MISSOURI MATHEMATICS CORE ACADEMIC STANDARDS CROSSWALK TO MISSOURI GLES/CLES
CONTENT ALIGNMENTS AND SHIFTS- Grade 5 *DRAFT*

Grade 5	
Critical Areas In Grade 5, instructional time should focus on three critical areas: 1. developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cased (unit fractions divided by whole numbers and whole numbers divided by unit fractions); 2. 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; and 3. developing understanding of volume.	**Mathematical Practices** 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

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Operations and Algebraic Thinking 5.OA			
Write and interpret numerical expressions.			
5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. http://illustrativemathematics.org/illustrations/555	**A2B5** ***use the commutative, distributive and associative properties*** for fractions and decimals	**N2C6** ***apply properties of operations (including order of operations)*** to positive rational numbers

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5.OA.2	Write simple expressions that record calculations with numbers, **and interpret numerical expressions without evaluating them**. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* http://illustrativemathematics.org/illustrations/139 http://illustrativemathematics.org/illustrations/556 http://illustrativemathematics.org/illustrations/590	**A2A5** ***using all operations, represent a mathematical situation as an expression*** or number sentence using a letter or symbol	
Analyze patterns and relationships.			
5.OA.3	**Generate two numerical patterns using two given rules.** Identify 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. *For example, 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. Explain informally why this is so.*	**A1A5** ***make generalizations about*** geometric and ***numeric patterns*** **A1B5** ***represent and analyze patterns using words, tables, and graphs*** **A3A5** ***model problem situations and draw conclusions, using representations, such as graphs, tables, or number sentences*** **A4A5** ****identify, model and describe situations with constant or varying rates of change*** **G2A5** ****use coordinate systems to specify locations***, describe paths and find the distance between points along horizontal and vertical lines.	
Number and Operations in Base Ten 5.NBT			
Understand the place value system.			

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5.NBT.1	Recognize 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 $\frac{1}{10}$ of what it represents in the place to its left.		**N1A6** ***apply and understand whole numbers*** to millions, ***fractions and decimals*** to the thousandths (including location on the number line)
5.NBT.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. Use whole-number exponents to denote powers of 10.		**N1C7** ****recognize equivalent representations for the same number*** and generate them by decomposing and composing numbers, ***including exponential notation*** **N2B4** ***describe the effects of multiplying and dividing whole numbers as well as the relationship between the two operations*** ***N2B6 describe the effects of multiplication and division on*** fractions and ***decimals***
5.NBT.3	Read, write, and compare decimals to thousandths.		
5.NBT.3.a	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 x ($\frac{1}{10}$) + 9 x ($\frac{1}{100}$) + 2 x ($\frac{1}{1000}$).	**N1C5** ****recognize equivalent representations for the same number and generate them by decomposing and composing numbers***	**N1A6** ***apply and understand*** whole numbers to millions, fractions and ***decimals to the thousandths (including location on the number line)*** **N1C3** ****recognize equivalent representations for the same number*** and generate them by decomposing and composing numbers***, including expanded notation***
5.NBT.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.	**N1B5** ***recognize and generate equivalent forms of*** commonly used fractions and ***decimals***	**N1A6** ***apply and understand*** whole numbers to millions, fractions and ***decimals to the thousandths (including location on the number line)***

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5.NBT.4	**Use place value understanding to round decimals to any place.**		
Perform operations with multi-digit whole numbers and with decimals to hundredths.			
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.		**N3B4** ***demonstrate fluency with basic number relationships*** (12 x12) ***of multiplication*** and related division facts **N3C4** ***apply*** and describe ***the strategy used to compute a given multiplication*** of 2-digit by 2-digit numbers and related division facts
5.NBT.6	Find whole-number quotients of whole numbers with **up to four-digit dividends** and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	***N2A5 represent and recognize division using various models***, including quotative and partitive **N3B5** ***demonstrate fluency with efficient procedures for*** adding and subtracting decimals and fractions (with unlike denominators) and ***division of whole numbers*** **N3C5** ***apply and describe the strategy used to compute a division problem up to a 3-digit by 2-digit*** and addition and subtraction of fractions and decimals **A2A5** using all operations, ***represent a mathematical situation as an*** expression, or ***number sentence*** using a letter or symbol **A3A5** ***model problem situations*** and draw conclusions, ***using representations*** such ***as graphs***, tables ***or number sentences***	**N2B4** ***describe the effects of multiplying and dividing whole numbers as well as the relationship between the two operations*** **N2C6** ****apply properties of operations*** (including order of operations) to positive rational numbers

