

Mathematics Standards Crosswalk

Following is a crosswalk between the Missouri Learning Standards: Grade Level Expectations and the Dynamic Learning Maps (DLM) Essential Elements.

ABOUT THE MISSOURI LEARNING STANDARDS: The State Board of Education approved the updated Missouri Learning Standards: Grade Level Expectations on April 19, 2016, based on the standards created by work groups of Missouri parents and educators. The revised standards were developed by Missourians for Missouri students. These expectations are challenging, yet attainable, for students in our state. The standards further define our high expectations for what children should know and be able to do in each course and grade level, helping ensure they graduate prepared for college, career, and life.

ABOUT THE DYNAMIC LEARNING MAPS ESSENTIAL ELEMENTS: The Dynamic Learning Maps Essential Elements for Mathematics are specific statements of knowledge and skills linked to Missouri Learning Standards: Grade Level Expectations. The purpose of the DLM Essential Elements is to build a bridge from the content in the general education mathematics framework to academic expectations for students with the most significant cognitive disabilities.

Kindergarten Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS	
CODE	EXPECTATION	CODE	ESSENTIAL ELEMENT
Know number names and the count sequence.		Know number names and the count sequence.	
K.NS.A.1	Count to 100 by ones and tens.	EE.K.CC.1	Starting with one, count to 10 by ones.
K.NS.A.2	Count forward beginning from a given number between 1 and 20.	Not applicable.	Not applicable.
K.NS.A.3	Count backward from a given number between 10 and 1.	Not applicable.	Not applicable.
K.NS.A.4	Read and write numerals and represent a number of objects from 0-20.	Not applicable.	Not applicable.
Understand the relationship between numbers and quantities; connect counting to cardinality.		Count to tell the numbers of objects.	
K.NS.B.1	Say the number names when counting objects, in the standard order pair, pairing each object with one and only one number name and each number name with one and only one object.	EE.K.CC.4	Demonstrate one-to-one correspondence, pairing each object with one and only one number and each number with one and only one object.
K.NS.B.2	Demonstrate that the last number name said tells the number of objects counted and the number of objects is the same regardless of their arrangement or the order in which they were counted.		
K.NS.B.3	Demonstrate that each successive number name refers to a quantity that is one larger than the previous number.		
K.NS.B.4	Recognize, without counting, the quantity of groups up to 5 objects arranged in common patterns.	Not applicable.	Not applicable.
K.NS.B.5	Demonstrate that a number can be used to represent “how many” are in a set.	EE.K.CC.5	Count out up to three objects from a larger set, pairing each object with one and only one number name to tell how many.
Compare numbers.		Compare numbers.	
K.NS.C.1	Compare two or more sets of objects and identify which set is equal to, more than, or less than the other.	EE.K.CC.6	Identify whether the number of objects in one group is more or less than (when the quantities are clearly different) or equal to the number of objects in another group.
K.NS.C.2	Compare two numerals, between 1 and 10, and determine which is more than or less than the other.	Not applicable.	Not applicable.
Work with numbers 11-19 to gain foundations for place value.		Work with numbers 11-19 to gain foundations for place value.	
K.NBT.A.1	Compose and decompose numbers from 11 to 19 into sets of tens with additional ones.	Not applicable.	Not applicable.

Understand addition as putting together or adding to, and understand subtraction as taking apart or taking from.		Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.	
K.RA.A.1	Represent addition and subtraction within 10.	EE.K.OA.1	Represent addition as “putting together” or subtraction as “taking from” in everyday activities.
K.RA.A.2	Demonstrate fluency for addition and subtraction within 5.	Not applicable.	Not applicable.
K.RA.A.3	Decompose numbers less than or equal to 10 in more than one way.	Not applicable.	Not applicable.
K.RA.A.4	Make 10 for any number from 1 to 9.	Not applicable.	Not applicable.
Reason with shapes and their attributes.		Describe and compare measurable attributes.	
K.GM.A.1	Describe several measurable attributes of objects.	EE.K.MD.1-3	Classify objects according to attributes (big/small, heavy/light)
K.GM.A.2	Compare the measurable attributes of two objects.		
Work with time and money.		Not applicable.	
K.GM.B.1	Demonstrate an understanding of concepts of time and devices that measure time.	Not applicable.	Not applicable.
K.GM.B.2	Name the days of the week.	Not applicable.	Not applicable.
K.GM.B.3	Identify pennies, nickels, dimes, and quarters.	Not applicable.	Not applicable.
Analyze squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres.		Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)	
K.GM.C.1	Identify shapes and describe objects in the environment using names of shapes, recognizing the name stays the same regardless of orientation or size.	EE.K.G.2-3	Match shapes of same size and orientation (circle, square, rectangle, triangle).
K.GM.C.2	Describe the relative position of objects in space.		
K.GM.C.3	Identify and describe the attributes of shapes, and use the attributes to sort a collection of shapes.		
K.GM.C.4	Draw or model simple two-dimensional shapes.	Not applicable.	Not applicable.
K.GM.C.5	Compose simple shapes to form larger shapes using manipulatives.	Not applicable.	Not applicable.
Classify objects and count the number of objects in each category.		Classify objects and count the number of objects in each category.	
K.DS.A.1	Classify objects into given categories; count the number of objects in each category.	EE.K.MD.1-3	Classify objects according to attributes (big/small, heavy/light).
K.DS.A.2	Compare category counts using appropriate language.		

1st Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS	
CODE	Expectation	Code	Essential Element
Understand and use numbers up to 120.		Extend the counting sequence.	
1.NS.A.1	Count to 120, starting at any number less than 120.	EE.1.NBT.1.a	Count by ones to 30.
1.NS.A.2	Read and write numerals and represent a number of objects with a written numeral.	EE.1.NBT.1.b	Count as many as 10 objects and represent the quantity with the corresponding numeral.
1.NS.A.3	Count backward from a given number between 20 and 1.	Not applicable.	Not applicable.
1.NS.A.4	Count by 5s to 100 starting at any multiple of five.	Not applicable.	Not applicable.
Understand place value of two-digit numbers.		Understand place value.	
1.NBT.A.1	Understand that 10 can be thought of as a bundle of 10 ones—called a “ten.”	EE.1.NBT.2	Create sets of 10.
1.NBT.A.2	Understand two-digit numbers are composed of ten(s) and one(s).		
1.NBT.A.3	Compare two two-digit numbers using the symbols $>$, $=$, or $<$.	EE.1.NBT.3.	Compare two groups of 10 or fewer items when the number of items in each group is similar.
1.NBT.A.4	Count by 10s to 120 starting at any number.	Not applicable.	Not applicable.
Use place value understanding to add and subtract.		Use place value understanding and properties of operations to add and subtract.	
1.NBT.B.1	Add within 100.	EE.1.NBT.4	Compose numbers less than or equal to five in more than one way.
1.NBT.B.2	Calculate 10 more or 10 less than a given number mentally without having to count.	Not applicable.	Not applicable.
1.NBT.B.3	Add or subtract a multiple of 10 from another two-digit number, and justify the solution.	EE.1.NBT.6	Decompose numbers less than or equal to five in more than one way.
Represent and solve problems involving addition and subtraction.		Represent and solve problems involving addition and subtraction.	
1.RA.A.1	Use addition and subtraction within 20 to solve problems.	EE.1.OA.1.a	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), or acting out situations.
1.RA.A.2	Solve problems that call for addition of three whole numbers whose sum is within 20.	EE.1.OA.2.	Use “putting together” to solve problems with two sets.
1.RA.A.3	Develop the meaning of the equal sign and determine if equations involving addition and subtraction are true or false.	EE.1.OA.1.b	Recognize two groups that have the same or equal quantity.
1.RA.A.4	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers.	Not applicable.	Not applicable.

