2nd Grade – Summary of Revisions and Planning Guidance - *Arizona Mathematics Standards - Adopted in 2016*

Additions		Deletions	
No additions		**No deletions**	
Parameter Changes/Clarifications		**Fluency Expectations**	
2.OA.A.1	Removed the reference to a list of strategies and examples.	1st	**1.OA.C.6 -** Fluently add and subtract within 10.
2.OA.B.2	Removed the reference to a list of mental strategies.	2nd	**2.OA.B.2 -** Fluently add and subtract within 20. By the end of 2nd grade, know from memory all sums of two one-digit numbers. **2.NBT.B.5 -** Fluently add and subtract within 100.
2.OA.C.3	Removed the example of writing an equation with 2 equal addends and understanding the sum will be even.	3rd	**3.NBT.A.2 -** Fluently add and subtract within 1000. **3.OA.C.7 -** Fluently multiply and divide within 100. By the end of 3rd grade, know from memory all multiplication products through 10 x 10 and division quotients when both the quotient and divisor are less than or equal to 10.
2.NBT.B.6	Standard is now adding three two-digit numbers rather than four.		
2.NBT.B.7	Standard states that students need to demonstrate understanding of addition and subtraction within 1000, raising the cognitive demand of this standard. Specific methods of adding or subtracting three-digit numbers were removed.		**Fluency Definition**
2.MD.A.2	Added "Understand that depending on the size of the unit, the number of units for the same length varies."		Fluency standard instruction should begin in at the beginning of the year and continue throughout the school year.
2.MD.B.5	Removed all examples as well as removing the requirement of writing equations with a symbol for the unknown.		Wherever the word *fluently* appears in a content standard, the word includes ***efficiently, accurately, flexibly,*** *and* ***appropriately***. Being fluent means that students are able to choose flexibly among methods and strategies to solve contextual and mathematical problems, they understand and are able to explain their approaches, and they are able to produce accurate answers efficiently.
2.MD.C.8	Added the requirement to write the total using $ and ¢.		
2.G.A.1	Students no longer have to recognize and draw various 2-D and 3-D shapes but rather identify and describe 2-D and 3-D shapes and draw only 2-D shapes.		• **Efficiency**—carries out easily, keeps track of sub-problems, and makes use of intermediate results to solve the problem.

Defining Standards, Curriculum and Instruction

Standards – What a student needs to know, understand, and be able to do by the end of each grade. Standards build across grade levels in a progression of increasing understanding and through a range of cognitive demand levels. Standards are adopted at the state level by the State Board of Education.

Curriculum – The resources used for teaching and learning the standards. Curricula are adopted at a local level by districts and schools.

Instruction – The methods used by teachers to teach their students. Instructional techniques are employed by individual teachers in response to the needs of the students in their classes to help them progress through the curriculum in order to master the standards.

• **Accuracy**—reliably produces the correct answer.

• **Flexibility**—knows more than one approach, chooses a viable strategy, and uses one method to solve and another method to double-check.

• **Appropriately**—knows when to apply a particular procedure.

2nd Grade Content Emphasis	
Operations and Algebraic Thinking (OA)	
●	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 (NBT)	
●	Understand place value.
●	Use place value understanding and properties of operations to add and subtract.
Measurement and Data (MD)	
●	Measure and estimate lengths in standard units.
●	Relate addition and subtraction to length.
▲	Work with time and money.
▲	Represent and interpret data.
Geometry (G)	
▲	Reason with shapes and their attributes.

● - Major Content   ▲ - Supporting Content

Major Content (●) from the content emphasis section should account for approximately 70% of instructional time. The majority of learning time in 2nd grade should focus on number and place value.

Changes in Cognitive Demand

There are times in which the standards were changed, resulting in an increase or decrease in cognitive demand expectations within the standards. This is an important aspect of the standard to examine, keeping in mind that cognitive demand refers to the complexity of thinking involved in which students interact with the content; it does **not** refer to difficulty.

Changes in Cognitive Demand in the 2nd Grade Standards
2.NBT.B.7
2.MD.A.2

| Standards that reference Table 1 in 2nd Grade		
2.OA.A.1		2.NBT.B.7
2.MD.B.5	2.MD.C.8	2.MD.D.10

The Standards for Mathematical Practice

The Standards for Mathematical Practice complement the content standards so that students increasingly engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years.

The Arizona Mathematics Standards now include narratives for each of the 8 Mathematical Practices.