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5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, 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 and explain the reasoning used.	**N2B5** ****describe the effects of addition and subtraction on*** fractions and ***decimals*** ***N3B5 demonstrate*** fluency ***with efficient procedures for adding and subtracting decimals*** and fractions (with unlike denominators) and division of whole numbers **N3C5** ***apply and describe the strategy used to compute*** a division problem up to a 3-digit by 2-digit and ***addition and subtraction of*** fractions and ***decimals***	**N2B6** ***describe*** the effects of ***multiplication and division on*** fractions and ***decimals*** **N2C6** ****apply properties of operations*** (including order of operations) ***to positive rational numbers***
Number and Operations-Fractions 5.NF			
Use equivalent fractions as a strategy to add and subtract fractions.			
5.NF.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. *For example,* $\frac{2}{3}+\frac{5}{4}=\frac{8}{12}+\frac{15}{12}=\frac{23}{12}$. *(In general,* $\frac{a}{b}+\frac{c}{d}=(\frac{ad}{bd}$.*)*	**N1B5** recognize and ***generate equivalent forms of*** commonly used ***fractions*** and decimals **N3B5** ***demonstrate*** fluency with ***efficient procedures for adding and subtracting*** decimals and ***fractions (with unlike denominators)*** and division of whole numbers	

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5.NF.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result* $\frac{2}{5}+\frac{1}{2}=\frac{3}{\_}$*, by observing that* $\frac{3}{\_}>\frac{1}{2}$.	**N3D5** ***estimate and justify*** products, and quotients of whole numbers and ***sums and differences of*** decimals and ***fractions*** **A3A5** ***model problem situations*** and draw conclusions, ***using representations, such as*** graphs, tables or ***number sentences***	**N1B4** ****use models, benchmarks (0,*** $\frac{1}{2}$***, and 1) and equivalent forms to judge the size of fractions***
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.			
5.NF.3	Interpret a fraction as division of the numerator by the denominator ($\frac{}{b} = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret* $\frac{3}{4}$ *as the result of dividing 3 by 4, noting that* $\frac{3}{4}$ *multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size* $\frac{3}{4}$*. 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?* http://illustrativemathematics.org/illustrations/293	**N2A5** ***represent and recognize division using various models, including quotative and partitive*** **N3D5** ***estimate and justify*** products, and ***quotients of whole numbers*** and sums and differences of decimals and fractions **A3A5** ***model problem situations and draw conclusions, using representations such as*** graphs, tables or ***number sentences***	**N1B6** ***recognize and generate equivalent forms of fractions*****,** decimals and benchmark percents **N2B6** ***describe the effects of*** multiplication and ***division on fractions*** and decimals

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5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.		
5.NF.4.a	Interpret the product $(\frac{}{b})$ x *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a x q ÷ b*. *For example, use a visual fraction model to show* $(\frac{2}{3}$ *x 4 =* $\frac{8}{3}$*, and create a story context for this equation. Do the same with* $(\frac{2}{3})$ *x* $(\frac{4}{5})$ *=* $\frac{8}{15}$*. (In general,* $(\frac{}{b})$ *x* $(\frac{c}{d})$ *=* $\frac{c}{bd}$*.)*	**A3A5** ***model problem situations and draw conclusions, using representations, such as*** graphs, tables or ***number sentences***	**N2B6** ***describe the effects of multiplication*** and division ***on fractions*** and decimals **N3C6** ***multiply*** and divide ***positive rational numbers***
5.NF.4.b	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.		**G4B6** ***draw or use visual models to represent and solve problems*** **M2C4** ***determine and justify areas of polygons*** and non-polygonal regions imposed on a rectangular grid **M2C6** ***solve problems involving the area*** or perimeter ***of polygons***
5.NF.5	Interpret multiplication as scaling (resizing), by: http://illustrativemathematics.org/illustrations/22 http://illustrativemathematics.org/illustrations/49 http://illustrativemathematics.org/illustrations/143 http://illustrativemathematics.org/illustrations/150 http://illustrativemathematics.org/illustrations/151 http://illustrativemathematics.org/illustrations/164		