Understand and apply properties of operations and the relationship between addition and subtraction.		Add and subtract within 20.	
1.RA.B.1	Use properties as strategies to add and subtract.	EE.1.OA.5.a	Use manipulatives or visual representations to indicate the number that results when adding one more.
		EE.1.OA.5.b	Apply knowledge of “one less” to subtract one from a number.
1.RA.B.2	Demonstrate that subtraction can be solved as an unknown-addend problem.	Not applicable.	Not applicable.
Add and subtract within 20.		Add and subtract within 20.	
1.RA.C.1	Add and subtract within 20.	Not applicable.	Not applicable.
1.RA.C.2	Demonstrate fluency with addition and subtraction within 10.	Not applicable.	Not applicable.
Reason with shapes and their attributes.		Reason with shapes and their attributes.	
1.GM.A.1	Distinguish between defining attributes versus non-defining attributes; build and draw shapes that possess defining attributes.	EE.1.G.1	Identify the relative position of objects that are on, off, in, and out.
1.GM.A.2	Compose and decompose two-and three-dimensional shapes to build an understanding of part-whole relationships and the properties of the original and composite shapes.	EE.1.G.2	Sort shapes of same size and orientation (circle, square, rectangle, triangle).
1.GM.A.3	Recognize two-and three-dimensional shapes from different perspectives and orientations.	Not applicable.	Not applicable.
1.GM.A.4	Partition circles and rectangles into two or four equal shares, and describe the shares and the wholes verbally.	EE.1.G.3	Put together two pieces to make a shape that relates to the whole (i.e., two semicircles to make a circle, two squares to make a rectangle).
Measure lengths in non-standard units.		Measure lengths indirectly and by iterating length units.	
1.GM.B.1	Order three or more objects by length.	EE.1.MD.1-2	Compare lengths to identify which is longer/shorter or taller/shorter.
1.GM.B.2	Compare the lengths of two objects indirectly by using a third object.		
1.GM.B.3	Demonstrate the ability to measure length or distance using objects.		
Work with time and money.		Tell and write time.	
1.GM.C.1	Tell and write time in hours and half-hours using analog and digital clocks.	EE.1.MD.3.a	Demonstrate an understanding of the terms <i>tomorrow</i> , <i>yesterday</i> , and <i>today</i> .
		EE.1.MD.3.b	Demonstrate an understanding of the terms <i>morning</i> , <i>afternoon</i> , <i>day</i> , and <i>night</i> .
		EE.1.MD.3.c	Identify activities that come before, next, and after.
		EE.1.MD.3.d	Demonstrate an understanding that telling time is the same every day.

1.GM.C.2	Know the value of a penny, nickel, dime, and quarter.	Not applicable.	Not applicable.
Represent and interpret data.		Represent and interpret data.	
1.DS.A.1	Collect, organize, and represent data with up to three categories.	EE.1.MD.4.	Organize data into categories by sorting.
1.DS.A.2	Draw conclusions from object graphs, picture graphs, T-charts and tallies.		

2nd Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS	
CODE	Expectation	Code	Essential Element
Understand place value of three digit numbers.		Understand place value.	
2.NBT.A.1	Understand three-digit numbers are composed of hundreds, tens and ones.	EE.2.NBT.1	Represent numbers up to 30 with sets of tens and ones using objects in columns or arrays.
2.NBT.A.2	Understand that 100 can be thought of as 10 tens—called a “hundred”		
2.NBT.A.3	Count within 1000 by 1s, 10s, and 100s starting with any number.	EE.2.NBT.2.a	Count from 1 to 30 (count with meaning; cardinality).
		EE.2.NBT.2.b	Name the next number in a sequence between 1 and 10.
2.NBT.A.4	Read and write numbers to 1000 using number names, base-ten numerals and expanded form.	EE.2.NBT.3	Identify numerals 1 to 30.
2.NBT.A.5	Compare two three-digit numbers using the symbols $>$, $=$ or $<$.	EE.2.NBT.4	Compare sets of objects and numbers using appropriate vocabulary (more, less, equal)
Use place value understanding and properties of operations to add and subtract.		Use place value understanding and properties of operations to add and subtract.	
2.NBT.B.1	Demonstrate fluency with addition and subtraction within 100.	EE.2.NBT.5.a	Identify the meaning of the “+” sign (i.e., combine, plus, add), “-” sign (i.e., separate, subtract, take), and the “=” sign (equal).
		EE.2.NBT.5.b	Using concrete examples compose and decompose numbers up to 10 in more than one way.
2.NBT.B.2	Add up to four two-digit numbers.	EE.2.NBT.6-7	Use objects, representations, and numbers (0-20) to add and subtract.
2.NBT.B.3	Add or subtract within 1000, and justify the solution.		
2.NBT.B.4	Use the relationship between addition and subtraction to solve problems.		
2.NBT.B.5	Add or subtract mentally 10 or 100 to or from a given number within 1000.	Not applicable.	Not applicable.
Represent and solve problems involving addition and subtraction.		Represent and solve problems involving addition and subtraction.	
2.NBT.C.6	Write and solve problems involving addition and subtraction within 100.	Not applicable.	Not applicable.
Add and subtract within 20.		Add and subtract within 20.	
2.RA.A.1	Demonstrate fluency with addition and subtraction within 20.	Not applicable.	Not applicable.

Develop foundations for multiplication and division.		Work with equal groups of objects to gain foundations for multiplication.	
2.RA.B.1	Determine if a set of objects has an odd or even number of members. a) Count by 2s to 100 starting with any even number. b) Express even numbers as pairings/groupings of 2, and write an expression to represent the number using addends of 2. c) Express even numbers as being composed of equal groups, and write an expression to represent the number with 2 equal addends.	EE.2.OA.3	Equally distribute even numbers of objects between two groups.
2.RA.B.2	Find the total number of objects arranged in a rectangular array with up to 5 rows and 5 columns, and write an equation to represent the total as a sum of equal addends.	EE.2.OA.4	Use addition to find the total number of objects arranged within equal groups up to a total of 10.
Reason with shapes and their attributes.		Reason with shapes and their attributes.	
2.GM.A.1	Recognize and draw shapes having specified attributes, such as a given number of angles or sides. a) Identify triangles, quadrilaterals, pentagons, hexagons, circles, and cubes. b) Identify the faces of three-dimensional objects.	EE.2.G.1	Identify common two-dimensional shapes: square, circle, triangle, and rectangle.
2.GM.A.2	Partition a rectangle into rows and columns of same-size squares, and count to find the total number of squares.	Not applicable.	Not applicable.
2.GM.A.3	Partition circles and rectangles into two, three, or four equal shares, and describe the shares and the whole. a) Demonstrate that equal shares of identical wholes need not have the same shape.	Not applicable.	Not applicable.
Measure and estimate lengths in standard units.		Measure and estimate lengths in standard units.	
2.GM.B.1	Measure the length of an object by selecting and using appropriate tools.	EE.2.MD.1	Measure the length of objects using non-standard units.
2.GM.B.2	Analyze the results of measuring the same object with different units.	Not applicable.	Not applicable.
2.GM.B.3	Estimate lengths using units of inches, feet, yards, centimeters, and meters.	EE.2.MD.3-4	Order by length using non-standard units.
2.GM.B.4	Measure to determine how much longer one object is than another.		

