of objects to gain foundations for multiplication	Understand place value	Identify line of symmetry in two dimensional figures
3	Multiply and divide within 100	Identify the measures of central tendency and distribution	Develop understanding of fractions as numbers

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Group Discussion

Shift #1: Focus strongly where the Standards focus.

- *In your groups, discuss ways to respond to the following question, "Why focus? There's so much math that students could be learning, why limit them to just a few things?"*
- *Complete the Focus section of the sheet "Reflecting on the Shifts in Mathematics"*

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Grade 3 Mathematics Sample ER Item Claim 2

The digits in a three-digit number represent the amounts of hundreds, tens, and ones. Fill in the chart to show the amounts of hundreds, tens, and ones in the number 523.

Number	Hundreds	Tens	Ones
523			

In the box below, write a number that meets the following conditions.

- The number must be between 1 and 9.
- When the number is subtracted from 523, the digit in the ones place of the difference is **greater** than the ones place of 523.

Grade 3 Mathematics Sample ER Item Claim 2

Sample Top-Score Response:

Number	Hundreds	Tens	Ones
523	5	2	3

4, 5, 6, 7, 8, or 9

Scoring Rubric:

Responses to this item will receive 0–2 points based on the following:

2 points: The student demonstrates thorough understanding of subtracting numbers using place value by naming each place value correctly in the chart and writing the number in the ones place of the difference that is greater than 3.

1 point: The student demonstrates a partial understanding of subtracting numbers using place value by either naming each value of 523 correctly in the chart or by writing the number in the ones place of the difference that is greater than 3.

0 points: The student demonstrates inconsistent or no understanding place value and of subtracting numbers using place value and place value when solving multi-digit arithmetic.

What's the Next Step?

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