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5.NF.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.		**N3E7** ***solve problems involving*** proportions, such as ***scaling*** and finding equivalent ratios
5.NF.5.b	Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); 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 $\frac{}{b}$ = *(n x a)/(n x b)* to the effect of multiplying $\frac{}{b}$ by 1.		**N2B6** ***describe the effects of multiplication*** and division ***on fractions*** and decimals
5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. http://illustrativemathematics.org/illustrations/294 http://illustrativemathematics.org/illustrations/295 http://illustrativemathematics.org/illustrations/296 http://illustrativemathematics.org/illustrations/297 http://illustrativemathematics.org/illustrations/609	**A3A5** ***model problem situations*** and draw conclusions, ***using representations*** such as graphs, tables ***or number sentences***	**N3C6** ***multiply*** and divide ***positive rational numbers***

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5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade). http://illustrativemathematics.org/illustrations/12		
5.NF.7.a	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for* $(\frac{1}{3}) \div 4$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $(\frac{1}{3}) \div 4 = \frac{1}{12}$ *because* $(\frac{1}{12}) \times 4 = \frac{1}{3}$.	**A3A5** ***model problem situations and draw conclusions, using representations***, such as graphs, tables or number sentences	**N2B6** ***describe the effects of*** multiplication and ***division on fractions*** and decimals **N3C6** multiply and ***divide positive rational numbers*** **G4B6** ***draw or use visual models to represent and solve problems***
5.NF.7.b	Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for* $4 \div (\frac{1}{5})$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $4 \div (\frac{1}{5}) = 20$ *because* $20 \times (\frac{1}{5}) = 4$.	**A3A5** ***model problem situations and draw conclusions, using representations***, such as graphs, tables or number sentences	**N2B6** ***describe the effects of*** multiplication and ***division on fractions*** and decimals **N3C6** multiply and ***divide positive rational numbers***

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5.NF.7.c	Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example how much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally? How many $\frac{1}{3}$ cup servings are in 2 cups of raisins?*	**A3A5** ***model problem and draw conclusions, using representations, such as*** graphs, tables or ***number sentences***	**N3C6** multiply and ***divide positive rational numbers*** **G4B6** ***draw or use visual models to represent and solve problems***
Measurement and Data 5.MD			
Convert like measurement units within a given measurement system.			
5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. http://illustrativemathematics.org/illustrations/293	**M2E5** ***convert from one unit to another within a system of linear measurement (customary and metric)***	**M2E6** ***convert from one unit to another with a system of measurement (mass and weight)*** **M2E7** ***convert from one unit to another within a system of measurement (capacity)*** and convert square or cubic units within the system of measurement
Represent and interpret data.			
5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). 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.*	**N3C5** ***apply*** and describe ***the strategy used to compute*** a division problem up to a 3-digit by 2-digit and ***addition and subtraction of fractions*** and decimals	**N1B8** ***use fractions***, decimals, and percents ***to solve problems*** **N3C6** ***multiply and divide positive rational numbers*** **D1C4** ***create*** tables or ***graphs to represent categorical and numerical data (including line plots)*** **D3A4** ****given a set of data, propose and justify conclusions that are based on the data***
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.			