Relate addition and subtraction to length.		Relate addition and subtraction to length.	
2.GM.C.1	Use addition and subtraction within 100 to solve problems involving lengths that are given in the same units.	EE.2.MD.5	Increase or decrease length by adding or subtracting unit(s).
2.GM.C.2	Represent whole numbers as lengths on a number line, and represent whole-number sums and differences within 100 on a number line.	EE.2.MD.6	Use a number line to add one more unit of length.
Work with time and money.		Work with time and money.	
2.GM.D.1	Tell and write time from analog and digital clocks to the nearest five minutes, using A.M. and P.M.	EE.2.MD.7	Identify on a digital clock the hour that matches a routine activity.
2.GM.D.2	Describe a time shown on a digital clock as representing hours and minutes, and relate a time shown on a digital clock to the same time on an analog clock.	Not applicable.	Not applicable.
2.GM.D.3	Find the value of combinations of dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ appropriately.	EE.2.MD.8	Recognize that money has value.
2.DM.D.4	Find combinations of coins that equal a given amount.		
Represent and interpret data.		Represent and interpret data.	
2.DS.A.1	Create a line plot to represent a set of numeric data, given a horizontal scale marked in whole numbers.	EE.2.MD.9-10	Create picture graphs from collected measurement data.
2.DS.A.2	Generate measurement data to the nearest whole unit, and display the data in a line plot.		
2.DS.A.3	Draw a picture graph or a bar graph to represent a data set with up to four categories.		
2.DS.A.4	Solve problems using information presented in line plots, picture graphs, and bar graphs.		
2.DS.A.5	Draw conclusions from line plots, picture graphs, and bar graphs.		

3rd Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Grade 3: Essential Elements
Use place value understanding and properties of operations to perform multi-digit arithmetic.		Understand place value.		
3.NBT.A.1	Round whole numbers to the nearest 10 or 100.	EE.3.NBT.1	Use decade numbers (10, 20, 30) as benchmarks to demonstrate understanding of place value for numbers 0-30.	This essential element is not currently being assessed.
3.NBT.A.2	Read, write, and identify whole numbers within 100,000 using base ten numerals, number names, and expanded forms.	Not applicable.	Not applicable.	Not applicable.
3.NBT.A.3	Demonstrate fluency with addition and subtraction within 1000.	EE.3.NBT.2	Demonstrate understanding of place value to tens.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Explain ten as a composition of ten ones. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize multiple tens and something. Compose numbers based on tens. <p>Target:</p> <ul style="list-style-type: none"> Explain place value for tens and ones. <p>Successor:</p> <ul style="list-style-type: none"> Explain the relationship between rounding and place value. Explain place value for hundreds.

3.NBT.A.4	Multiply whole numbers by multiples of 10 in the range 10-90.	EE.3.NBT.3	Count by tens using models such as objects, base ten blocks, or money.	Initial Precursor: <ul style="list-style-type: none">• Recognize before.• Recognize after. Distal Precursor: <ul style="list-style-type: none">• Explain number sequence pattern. Proximal Precursor: <ul style="list-style-type: none">• Rote count to 30.• Count to 30. Target: <ul style="list-style-type: none">• Skip count by 10s. Successor: <ul style="list-style-type: none">• Skip count by 10s starting at a multiple of 10.• Count with dimes.• Count with 10 dollar bills.• Explain repeated addition.
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Develop understanding of fractions as numbers.		Develop understanding of fractions as numbers.		
3.NF.A.1	Understand a unit fraction as the quantity formed by one part when a whole is partitioned into equal parts.	EE.3.NF.1-3	Differentiate a fractional part from a whole.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize some. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize wholeness. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Partition shapes. <p>Target:</p> <ul style="list-style-type: none"> Recognize parts of a given whole or a unit. Explain unit fraction. <p>Successor:</p> <ul style="list-style-type: none"> Recognize fraction. Recognize whole on an area model. Recognize one half on an area model.
3.NF.A.2	Understand that when a whole is partitioned equally, a fraction can be used to represent a portion of the whole. <ul style="list-style-type: none"> a) Describe the numerator as representing the number of pieces being considered. b) Describe the denominator as the number of pieces that make the whole. 			
3.NF.A.3	Represent fractions on a number line. <ul style="list-style-type: none"> a) Understand the whole is the interval from 0 to 1. b) Understand the whole is partitioned into equal parts. c) Understand a fraction represents the endpoint of the length a given number of partitions from 0. 			
3.NF.A.4	Demonstrate that two fractions are equivalent if they are the same size, or the same point on a number line.			
3.NF.A.5	Recognize and generate equivalent fractions using visual models, and justify why the fractions are equivalent.			
3.NF.A.6	Compare two fractions with the same numerator or denominator using the symbols $>$, $=$, or $<$, and justify the solution.			
3.NF.A.7	Explain why fraction comparisons are only valid when the two fractions refer to the same whole.			

Represent and solve problems involving multiplication and division.		Represent and solve problems involving multiplication and division.		
3.RA.A.1	Interpret products of whole numbers.	EE.3.OA.1-2	Use repeated addition to find the total number of objects and determine the sum.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize subset. Recognize set. Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Demonstrate the concept of addition. Combine sets. Combine. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Represent repeated addition with an equation. Represent repeated addition with a model. <p>Target:</p> <ul style="list-style-type: none"> Solve repeated addition problems. <p>Successor:</p> <ul style="list-style-type: none"> Demonstrate the concept of multiplication.
3.RA.A.2	Interpret quotients of whole numbers.			
3.RA.A.3	Describe in words or drawings a problem that illustrates a multiplication or division situation.			
3.RA.A.4	Use multiplication and division within 100 to solve problems.	Not applicable.	Not applicable.	Not applicable.

3.RA.A.5	Determine the unknown number in a multiplication or division equation relating three whole numbers.	EE.3.OA.4	Solve addition and subtraction problems when result is unknown, limited to operands and results within 20.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize separateness. • Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Combine sets. • Demonstrate the concept of addition. • Partition sets. • Demonstrate the concept of subtraction. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize the addition sign. • Explain the function of the addition sign. • Represent addition with equations. • Recognize the subtraction sign. • Explain the function of the minus sign. • Represent subtraction with equations. • Recognize the equal sign. • Explain the function of the equal sign. <p>Target:</p> <ul style="list-style-type: none"> • Determine the unknown in a subtraction equation. • Determine the unknown in an addition equation. <p>Successor:</p> <ul style="list-style-type: none"> • Solve joint problems. • Solve part-part-whole problems. • Solve compare problems. • Solve separate problems.
Understand properties of multiplication and the relationship between multiplication and division.		Understand properties of multiplication and the relationship between multiplication and division.		
3.RA.B.1	Apply properties of operations as strategies to multiply and divide.	Not applicable.	Not applicable.	Not applicable.

Multiply and divide within 100.		Multiply and divide within 100.		
3.RA.C.1	Multiply and divide with numbers and results within 100 using strategies such as the relationship between multiplication and division or properties of operations. Know all products of two one-digit numbers.	Not applicable	Not applicable.	Not applicable.
3.RA.C.2	Demonstrate fluency with products within 100.			
Use the four operations to solve word problems.		Solve problems involving the four operations, and identify and explain patterns in arithmetic.		
3.RA.D.1	Write and solve two-step problems involving variables using any of the four operations.	EE.3.OA.8	Solve one-step real-world problems using addition or subtraction within 20.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Combine sets. • Partition sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of addition. • Demonstrate the concept of subtraction. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Determine the unknown in an addition equation. • Determine the unknown in a subtraction equation. <p>Target:</p> <ul style="list-style-type: none"> • Solve subtraction word problems within 100. • Solve addition word problems within 100. <p>Successor:</p> <ul style="list-style-type: none"> • Solve 2-step addition and subtraction word problems.
3.RA.D.2	Interpret the reasonableness of answers using mental computation and estimation strategies including rounding.			

