5th Grade Essential Standards Justification

Essential Standards are individual standards selected to receive a greater proportion of questions on the AASA exams. The AASA exams, administered in grades three through eight, are developed based on a standards blueprint approved by the State Board of Education that includes individual standards grouped into clusters and identifies an allocation of questions for each cluster. The identified Essential Standards will receive the maximum number of questions allowed by the standards blueprint. Note that ALL standards will continue to be included in the test design of the annual state exams. ALL STANDARDS WILL BE ASSESSED. The identified Essential Standards are targeted for emphasis, indicating that these standards will have a higher proportion of the AASA when possible. The state assessment will retain the same length and duration. ALL STANDARDS remain valid and subject to inclusion in each year's AASA. *All justifications listed in this document were developed by a working group of Arizona math educators and leaders.*

Fifth Grade: Overview

1. **Develop competency in dividing and fluency in multiplying whole numbers through the application of understanding of place value and multiplication and division.**

Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They are fluent with multi-digit multiplication of whole numbers. Students are able to explain patterns associated with multiplication through application of their knowledge of place value such as explaining the pattern in the number of zeros in a product. Students apply their understanding of division to begin working with decimals. They understand and can explain the placement of the decimal point when multiplying or dividing. Students apply their understanding of addition and multiplication of whole numbers (NBT) to foundational understanding of volume (MD).

2. Develop understanding in performing operations with decimals to hundredths and estimating by rounding.

Students apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations and make reasonable estimates (through rounding) of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (e.g., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths.

3. Develop understanding of multiplication of fractions and division of fractions in limited cases unit fractions divided by whole numbers and whole numbers divided by unit fractions.

Students apply their understanding of fractions and fraction models to efficiently and accurately add and subtract fractions with unlike denominators. Students use their understanding of fractions; make connections to their understanding of multiplication and division, to explain the "why" of multiplying and dividing fractions. ***(Note: Division of fractions is limited to dividing unit fractions by whole numbers and whole numbers by unit fractions.)***

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.

Develop competency in dividing and fluency in multiplying whole numbers through the application of understanding of place value and multiplication, and division. Students develop an understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They are fluent with multi-digit multiplication of whole numbers. Students are able to explain patterns associated with multiplication through the application of their knowledge of place value, such as explaining the pattern in the number of zeros in a product. Students apply their understanding of division to begin working with decimals. They understand and can explain the placement of the decimal point when multiplying or dividing. Students apply their understanding of addition and multiplication of whole numbers (NBT) to a foundational understanding of volume (MD).		
Clusters Included		
5.NBT.A Understand the Place Value System **5.NBT.B Perform Operations with Multi-Digit Whole Numbers and with Decimals to Hundredths**		**5.MD.C Geometric Measurement: Understand Concepts of Volume and Relate Volume to Multiplication and to Addition** **5.OA.A Write and Interpret Numerical Expressions** **5.OA.B Analyze Patterns and Relationships**
Coding	**Standard**	**Justification**
5.NBT.A.1	**Apply concepts of place value, multiplication, and division to understand that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.**	• This standard a major standard • This is connected to Algebraic Thinking Cluster A standards
5.NBT.B.7	**Add, subtract, multiply, and divide decimals to hundredths, connecting objects or drawings to strategies based on place value, properties of operations, and/or the relationship between operations. Relate the strategy to a written form.**	• This standard must have connectivity to objects/drawings, strategies based on place value, properties of operations, and/or relationships. • Should be assessed within contextual problems most of the time
Additional standards that support the big ideas of the grade level.		

5.NBT.A.2	**Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.**	• This standard is a major standard, yet it does not need more testing
5.NBT.A.3.a	**Read and write decimals to thousandths using base-ten numerals, number names, and expanded form.**	
5.NBT.A.3.b	**Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.**	
5.NBT.A.4	**Use place value understanding to round decimals to any place.**	
5.NBT.B.5	**Fluently multiply multi-digit whole numbers using a standard algorithm.**	• Embedded into 5.NBT.B.7
5.NBT.B.6	**Apply and extend understanding of division to find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.**	• This standard is a major standard, yet it does not need more testing
5.OA.A.1	Use parentheses and brackets in numerical expressions, and evaluate expressions with these symbols (Order of Operations).	• All supporting standards do not require more testing
5.OA.A.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them (e.g., express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18,932 + 921) is three times as large as 18,932 + 921, without having to calculate the indicated sum or product.	
5.OA.B.3	Generate two numerical patterns using two given rules (e.g., generate terms in the resulting sequences). Identify and explain the apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane (e.g., given the rule "add 3" and the starting number 0, and given the rule "add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence).	
5.OA.B.4	Understand primes have only two factors and decompose numbers into	

	prime factors.	
5.MD.C.3.a	**A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.**	• This standard is a major standard, yet it does not need more testing
5.MD.C.3.b	**A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.**	
5.MD.C.4	**Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.**	
5.MD.C.5.a	**Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes (e.g., to represent the associative property of multiplication).**	
5.MD.C.5.b	**Understand and use the formulas *V* = *l* x *w* x *h* and *V* = *B* x *h*, where in this case *B* is the area of the base (*B* = *l* x *w*), for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths to solve mathematical problems and problems in real-world contexts.**	
5.MD.C.5.c	**Understand volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms, applying this technique to solve mathematical problems and problems in real-world contexts.**	

Develop understanding in performing operations with decimals to hundredths and estimating by rounding. Students apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations and make reasonable estimates (through rounding) of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (e.g., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths.

