2010 Arizona Mathematics Standards (Common Core)

Where we've been…Snorkeling

2009-2010:

- Narrowed the content
- Beginning of deep investigation into mathematics problem solving
- Much less repetition

Where we are…Scuba Diving

2011 to present:

- Standards are fewer, much deeper
- Even greater focus on problem solving
- Each grade level has only the domains (major topics) relevant to their focus

Key Advances in 2010 Mathematics Standards

K-12: Focus on problem-solving, reasoning about numbers, and modeling

- **K-5:** Focus on number sense and operations
- **K-7:** Fractions, ratios, and proportional reasoning to support algebra
- **6-8:** Modeling with ratios, geometry, statistics, and probability
- **High School:** Rigorous algebra, geometry, modeling, statistics and probability

Building Foundations across K-12

Grade	K	1	2	3	4	5	6	7	8	HS Conceptual Categories
Domains	CC—Counting & Cardinality						RP—Ratios & Proportional Relationships		F—Functions	F—Functions
	OA—Operations & Algebraic Thinking						EE—Expressions & Equations			A—Algebra
	NBT—Number and Operations in Base Ten						NS—The Number System			N—Number & Quantity
				F—Fractions						
	MD—Measurement & Data						SP—Statistics & Probability			SP—Statistics & Probability
	G—Geometry									
	MP—Standards for Mathematical Practice									

Critical Areas: Kindergarten

- Representing and relating whole numbers, initially with sets of objects
- Adding and subtracting with whole numbers, initially with sets of objects
- Describing shapes and space

Critical Areas: 1st Grade

- Developing an understanding of and strategies for addition and subtraction
- Developing an understanding of whole number relationships and place value (grouping in tens and ones)
- Understanding linear measurement and measuring lengths
- Reasoning about and composing/decomposing (making/breaking apart) geometric shapes.

Critical Areas: 2nd Grade

- Extending an understanding of base-ten notation (ones, tens, hundreds)
- Building fluency with addition and subtraction (accurate and flexible)
- Using standard units of measure (inches, centimeters, etc.)
- Describing and analyzing shapes

Critical Areas: 3rd Grade

- Developing an understanding of multiplication and division and strategies
- Developing an understanding of fractions, especially unit fractions (fractions with numerator 1)
- Developing an understanding of the structure of rectangular arrays and of area
- Describing and analyzing two-dimensional shapes

Critical Areas: 4th Grade

- Developing an understanding and fluency with multi-digit multiplication and dividing to find quotients involving multi-digit dividends
- Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers
- Understanding that geometric figures can be analyzed and classified based on their properties (parallel sides, perpendicular sides, angle measurements, symmetry, etc.)

Critical Areas: 5th Grade

- Developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases
- Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations
- Developing an understanding of volume

Critical Areas: 6th Grade

- Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems
- Completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative number
- Writing, interpreting, and using expressions and equations
- Developing an understanding of statistical thinking

Standards for Mathematical Practices

Habits of Mind of a Productive Mathematical Thinker

MP.1 Make sense of problems and persevere in solving them.

MP.6 Attend to precision.

Reasoning and Explaining

MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.

Modeling and Using Tools

MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.

Seeing Structure and Generalizing

MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

What does that mean for mathematics instruction?

- Procedural fluency is one-fourth of the focus of mathematics instruction.
  - Fluency is defined as accurate and *flexible*.
- The other three-fourths of mathematics instruction include:
  - Strategy in problem solving
  - Reasoning
  - Reasoning about connections (transfer)

How Parents Can Help…

- Word problems, especially problems of the day, may seem very complicated and advanced.
- Students will need support thinking about these ideas before they begin to solve:
  - What they know about the problem
  - What they know about the answer
  - Whether this looks like a problem they have seen before

How Parents Can Help…

- Often times students will be encouraged to use sense-making strategies to solve mathematical problems.
- These strategies will support their growth.
- Teachers may delay showing students short cuts or standard algorithms.
- *Please honor that delay, it is by design to develop a deep understanding of the concept.*