Identify and explain arithmetic patterns.		Solve problems involving the four operations, and identify and explain patterns in arithmetic.		
3.RA.E.3	Identify arithmetic patterns and explain the patterns using properties of operations.	EE.3.OA.9	Identify arithmetic patterns.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize same. Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Order objects. Classify. Contrast objects. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize patterns. <p>Target:</p> <ul style="list-style-type: none"> Recognize repeating patterns. Recognize symbolic patterns. Recognize growing patterns. <p>Successor:</p> <ul style="list-style-type: none"> Extend a symbolic pattern by applying the rule. Recognize the pattern rule in a growing pattern.
Reason with shapes and their attributes.		Reason with shapes and their attributes.		
3.GM.A.1	Understand that shapes in different categories may share attributes and that the shared attributes can define a larger category.	EE.3.G.1	Describe attributes of two-dimensional shapes.	This essential element is not currently being assessed.
3.GM.A.2	Distinguish rhombuses and rectangles as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to these subcategories.			

3.GM.A.3	Partition shapes into parts with equal areas, and express the area of each part as a unit fraction of the whole.	EE.3.G.2	Recognize that shapes can be partitioned into equal areas.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize unit. • Recognize wholeness. • Recognize parts of a given whole or a unit. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Partition shapes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Model equal parts. • Partition circle into 2 equal parts. • Partition circle into 3 equal parts. • Partition circle into 4 equal parts. • Partition a rectangle into rows and columns. • Partition rectangle into 2 equal parts. • Partition rectangle into 3 equal parts. • Partition rectangle into 4 equal parts. <p>Target:</p> <ul style="list-style-type: none"> • Partition any shape into equal parts. <p>Successor:</p> <ul style="list-style-type: none"> • Recognize one tenth on an area model. • Recognize one third on an area model. • Recognize one half on an area model. • Recognize one fourth on an area model.
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Solve problems involving the measurement of time, liquid volumes and weights of objects.		Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.		
3.GM.B.1	Tell and write time to the nearest minute.	EE.3.MD.1	Tell time to the hour on a digital clock.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Attend. Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize measurable attributes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize the hour on a digital clock. Recognize the minute on a digital clock. <p>Target:</p> <ul style="list-style-type: none"> Tell time to the hour. <p>Successor:</p> <ul style="list-style-type: none"> Tell time to the half hour. Tell time to the quarter hour.
3.GM.B.2	Estimate time intervals in minutes.			
3.GM.B.3	Solve problems involving addition and subtraction of minutes.			
3.GM.B.4	Measure or estimate length, liquid volume, and weight of objects.	EE.3.MD.2	Identify the appropriate measurement tool to solve one-step word problems involving mass and volume.	This essential element is not currently being assessed.
3.GM.B.5	Use the four operations to solve problems involving lengths, liquid volumes or weights given in the same units.			

Understand concepts of area.		Geometric measurement: Understand concepts of area, and relate area to multiplication and to addition.		
3.GM.C.1	Calculate area by using unit squares to cover a plane figure with no gaps or overlaps.	Not applicable.	Not applicable.	Not applicable.
3.GM.C.2	Label area measurements with squared units.			
3.GM.C.3	Demonstrate that tiling a rectangle to find the area and multiplying the side lengths result in the same value.			
3.GM.C.4	Multiply whole-number side lengths to solve problems involving the area of rectangles.			
3.GM.C.5	Find rectangular arrangements that can be formed for a given area.			
3.GM.C.6	Decompose a rectangle into smaller rectangles to find the area of the original rectangle			
Understand concepts of perimeter.		Geometric measurement: recognize perimeter as an attribute of plane figures, and distinguish between linear and area measures.		
3.GM.D.1	Solve problems involving perimeters of polygons.	Not applicable.	Not applicable.	Not applicable.
3.GM.D.2	Understand that rectangles can have equal perimeters but different areas, or rectangles can have equal areas but different perimeters.			

Represent and analyze data.		Represent and interpret data.		
3.DS.A.1	Create frequency tables, scaled picture graphs and bar graphs to represent a data set with several categories.	EE.3.MD.3	Use picture or bar graph data to answer questions about data.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. Arrange objects in pairs. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Classify. Order objects. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize the structure of a bar graph. Recognize the structure of a picture graph. <p>Target:</p> <ul style="list-style-type: none"> Use bar graphs to read the data. Use picture graphs to read the data. <p>Successor:</p> <ul style="list-style-type: none"> Use graphs to read between the data.
3.DS.A.2	Solve one- and two-step problems using information presented in bar and/or picture graphs.			
3.DS.A.3	Create a line plot to represent data.	EE.3.MD.4	Measure length of objects using standard tools, such as rulers, yardsticks, and meter sticks.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Make direct comparison of 2 lengths. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Demonstrate iteration of length unit. Measure length using informal units. <p>Target:</p> <ul style="list-style-type: none"> Use an appropriate tool to measure length using inches. Use an appropriate tool to measure length using feet. <p>Successor:</p> <ul style="list-style-type: none"> Compare lengths of 2 or more objects using standard tools.
3.DS.A.4	Use data shown in a line plot to answer questions.			

4th Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Grade 4: Essential Elements
Use place value understanding and properties of operations to perform multi-digit arithmetic with numbers up to one million.		Generalize place value understanding for multi-digit whole numbers.		
4.NBT.A.1	Round multi-digit whole numbers to any place.	EE.R.NBT.3	Round any whole number 0-30 to the nearest ten.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Use perceptual subitizing. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize a unit. • Explain ten as a composition of ten ones. • Recognize ten and something. • Recognize multiple tens and something. • Decompose numbers based on tens. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Explain place value for ones and tens. • Explain the relationship between rounding and place value. <p>Target:</p> <ul style="list-style-type: none"> • Round whole numbers from 0-30 to the nearest ten. <p>Successor:</p> <ul style="list-style-type: none"> • Round whole numbers 0-100 to the nearest ten. • Round whole numbers to the nearest hundred.

4.NBT.A.2	Read, write and identify multi-digit whole numbers up to one million using number names, base ten numerals, and expanded form.	Not applicable.	Not applicable.	Not applicable.
4.NBT.A.3	Compare two multi-digit numbers using the symbols $>$, $=$, or $<$, and justify the solution.	EE.4.NBT.2	Compare whole numbers to 10 using symbols ($<$, $>$, $=$).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> ● Recognize set. ● Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> ● Count all objects in a set or subset. ● Recognize same number of. ● Recognize different number of. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> ● Compare 2 quantities up to 10 using models. <p>Target:</p> <ul style="list-style-type: none"> ● Compare 2 numerals up to 10 using symbols ($=$, $<$, $>$). <p>Successor:</p> <ul style="list-style-type: none"> ● Order more than 2 one-digit numerals or quantities from greatest to least. ● Compare 2 numerals up to 100 using symbols ($=$, $<$, $>$). ● Order more than 2 one-digit numerals or quantities from least to greatest.

4.NBT.A.4	Understand that in a multi-digit whole number, a digit represents 10 times what it would represent in the place to its right.	Not applicable.	Not applicable.	Not applicable.
4.NBT.A.5	Demonstrate fluency with addition and subtraction of whole numbers.	EE.4.NBT.4	Add and subtract two-digit whole numbers.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> ● Recognize subset. ● Recognize set. ● Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> ● Combine sets. ● Count all objects in a set or subset. ● Partition sets. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> ● Add within 10. ● Add within 20. ● Subtract within 20. ● Subtract within 10. ● Add within 5. ● Add 1, 2, 3, and/or 4. ● Add 1 and 1. ● Subtract 1 from 2. ● Subtract 1 from up to 5. ● Subtract within 5. <p>Target:</p> <ul style="list-style-type: none"> ● Add within 100 where all addends are multiples of 10. ● Add within 100. ● Add within 100 with a 2 digit number and a multiple of 10. ● Subtract within 100 where both numbers are multiples of 10. ● Subtract within 100. ● Subtract a multiple of 10 from a 2 digit number within 100. <p>Successor:</p> <ul style="list-style-type: none"> ● Solve addition word problems within 100. ● Solve subtraction word problems within 100.