Balance of Rigor in the Math Classroom
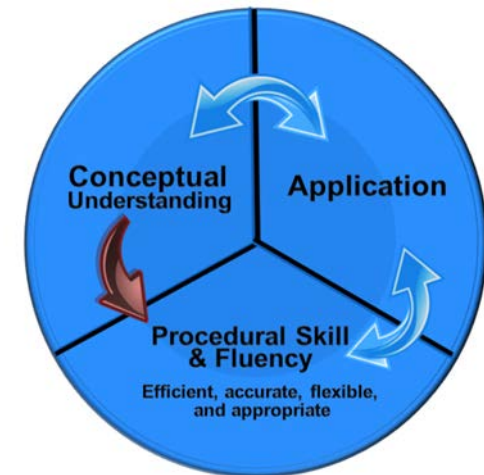
"Tasks that ask students to perform a memorized procedure in a routine manner lead to one type of opportunity for student thinking; tasks that require students to think conceptually and that stimulate students to make connections lead to a different set of opportunities for student thinking."
(Stein & Smith, 1998)

Comparison of Arizona Mathematics Standards – 2010 to 2016

Adopted **2010**		Adopted **2016**		
Operations and Algebraic Thinking (OA)		**Operations and Algebraic Thinking (OA)**		
2.OA.A	**Represent and solve problems involving addition and subtraction.**			
	2.OA.A.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (See Table 1.)	**2.OA.A Represent and solve problems involving addition and subtraction.**	**2.OA.A.1**	Use addition and subtraction within 100 to solve one- and two-step word problems. Represent a word problem as an equation with a symbol for the unknown. *See Table 1.*
2.OA.B	**Add and subtract within 20.**			
	2.OA.B.2. Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. (See standard *1.OA.6* for a list of mental strategies.)	**2.OA.B Add and subtract within 20.**	**2.OA.B.2**	Fluently add and subtract within 20. By end of Grade 2, know from memory all sums of two one-digit numbers.
2.OA.C	**Work with equal groups of objects to gain foundations for multiplication.**			
	2.OA.C.3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	**2.OA.C Work with equal groups of objects to gain foundations for multiplication.**	**2.OA.C.3**	Determine whether a group of objects (up to 20) has an odd or even number of members (e.g., by pairing objects or counting them by 2's).
	2.OA.C.4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.		**2.OA.C.4**	Use addition to find the total number of objects arranged in rectangular arrays (with up to 5 rows and 5 columns). Write an equation to express the total as a sum of equal addends.

Number and Operations in Base Ten (NBT)			Number and Operations in Base Ten (NBT)		
2.NBT.A	**Understand place value.**				
	2.NBT.A.1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens—called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	**2.NBT.A** **Understand place value.**	**2.NBT.A.1**	Understand that the three digits of a three-digit number represent groups of hundreds, tens, and ones (e.g., 706 equals 7 hundreds, 0 tens, and 6 ones and also equals 70 tens and 6 ones). Understand the following as special cases: a. 100 can be thought of as a group of ten tens—called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
	2.NBT.A.2. Count within 1000; skip-count by 5s, 10s, and 100s.		**2.NBT.A.2**	Count within 1000; skip count by 5's, 10's and 100's.
	2.NBT.A.3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.		**2.NBT.A.3**	Read and write numbers up to 1000 using base-ten numerals, number names, and expanded form.
	2.NBT.A.4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.		**2.NBT.A.4**	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
2.NBT.B	**Use place value understanding and properties of operations to add and subtract.**				
	2.NBT.B.5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	**2.NBT.B** **Use place value understanding and properties of operations to add and subtract.**	**2.NBT.B.5**	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
	2.NBT.B.6. Add up to four two-digit numbers using strategies based on place value and properties of operations.		**2.NBT.B.6**	Add up to three two-digit numbers using strategies based on place value and properties of operations.

	2.NBT.B.7. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	**2.NBT.B (Cont.)**	2.NBT.B.7	Demonstrate understanding of addition and subtraction within 1000, connecting objects or drawings to strategies based on place value (including multiples of 10), properties of operations, and/or the relationship between addition and subtraction. Relate the strategy to a written form. *See Table 1.*
	2.NBT.B.8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.		2.NBT.B.8	Mentally add 10 or 100 to a given number in the range of 100 and 900, and mentally subtract 10 or 100 from a given number in the range of 100 and 900.
	2.NBT.B.9. Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)		2.NBT.B.9	Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)
	Measurement and Data (MD)		**Measurement and Data (MD)**	
2.MD.A	**Measure and estimate lengths in standard units.**			
	2.MD.A.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	**2.MD.A Measure and estimate lengths in standard units.**	2.MD.A.1	Measure the length of an object by selecting and using appropriate tools (e.g., ruler, meter stick, yardstick, measuring tape).
	2.MD.A.2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.		2.MD.A.2	Measure the length of an object twice, using different standard length units for the two measurements; describe how the two measurements relate to the size of the unit chosen. Understand that depending on the size of the unit, the number of units for the same length varies.
	2.MD.A.3. Estimate lengths using units of inches, feet, centimeters, and meters.		2.MD.A.3	Estimate lengths using units of inches, feet, centimeters, and meters.
	2.MD.A.4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.		2.MD.A.4	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