Clusters Included	
5.NBT.A Understand the Place Value System **5.MD.A Convert Like Measurement Units Within a Given Measurement System**	**5.G.A Graph Points on the Coordinate Plane to Solve Mathematical Problems as well as Problems in Real-World Context** **5.G.B Classify Two-Dimensional Figures into Categories Based on Their Properties**

Coding	Standard	Justification
Additional standards that support the big ideas of the grade level.		
5.NBT.A.1	**Apply concepts of place value, multiplication, and division to understand that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.**	• This standard is a major standard, yet it does not need more testing • This is connected to Algebraic Thinking Cluster A standards
5.NBT.A.3.a	**Read and write decimals to thousandths using base-ten numerals, number names, and expanded form.**	• All supporting standards do not require more testing
5.NBT.A.3.b	**Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.**	
5.NBT.A.4	**Use place value understanding to round decimals to any place.**	
5.MD.A.1	**Convert among different-sized standard measurement units within a given measurement system and use these conversions to solve multi-step, real-world problems.**	• All supporting standards do not require more testing

5.G.A.1	**Understand and describe a coordinate system as perpendicular number lines, called axes, that intersect at the origin (0, 0). Identify a given point in the first quadrant of the coordinate plane using an ordered pair of numbers, called coordinates. Understand that the first number (*x*) indicates the distance traveled on the horizontal axis, and the second number (*y*) indicates the distance traveled on the vertical axis.**	• All supporting standards do not require more testing
5.G.A.2	**Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.**	
5.G.B.3	**Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.**	
5.G.B.4	**Classify two-dimensional figures in a hierarchy based on properties.**	

Develop understanding of multiplication of fractions and division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions). Students apply their understanding of fractions and fraction models to efficiently and accurately add and subtract fractions with unlike denominators. Students use their understanding of fractions; make connections to their understanding of multiplication and division, to explain the "why" of multiplying and dividing fractions.
(Note: Division of fractions is limited to dividing unit fractions by whole numbers and whole numbers by unit fractions.)

Clusters Included	
5.NF.A Use Equivalent Fractions to Add and Subtract Fractions **5.NF.B Use Previous Understandings of Multiplication and Division to Multiply and Divide Fractions**	**5.MD.B Represent and Interpret Data**

Coding	Standard	Justification
5.NF.A.2	**Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, by using a variety of representations, equations, and visual models to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers (e.g., recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2).**	• Deepens understanding of fractions by using models and equations to solve real-world problems with unlike denominators.
5.NF.B.6	**Solve problems in real-world contexts involving multiplication of fractions, including mixed numbers, by using a variety of representations, including equations and models.**	• The focus must be on a variety of representations and models
5.NF.B.7.c	**Solve problems in real-world contexts involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, using a variety of representations.**	• B.7.c is the priority indicator in this cluster
5.MD.B.2	**Make a line plot to display a data set of measurements in fractions of a unit (1/8, 1/2, 3/4). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.***	• Applies fraction operations to solve real-world problems

Additional standards that support the big ideas of the grade level.		
5.NF.A.1	**Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators (e.g., 2/3 + 5/4 = 8/12 + 15/12 = 23/12).**	• This standard is embedded into 5.NF.A.2
5.NF.B.3	**Interpret a fraction as the number that results from dividing the whole number numerator by the whole number denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people, each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?***	• This standard is a major standard, yet it does not need more testing
5.NF.B.4.a	**Interpret the product (*a/b*) x *q* as *a* part of a partition of *q* into *b* equal parts. *For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation.***	
5.NF.B.4.b	**Interpret the product of a fraction multiplied by a fraction (*a/b*) x (*c/d*). Use a visual fraction model and create a story context for this equation.*For example, use a visual fraction model to show (2/3) x (4/5) = 8/15, and create a story context for this equation.* In general, (*a/b*) x (*c/d*) = *ac/bd*.**	
5.NF.B.4.c	**Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.**	• This standard is a major standard, yet does not need more testing
5.NF.B.5.a	**Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.**	• This standard is a major standard, yet it does not need more testing
5.NF.B.5.b	**Explaining why multiplying a given number by a fraction greater**	• This standard is a major standard, yet it does

	than 1 results in a product greater than the given number; explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{n \times a}{n \times b}$ to the effect of $\frac{a}{b}$ multiplying by 1.	not need more testing
5.NF.B.7.a	**Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. Use the relationship between multiplication and division to justify conclusions.**	
5.NF.B.7.b	**Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient.* Use the relationship between multiplication and division to justify conclusions (e.g., 4 ÷ (1/5) = 20 because 20 x (1/5) = 4).**	