4.NBT.A.6	Multiply a whole number of up to four digits by a one-digit whole number and multiply two two-digit numbers, and justify the solution.	Not applicable.	Not applicable.	Not applicable.
4.NBT.A.7	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, and justify the solution.	Not applicable.	Not applicable.	Not applicable.
Extend understanding of fraction equivalence and ordering (Limit denominators to 2, 3, 4, 5, 6, 8, 10, 12, and 100).		Extend understanding of fraction equivalence and ordering.		
4.NF.A.1	Explain and/or illustrate why two fractions are equivalent.	EE.4.NF.1-2	Identify models of one half ($1/2$) and one fourth ($1/4$).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize wholeness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Partition shapes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Partition any shapes into equal parts. <p>Target:</p> <ul style="list-style-type: none"> Recognize one half on an area model. Recognize one fourth on an area model. <p>Successor:</p> <ul style="list-style-type: none"> Recognize halves on an area model. Recognize fourths on an area model.
4.NF.A.2	Recognize and generate equivalent fractions.			
4.NF.A.3	Compare two fractions using the symbols $>$, $=$, or $<$, and justify the solution.			

Extend understanding of operations on whole numbers to fraction operations.		Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.		
4.NF.B.1	Understand addition and subtraction of fractions as joining/composing and separating/decomposing parts referring to the same whole.	EE.4.NF.3	Differentiate between whole and half.	Proximal Precursor: <ul style="list-style-type: none"> Recognize wholeness. Recognize separateness. Distal Precursor: <ul style="list-style-type: none"> Partition shapes. Proximal Precursor: <ul style="list-style-type: none"> Recognize parts of a given whole or a unit. Explain unit fraction. Target: <ul style="list-style-type: none"> Recognize fraction. Recognize one half on an area model. Recognize whole on an area model. Successor: <ul style="list-style-type: none"> Recognize one fourth on an area model. Recognize halves on an area model. Recognize fourths on an area model.
4.NF.B.2	Decompose a fraction into a sum of fractions with the same denominator and record each decomposition with an equation and justification.			
4.NF.B.3	Solve problems involving adding and subtracting fractions and mixed numbers with like denominators.			
4.NF.B.4	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.	Not applicable.	Not applicable.	Not applicable.
4.NF.B.5	Solve problems involving multiplication of a fraction by a whole number.			
Understand decimal notation for fractions, and compare decimal fractions (Denominator of 10 or 100).		Not applicable.		
4.NF.C.1	Use decimal notation for fractions with denominators of 10 or 100.	Not applicable.	Not applicable.	Not applicable.
4.NF.C.2	Understand that fractions and decimals are equivalent representations of the same quantity.	Not applicable.	Not applicable.	Not applicable.
4.NF.C.3	Read, write, and identify decimals to the hundredths place using number names, base ten numerals, and expanded form.	Not applicable.	Not applicable.	Not applicable.

4.NF.C.4	Compare two decimals to the hundredths place using the symbols $>$, $=$, or $<$, and justify the solution.	Not applicable.	Not applicable.	Not applicable.
Use the four operations with whole numbers to solve problems.		Use the four operations with whole numbers to solve problems.		
4.RA.A.1	Multiply or divide to solve problems involving a multiplicative comparison.	EE.4.OA.1-2	Demonstrate the connection between repeated addition and multiplication.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize subset. • Recognize set. • Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of addition. • Combine sets. • Combine. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Represent repeated addition with an equation. • Represent repeated addition with a model. <p>Target:</p> <ul style="list-style-type: none"> • Demonstrate the concept of multiplication. <p>Successor:</p> <ul style="list-style-type: none"> • Multiply by 5. • Multiply by 4. • Multiply by 3. • Multiply by 2. • Multiply by 1.

4.RA.A.2	Solve multi-step whole number problems involving the four operations and variables and using estimation to interpret the reasonableness of the answer.	EE.4.OA.3	Solve one-step real-world problems using addition or subtraction within 100.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Combine sets. • Partition sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of addition. • Demonstrate the concept of subtraction. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Determine the unknown in an addition equation. • Determine the unknown in a subtraction equation. <p>Target:</p> <ul style="list-style-type: none"> • Solve subtraction word problems within 100. • Solve addition word problems within 100. <p>Successor:</p> <ul style="list-style-type: none"> • Solve 2-step addition and subtraction word problems.
4.RA.A.3	Solve whole number division problems involving variables in which remainders need to be interpreted, and justify the solution.			
Work with factors and multiples.		Gain familiarity with factors and multiples.		
4.RA.B.1	Recognize that a whole number is a multiple of each of its factors and find the multiples for a given number.	EE.4.OA.4	Show one way to arrive at a product.	This essential element is not currently being assessed.
4.RA.B.2	Determine if a whole number within 100 is composite or prime, and find all factor pairs for whole numbers within 100.			

Generate and analyze patterns.		Generate and analyze patterns.		
4.RA.C.1	Generate a number pattern that follows a given rule.	EE.4.OA.5	Use repeating patterns to make predictions.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. Arrange objects in pairs. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize patterns. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize symbolic patterns. Recognize repeating patterns. Recognize pictorial patterns. <p>Target:</p> <ul style="list-style-type: none"> Recognize the core unit in a repeated pattern. <p>Successor:</p> <ul style="list-style-type: none"> Extend a pictorial pattern by applying the rule. Extend a symbolic pattern by applying the rule.
4.RA.C.2	Use words or mathematical symbols to express a rule for a given pattern.			
Classify 2-dimensional shapes by properties of their lines and angles.		Draw and identify lines and angles, and classify shapes by properties of their lines and angles.		
4.GM.A.1	Draw and identify points, lines, line segments, rays, angles, perpendicular lines, and parallel lines.	EE.4.G.1	Recognize parallel lines and intersecting lines.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize point. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize line. Recognize line segment. <p>Target:</p> <ul style="list-style-type: none"> Recognize intersecting lines/line segments. Recognize parallel lines/line segments. <p>Successor:</p> <ul style="list-style-type: none"> Recognize perpendicular lines/line segments. Recognize parallel line segments in a two-dimensional figure.

4.GM.A.2	Classify two-dimensional shapes by their sides and/or angles.	EE.4.G.2	Describe the defining attributes of two-dimensional shapes.	This essential element is not currently being assessed.
4.GM.A.3	Construct lines of symmetry for a two-dimensional figure.	EE.4.G.3	Recognize that lines of symmetry partition shapes into equal areas.	This essential element is not currently being assessed.
Understand the concept of angle and measure angles		Geometric measurement: understand concepts of angle and measure angles.		
4.GM.B.1	Identify and estimate angles and their measure.	EE.4.MD.5	Recognize angles in geometric shapes.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize point. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize line. Recognize ray. Recognize line segment. <p>Target:</p> <ul style="list-style-type: none"> Recognize angle. <p>Successor:</p> <ul style="list-style-type: none"> Make direct comparison of 2 angles.
4.GM.B.2	Draw and measure angles in whole-number degrees using a protractor.	EE.4.MD.6	Identify angles as larger and smaller.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. Recognize different. Recognize same. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize different amount. Recognize same amount. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize more amount. Recognize less amount. <p>Target:</p> <ul style="list-style-type: none"> Make direct comparison of 2 angles. <p>Successor:</p> <ul style="list-style-type: none"> Order more than 2 angles using direct comparison.