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5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.		
5.MD.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.		**M1A6** ***identify and justify the unit of measure for area and volume (customary and metric)***
5.MD.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.	**M2C5** ***determine volume by finding the total number of the same size units needed to fill a space without gaps or overlaps***	**M1A6** ***identify and justify the unit of measure for area and volume (customary and metric)***
5.MD.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	**M2C5** ***determine volume by finding the total number of the same size units needed to fill a space without gaps or overlaps***	
5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.		
5.MD.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.	**M2C5** ***determine volume by finding the total number of the same size units needed to fill a space without gaps or overlaps***	**A2B4** ***use*** commutative, distributive and ***associative properties of*** addition and ***multiplication for multi-digit numbers*** **M2C7** ***solve problems involving*** circumference and/or area of a circle and surface area/ ***volume of a rectangular*** or triangular ***prism*****,** or cylinder
5.MD.5.b	Apply the formulas *V = l x w x h* and *V = b x h* for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.		**M2C7** ***solve problems involving*** circumference and/or area of a circle and surface area/***volume of a rectangular*** or triangular ***prism***, or cylinder

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5.MD.5.c	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	**G1C5** ***predict and justify the results subdividing, combining and transforming shapes***	**G4B6** ***draw or use visual models to represent and solve problems*** **M2C7** ***solve problems involving*** circumference and/or area of a circle and surface area/***volume of a rectangular*** or triangular ***prism***, or cylinder
Geometry 5.G			
Graph points on the coordinate plane to solve real-world and mathematical problems.			
5.G.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). http://illustrativemathematics.org/illustrations/489	**G2A5** ****use coordinate systems to specify locations, describe paths*** and find distance between points along horizontal and vertical lines	
5.G.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.	**G2A5** ****use coordinate systems to specify locations and describe paths*** and find distance between points along horizontal and vertical lines	
Classify two-dimensional figures into categories based on their properties.			

MISSOURI MATHEMATICS CORE ACADEMIC STANDARDS CROSSWALK TO MISSOURI GLES/CLES
CONTENT ALIGNMENTS AND SHIFTS- Grade 5 *DRAFT*

Core Academic Standard (CAS) **Bold/Highlighted portions** of the CAS indicate content that does not align to any existing GLE/CLE for any course or grade. This content should be included in the instruction and assessment for Grade 5 upon transition to the mathematics CAS. ***Note: The link(s) provided from the Illustrative Mathematics Project in the CAS column provide draft examples intended to illustrate and clarify the CAS.***		**Grade 5 GLE** ***Bold, ITALICIZED portions*** of the 2008 Missouri GLE indicate content that aligns to the CAS for Grade 5. This content should be included in the instruction and assessment for Grade 5 upon transition to the mathematics CAS.	**GLE Shift to Grade 5** ***Bold, ITALICIZED portions*** of these off-grade 2008 Missouri GLEs indicate content that aligns to the CAS for Grade 5. This content should be included in the instruction and assessment for Grade 5 upon transition to the mathematics CAS.
5.G.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*	**G1A5** ****analyze and classify 2-***and 3-***dimensional shapes by describing the attributes***	
5.G.4	Classify two-dimensional figures in a hierarchy based on properties.	**G1A5** ****analyze and classify 2-*** and 3-***dimensional shapes by describing the attributes***	
Grade 5 GLEs not included in Grade 5 CAS			
N1A5 ****r***ead, write and compare whole numbers less than 1,000,000, unit fractions, and decimals to hundredths (including location on the number line) **N1D5** *******describe numbers according to their characteristics, including whole number common factors and multiples, prime, or composite, and square numbers **N3A5** *******describe a mental strategy used to compute a given division problem, where the quotient is a multiple of 10 and the divisor is a 1-digit number (e.g., $\frac{350}{\quad}$) **G3A5** *******predict, draw, and describe the results of sliding/translating, flipping/reflecting, and turning/rotating around a center point of a polygon **G3C5** identify polygons, and designs with rotational symmetry **G4A5** given a net of a prism or cylinder, identify the 3-dimensional shape **M1A5** *******identify and justify the unit of measures for area (customary and metric) **M1B5** identify the equivalent weights and equivalent capacities within a system of measurement **D1A5** evaluate data-collection methods **D1C5** *******describe methods to collect, organize and represent categorical and numerical data **D2A5** compare related data sets **D3A5** given a set of data make and justify predictions **D4A5** *******describe the degree of likelihood of events using such words as certain, equally likely and impossible		