2.MD.B	Relate addition and subtraction to length.			
	2.MD.B.5. Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.	**2.MD.B Relate addition and subtraction to length.**	2.MD.B.5	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same unit. *See Table 1.*
	2.MD.B.6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.		2.MD.B.6	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.
2.MD.C	**Work with time and money.**			
	2.MD.C.7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	**2.MD.C Work with time and money.**	2.MD.C.7	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
	2.MD.C.8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*		2.MD.C.8	Solve word problems involving collections of money, including dollar bills, quarters, dimes, nickels, and pennies. Record the total using $ and ¢ appropriately. *See Table 1.*
2.MD.D	**Represent and interpret data.**			
	2.MD.D.9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	**2.MD.D Represent and interpret data.**	2.MD.D.9	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
	2.MD.D.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (See Table 1.)		2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in the graph. *See Table 1.*

Geometry (G)		Geometry (G)		
2.G.A	**Reason with shapes and their attributes.**			
	2.G.A.1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. (Sizes are compared directly or visually, not compared by measuring.)	**2.G.A** **Reason with shapes and their attributes.**	2.G.A.1	Identify and describe specified attributes of two-dimensional and three-dimensional shapes, according to the number and shape of faces, number of angles, and the number of sides and/or vertices. Draw two-dimensional shapes based on the specified attributes (e.g. triangles, quadrilaterals, pentagons, and hexagons).
	2.G.A.2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.		2.G.A.2	Partition a rectangle into rows and columns of same-size rectangles and count to find the total number of rectangles.
	2.G.A.3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves*, *thirds*, *half of*, *a third of*, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.		2.G.A.3	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, fourths, half of, third of, fourth of, and describe the whole as two halves, three thirds, or four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Standards for Mathematical Practice

2.MP.1 Make sense of problems and persevere in solving them.
Mathematically proficient students explain to themselves the meaning of a problem, look for entry points to begin work on the problem, and plan and choose a solution pathway. While engaging in productive struggle to solve a problem, they continually ask themselves, "Does this make sense?" to monitor and evaluate their progress and change course if necessary. Once they have a solution, they look back at the problem to determine if the solution is reasonable and accurate. Mathematically proficient students check their solutions to problems using different methods, approaches, or representations. They also compare and understand different representations of problems and different solution pathways, both their own and those of others.

2.MP.2 Reason abstractly and quantitatively.
Mathematically proficient students make sense of quantities and their relationships in problem situations. Students can contextualize and decontextualize problems involving quantitative relationships. They contextualize quantities, operations, and expressions by describing a corresponding situation. They decontextualize a situation by representing it symbolically. As they manipulate the symbols, they can pause as needed to access the meaning of the numbers, the units, and the operations that the symbols represent. Mathematically proficient students know and flexibly use different properties of operations, numbers, and geometric objects and when appropriate they interpret their solution in terms of the context.

2.MP.3 Construct viable arguments, and critique the reasoning of others.
Mathematically proficient students construct mathematical arguments (explain the reasoning underlying a strategy, solution, or conjecture) using concrete, pictorial, or symbolic referents. Arguments may also rely on definitions, assumptions, previously established results, properties, or structures. Mathematically proficient students make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. Mathematically proficient students present their arguments in the form of representations, actions on those representations, and explanations in words (oral or written). Students critique others by affirming or questioning the reasoning of others. They can listen to or read the reasoning of others, decide whether it makes sense, ask questions to clarify or improve the reasoning, and validate or build on it. Mathematically proficient students can communicate their arguments, compare them to others, and reconsider their own arguments in response to the critiques of others.

2.MP.4 Model with mathematics.
Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. When given a problem in a contextual situation, they identify the mathematical elements of a situation and create a mathematical model that represents those mathematical elements and the relationships among them. Mathematically proficient students use their model to analyze the relationships and draw conclusions. They interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

2.MP.5 Use appropriate tools strategically.
Mathematically proficient students consider available tools when solving a mathematical problem. They choose tools that are relevant and useful to the problem at hand. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful; recognizing both the insight to be gained and their limitations. Students deepen their understanding of mathematical concepts when using tools to visualize, explore, compare, communicate, make and test predictions, and understand the thinking of others.

2.MP.6 Attend to precision.
Mathematically proficient students clearly communicate to others using appropriate mathematical terminology, and craft explanations that convey their reasoning. When making mathematical arguments about a solution, strategy, or conjecture, they describe mathematical relationships and connect their words clearly to their representations. Mathematically proficient students understand meanings of symbols used in mathematics, calculate accurately and efficiently, label quantities appropriately, and record their work clearly and concisely.

2.MP.7 Look for and make use of structure.
Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notations into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.

2.MP.8 Look for and express regularity in repeated reasoning.
Mathematically proficient students look for and describe regularities as they solve multiple related problems. They formulate conjectures about what they notice and communicate observations with precision. While solving problems, students maintain oversight of the process and continually evaluate the reasonableness of their results. This informs and strengthens their understanding of the structure of mathematics which leads to fluency.