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.		Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.		
4.GM.C.1	Know relative sizes of measurement units within one system of units. a) Convert measurements in a larger unit in terms of a smaller unit.	EE.4.MD.1	Identify the smaller measurement unit that comprises a larger unit within a measurement system (inches/foot, centimeter/meter, minutes/hour).	This essential element is not currently being assessed.
		EE.4.MD.2.b	Measure mass or volume using standard tools.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize different. Recognize same. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Make direct comparison of 2 volumes. Make direct comparison of 2 masses. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Measure volume using informal units. Measure mass using informal units. <p>Target:</p> <ul style="list-style-type: none"> Use an appropriate tool to measure liquid volumes in cups. Use an appropriate tool to measure mass in ounces. Use an appropriate tool to measure mass in pounds. <p>Successor:</p> <ul style="list-style-type: none"> Estimate liquid volume in cups. Estimate mass in ounces. Estimate mass in pounds.

4.GM.C.2	Use the four operations to solve problems involving distances, intervals of time, liquid volume, weight of objects, and money.	EE.4.MD.2.a	Tell time using a digital clock. Tell time to the nearest hour using an analog clock.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Attend • Recognize different <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize measureable attributes <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize the hour hand • Know hours on a clock • Recognize the hour on a digital clock • Recognize the minute hand • Recognize the minute on a digital clock <p>Target:</p> <ul style="list-style-type: none"> • Tell the time to the hour • Read a digital clock <p>Successor:</p> <ul style="list-style-type: none"> • Tell time to the half hour • Tell time to the quarter hour
		EE.4.MD.2.c	Use standard measurement to compare lengths of objects.	This essential element is not currently being assessed.

		EE.4.MD.2.d	Identify coins (penny, nickel, dime, quarter) and their values.	Initial Precursor: <ul style="list-style-type: none">• Attend. Distal Precursor: <ul style="list-style-type: none">• Recognize attribute values. Proximal Precursor <ul style="list-style-type: none">• Recognize money. Target: <ul style="list-style-type: none">• State value of penny.• State value of nickel.• State value of dime.• State value of quarter.• Recognize penny.• Recognize nickel.• Recognize dime.• Recognize quarter. Successor: <ul style="list-style-type: none">• State the value of a penny related to a quarter.• State the value of a nickel related to a quarter.• State the value of a penny related to a dime.• State the value of a penny related to a nickel.• State the value of a nickel related to a dime.
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4.GM.C.3	Apply the area and perimeter formulas for rectangles to solve problems.	EE.4.MD.3	Determine the area of a square or rectangle by counting units of measure (unit squares).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize some. Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize enclosure. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain unit square. Explain area. <p>Target:</p> <ul style="list-style-type: none"> Calculate area by counting unit squares. Calculate area of a rectangle with tiling. <p>Successor:</p> <ul style="list-style-type: none"> Solve word problems involving area of rectangles.
Represent and analyze data.		Represent and interpret data.		
4.DS.A.1	Create a frequency table and/or line plot to display measurement data.	EE.4.MD.4.a	Represent data on a picture or bar graph given a model and a graph to complete.	This essential element is not currently being assessed.
4.DS.A.2	Solve problems involving addition and subtraction by using information presented in a data display.	Not applicable.	Not applicable.	Not applicable.
4.DS.A.3	Analyze the data in a frequency table, line plot, bar graph, or picture graph.	EE.4.MD.4.b	Interpret data from a picture or bar graph.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Classify. Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize the structure of a bar graph. Recognize the structure of a picture graph. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Use bar graphs to read the data. Use picture graphs to read the data. <p>Target:</p> <ul style="list-style-type: none"> Use graphs to read between the data. <p>Successor:</p> <ul style="list-style-type: none"> Use graphs to read beyond the data.

5th Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Grade 5: Essential Elements
Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.		Understand the place value system.		
5.NBT.A.1	Read, write and identify numbers from billions to thousandths using number names, base ten numerals, and expanded form.	EE.5.NBT.3	Compare whole numbers up to 100 using symbols (<, >, =).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Compare 2 quantities up to 10 using models. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Compare 2 numerals up to 10 using symbols (=, <,>). <p>Target:</p> <ul style="list-style-type: none"> Compare 2 numerals up to 100 using symbols (=, <,>). <p>Successor:</p> <ul style="list-style-type: none"> Compare 2 numerals up to 1000 using symbols (=, <,>). Order more than 2 two-digit numerals or quantities from greatest to least. Order more than 2 two-digit numerals or quantities from least to greatest.
5.NBT.A.2	Compare two numbers from billions to thousandths using the symbols >, =, or <, and justify the solution.			

5.NBT.A.3	Understand that in a multi-digit number, a digit represents 1/10 times what it would represent in the place to its left.	EE.5.NBT.1	Compare numbers up to 99 using base ten models.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> ● Recognize separateness. ● Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> ● Count all objects in a set or subset. ● Recognize same number of. ● Recognize different number of. ● Recognize more number of. ● Recognize fewer number of. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> ● Compare 2 quantities up to 10 using models. <p>Target:</p> <ul style="list-style-type: none"> ● Compare 2 quantities up to 100 using models. <p>Successor:</p> <ul style="list-style-type: none"> ● Compare 2 numerals up to 100 using symbols (=,<,>). ● Order more than 2 two-digit numerals or quantities from greatest to least. ● Order more than 2 two-digit numerals or quantities from least to greatest.
5.NBT.A.4	Evaluate the value of powers of 10 and understand the relationship to the place value system.	EE.5.NBT.2	Use the number of zeros in numbers that are powers of 10 to determine which values are equal, greater than, or less than.	This essential element is not currently being assessed.

5.NBT.A.5	Round numbers from billions to thousandths place.	EE.5.NBT.4	Round two-digit whole numbers to the nearest 10 from 0-90.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Use perceptual subitizing. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize ten and something. • Recognize multiple tens and something. • Decompose numbers based on tens. • Explain ten as a composition of ten ones. • Recognize a unit. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Explain place value for ones and tens. • Explain the relationship between rounding and place value. <p>Target:</p> <ul style="list-style-type: none"> • Round whole numbers 0-100 to the nearest ten. <p>Successor:</p> <ul style="list-style-type: none"> • Round whole numbers to the nearest hundred.
5.NBT.A.6	Add and subtract multi-digit whole numbers and decimals to the thousandths place, and justify the solution.	Not applicable.	Not applicable.	Not applicable.

5.NBT.A.7	Multiply multi-digit whole numbers and decimals to the hundredths place, and justify the solution.	EE.NBT.5	Multiply whole numbers up to 5 x 5.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize separateness. • Recognize set. • Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain repeated addition. • Represent repeated addition with an equation. • Solve repeated addition problems. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of multiplication. <p>Target:</p> <ul style="list-style-type: none"> • Multiply by 1. • Multiply by 2. • Multiply by 3. • Multiply by 4. • Multiply by 5. <p>Successor:</p> <ul style="list-style-type: none"> • Apply the relationship between multiplication and division.
5.NBT.A.8	Divide multi-digit whole numbers and decimals to the hundredths place using up to two-digit divisors and four-digit dividends, and justify the solution.	EE.5.NBT.6-7	Illustrate the concept of division using fair and equal shares.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize separateness. • Recognize set. • Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Model equal set. • Recognize equal. • Recognize same number of. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Partition sets. <p>Target:</p> <ul style="list-style-type: none"> • Partition sets into equal subsets. <p>Successor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of division. • Explain repeated subtraction.

Understand the relationship between fractions and decimals (denominators that are factors of 100).		Use equivalent fractions as a strategy to add and subtract fractions.		
5.NF.A.1	Understand That parts of a whole can be expressed as fractions and/or decimals.	Not applicable.	Not applicable.	Not applicable.
5.NF.A.2	Convert decimals to fractions and fractions to decimals.	Not applicable.	Not applicable.	Not applicable.
5.NF.A.3	Compare and order fractions and/or decimals to the thousandths place using the symbols $>$, $=$, or $<$, and justify the solution.	EE.5.NBT.3	Compare whole numbers up to 100 using symbols ($<$, $>$, $=$).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Compare 2 quantities up to 10 using models. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Compare 2 numerals up to 10 using symbols ($=$, $<$, $>$). <p>Target:</p> <ul style="list-style-type: none"> Compare 2 numerals up to 100 using symbols ($=$, $<$, $>$). <p>Successor:</p> <ul style="list-style-type: none"> Compare 2 numerals up to 1000 using symbols ($=$, $<$, $>$). Order more than 2 two-digit numerals or quantities from greatest to least. Order more than 2 two-digit numerals or quantities from least to greatest.

Perform operations, and solve problems with fractions and decimals.		Use equivalent fractions as a strategy to add and subtract fractions.		
5.NF.B.1	Estimate results of sums, differences and products with fractions and decimals to the thousandths.	Not applicable.	Not applicable.	Not applicable.
5.NF.B.2	Justify the reasonableness of a product when multiplying with fractions. <ol style="list-style-type: none"> a) Estimate the size of the product based on the size of the two factors. b) Explain why multiplying a given number by a fraction greater than 1 results in a product larger than the given number. c) Explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number. d) Explain why multiplying the numerator and denominator by the same number is equivalent to multiplying the fraction by 1. 	Not applicable.	Not applicable.	Not applicable.

5.NF.B.3	Solve problems involving addition and subtraction of fractions and mixed numbers with unlike denominators, and justify the solution.	EE.5.NF.1	Identify models of halves ($\frac{1}{2}$, $\frac{2}{2}$) and fourths ($\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize some. Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Partition sets into equal subsets. Partition any shape into equal parts. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize one fourth in a set model. Recognize one half in a set model. Recognize one half on an area model. Recognize one fourth on an area model. <p>Target:</p> <ul style="list-style-type: none"> Recognize fourths in a set model. Recognize halves in a set model. Recognize halves on an area model. Recognize fourths on an area model. <p>Successor:</p> <ul style="list-style-type: none"> Recognize proper fractions with a set model. Recognize proper fraction with an area model.
		EE.5.NF.2	Identify models of thirds ($\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$) and tenths ($\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10}$, $\frac{5}{10}$, $\frac{6}{10}$, $\frac{7}{10}$, $\frac{8}{10}$, $\frac{9}{10}$, $\frac{10}{10}$).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize some. Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Partition any shape into equal parts. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize one third on an area model. Recognize one tenth on an area model. <p>Target:</p> <ul style="list-style-type: none"> Recognize thirds on an area model. Recognize tenths on an area model. <p>Successor:</p> <ul style="list-style-type: none"> Recognize proper fractions with an area model.

5.NF.B.4	<p>Extend the concept of multiplication to multiply a fraction or whole number by a fraction.</p> <ul style="list-style-type: none">a) Recognize the relationship between multiplying fractions and finding the areas of rectangles with fractional side lengths.b) Calculate and interpret the product of a fraction by a whole number and a whole number by a fraction.c) Calculate and interpret the product of two fractions less than one.	Not applicable	Not applicable.	Not applicable.
5.NF.B.5	<p>Extend the concept of division to divide unit fractions and whole numbers by using visual fraction models and equations.</p> <ul style="list-style-type: none">a) Calculate and interpret the quotient of a unit fraction by a non-zero whole number.b) Calculate and interpret the quotient of a whole number by a unit fraction.	Not applicable.	Not applicable.	Not applicable.

Represent and analyze patterns and relationships.		Analyze patterns and relationships.		
5.RA.A.1	Investigate the relationship between two numeric patterns. a) Generate two numeric patterns given two rules. b) Translate two numeric patterns into two sets of ordered pairs. c) Graph numeric patterns on the Cartesian coordinate plane. d) Identify the relationship or explain a given numeric pattern.	EE.5.OA.3	Identify and extend numerical patterns.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Order objects. Classify. Contrast objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize patterns. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize repeating patterns. Recognize the core unit in a repeated pattern. Recognize the pattern rule in a growing pattern. Recognize growing patterns. Recognize symbolic patterns. Recognize shrinking patterns. Recognize the pattern rule in a shrinking pattern. <p>Target:</p> <ul style="list-style-type: none"> Extend a symbolic pattern by applying the rule. <p>Successor:</p> <ul style="list-style-type: none"> Predict an element in a symbolic pattern by applying the rule.
5.RA.A.2	Write a rule to describe or explain a given numeric pattern.			
Write and interpret numerical expressions.		Write and interpret numerical expressions.		
5.RA.B.1	Write, evaluate, and interpret numeric expressions using the order of operations.	Not applicable.	Not applicable.	Not applicable.
5.RA.B.2	Translate written expressions into algebraic expressions.	Not applicable.	Not applicable.	Not applicable.

Use the four operations to represent and solve problems.		Perform operations with multi-digit whole numbers and with decimals to hundredths.		
5.RA.C.1	Solve and justify multi-step problems involving variables, whole numbers, fractions, and decimals.	Not applicable.	Not applicable.	Not applicable.
Classify two-and three-dimensional geometric shapes.		Classify two-dimensional figures into categories based on their properties.		
5.GM.A.1	Understand that attributes belonging to a category of figures also belong to all subcategories	EE.5.G.1-4	Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize same. Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Classify same two-dimensional shapes with same size and same orientation. Classify same two-dimensional shapes with different size and/or different orientation. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Describe attributes of shapes. <p>Target:</p> <ul style="list-style-type: none"> Analyze shapes to identify common attributes. <p>Successor:</p> <ul style="list-style-type: none"> Explain attribute relationships between shapes.
5.GM.A.2	Classify figures in a hierarchy based on properties.			
5.GM.A.3	Analyze and describe the properties of prisms and pyramids.			

Understand and compute volume.		Geometric measurement: understand concepts of volume, and relate volume to multiplication and to addition.		
5.GM.B.1	<p>Understand the concept of volume and recognize that volume is measured in cubic units.</p> <p>a) Describe a cube with edge length 1 unit as a “unit cube” and is said to have “one cubic unit” of volume and can be used to measure volume.</p> <p>b) Understand that the volume of a right rectangular prism can be found by stacking multiple layers of the base.</p>	EE.5.MD.3	Identify common three-dimensional shapes.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Notice what is new. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize same. • Recognize different. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Match the same three-dimensional shapes with same size and different orientation. • Match the same three-dimensional shape with different size and different orientation • Match the same three-dimensional shape with same size and same orientation. • Match the same three-dimensional shape with different size and same orientation. <p>Target:</p> <ul style="list-style-type: none"> • Recognize spheres. • Recognize cones • Recognize cubes. • Recognize cylinders. <p>Successor:</p> <ul style="list-style-type: none"> • Use geometric shapes to describe objects. • Describe attributes of shapes

		EE.5.MD.4-5	Determine the volume of a rectangular prism by counting units of measure (unit cubes).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize enclosure. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Explain volume. Explain a unit cube. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain volume as a composition of cube units. Calculate volume by counting unit cubes. <p>Target:</p> <ul style="list-style-type: none"> Calculate volume of a right rectangular prism by packing unit cubes. <p>Successor:</p> <ul style="list-style-type: none"> Solve word problems involving volume of rectangular prisms.
5.GM.B.2	Apply the formulas $V=l \times w \times h$ and $V= B \times h$ for volume of right rectangular prisms with whole-number edge lengths.	Not applicable.	Not applicable.	Not applicable.

Graph points on the Cartesian coordinate plane within the first quadrant to solve problems.		Graph points on the coordinate plane to solve real-world and mathematical problems.		
5.GM.C.1	<p>Define a first quadrant Cartesian coordinate system.</p> <ul style="list-style-type: none"> a) Represent the axes as scaled perpendicular number lines that both intersect at 0, the origin. b) Identify any point on the Cartesian coordinate plane by its ordered pair coordinates. c) Define the first number in an ordered pair as the horizontal distance from the origin. d) Define the second number in an ordered pair as the vertical distance from the origin. 	Not applicable.	Not applicable.	Not applicable.
5.GM.C.2	Plot and interpret points in the first quadrant of the Cartesian coordinate plane.	Not applicable.	Not applicable.	Not applicable.

Solve problems involving measurement and conversions within a measurement system.		Convert like measurement units within a given measurement system.		
5.GM.D.8	Convert measurements of capacity, length, and weight within a given measurement system.	EE.5.MD.1.b	Use standard units to measure weight and length of objects.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize measureable attributes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Make direct comparison of 2 lengths. Order more than 2 lengths by direct comparison. Order more than 2 masses by direct comparison. Make direct comparison of 2 masses. <p>Target:</p> <ul style="list-style-type: none"> Use an appropriate tool for measuring length using inches. Use an appropriate tool for measuring length using feet. Use an appropriate tool for measuring mass in pounds. Use an appropriate tool for measuring mass in ounces. <p>Successor:</p> <ul style="list-style-type: none"> Estimate length using inches. Estimate length using feet. Estimate mass in pounds. Estimate mass in ounces.

5.GM.D.9	Solve multi-step problems that require measurement conversions.	EE.5.MD.1.a	Tell time using an analog or digital clock to the half or quarter hour.	Initial Precursor: <ul style="list-style-type: none">• Attend.• Recognize different. Distal Precursor: <ul style="list-style-type: none">• Recognize measureable attributes. Proximal Precursor: <ul style="list-style-type: none">• Recognize the hour hand.• Know hours on a clock.• Recognize the hour on a digital clock.• Recognize the minute hand.• Recognize the minute on a digital clock. Target: <ul style="list-style-type: none">• Tell time to the quarter hour.• Tell time to the half hour. Successor: <ul style="list-style-type: none">• Represent time.
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		EE.5.MD.1.c	Indicate relative value of collections of coins.	<p>Initial Precursor:</p> <ul style="list-style-type: none">• Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none">• Recognize money. <p>Proximal Precursor:</p> <ul style="list-style-type: none">• State the value of a penny.• State the value of a nickel.• State the value of a dime.• State the value of a quarter.• Recognize penny.• Recognize nickel.• Recognize dime.• Recognize quarter. <p>Target:</p> <ul style="list-style-type: none">• State the value of a nickel related to a dime.• State the value of a nickel related to a quarter.• State the value of a penny related to a nickel.• State the value of a penny related to a dime.• State the value of a penny related to a quarter. <p>Successor:</p> <ul style="list-style-type: none">• Count with mixed coins.
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Represent and analyze data.		Represent and interpret data.		
5.DS.A.1	Create a line graph to represent a data set, and analyze the data to answer questions and solve problems.	EE.5.MD.2	Represent and interpret data on a picture, line plot, or bar graph.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Arrange objects in pairs. • Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Classify. • Order objects. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Use bar graphs to read the data. • Use picture graphs to read the data. • Use line plots (dot plots) to read the data. <p>Target:</p> <ul style="list-style-type: none"> • Represent data using bar graph. • Represent data using picture graph. • Represent data using line plot (dot plot) • Use graphs to read between the data. <p>Successor:</p> <ul style="list-style-type: none"> • Use graphs to read beyond the data.
5.DS.A.2	Create a line plot to represent a given or generated data set, and analyze the data to answer questions and solve problems, recognizing the outliers and generating the median.			

6th Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Grade 6: Essential Elements
Understand and use ratios to solve problems.		Understand ratio concepts, and use ratio reasoning to solve problems.		
6.RP.A.1	Understand a ratio as a comparison of two quantities and represent these comparisons.	EE.6.RP.1	Demonstrate a simple ratio relationship.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize wholeness. Recognize a unit. Recognize parts of a given whole or a unit. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Model equal part. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Partition any shape into equal parts. Explain unit fraction. Recognize fraction. <p>Target:</p> <ul style="list-style-type: none"> Recognize many to 1 ratio. Represent many to 1 ratio. <p>Successor:</p> <ul style="list-style-type: none"> Recognize many to many ratio.
6.RP.A.2	Understand the concept of a unit rate associated with a ratio, and describe the meaning of unit rate.	Not applicable.	Not applicable.	Not applicable.
6.RP.A.3	Solve problems involving ratios and rates. <ul style="list-style-type: none"> a) Create tables of equivalent ratios, find missing values in the tables and plot the pairs of values on the Cartesian coordinate plane. b) Solve unit rate problems. c) Solve percent problems. d) Convert measurement units within and between two systems of measurement. 	Not applicable.	Not applicable.	Not applicable.

Apply and extend previous understandings of multiplication and division to divide fractions by fractions.		Apply and extend previous understandings of multiplication and division to divide fractions by fractions.		
6.NS.A.1	<p>Compute and interpret quotients of positive fractions.</p> <p>a) Solve problems involving division of fractions by fractions.</p>	EE.6.NS.1	Compare the relationships between two unit fractions.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize wholeness. Recognize a unit. Recognize parts of a given whole or unit. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Model equal part. Partition any shape into equal parts. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize fraction. Explain unit fraction. Recognize numerator. Recognize denominator. <p>Target:</p> <ul style="list-style-type: none"> Explain relationships between unit fractions. <p>Successor:</p> <ul style="list-style-type: none"> Explain numerator. Explain denominator. Compare fractions using models. Decompose a fraction into a sum of unit fractions with the same denominator. Add fraction with common denominators.

Compute with non-negative multi-digit numbers, and find common factors and multiples.		Compute fluently with multi-digit numbers, and find common factors and multiples.		
6.NS.B.1	Demonstrate fluency with division of multi-digit whole numbers.	EE.6.NS.2	Apply the concept of fair share and equal shares to divide.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Partition sets. Partition sets into equal subsets. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain repeated subtraction. Represent repeated subtraction with an equation. Represent repeated subtraction with a model. <p>Target:</p> <ul style="list-style-type: none"> Demonstrate the concept of division. <p>Successor:</p> <ul style="list-style-type: none"> Divide by 1, 2, 3, 4, 5, and 10.
6.NS.B.2	Demonstrate fluency with addition, subtraction, multiplication, and division of decimals.	EE.6.NS.3	Solve two-factor multiplication problems with products up to 50 using concrete objects and/or a calculator.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Explain repeated addition. Represent repeated addition with an equation. Solve repeated addition problems. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Demonstrate the concept of multiplication. <p>Target:</p> <ul style="list-style-type: none"> Multiply by 1, 2, 3, 4, and/or 5. <p>Successor:</p> <ul style="list-style-type: none"> Apply the relationship between multiplication and division. Divide by 1, 2, 3, 4, and/or 5.

6.NS.B.3	Find common factors and multiples. a) Find the greatest common factor (GCF) and the least common multiple (LCM). b) Use the distributive property to express a sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers.	Not applicable.	Not applicable.	Not applicable.
Apply and extend previous understandings of numbers to the system of rational numbers.		Apply and extend previous understandings of numbers to the system of rational numbers.		
6.NS.C.1	Use positive and negative numbers to represent quantities.	EE.6.NS.5-8	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero).	Initial Precursor: <ul style="list-style-type: none"> Recognize separateness. Recognize set. Distal Precursor: <ul style="list-style-type: none"> Count all objects in a set or subset. Recognize different number of. Recognize fewer number of. Recognize more number of. Proximal Precursor: <ul style="list-style-type: none"> Recognize opposite numbers. Target: <ul style="list-style-type: none"> Use positive and negative numbers in real-world contexts. Successor: <ul style="list-style-type: none"> Relate the meaning of 0 to positive and negative numbers in real-world contexts. Explain inequalities from real world contexts.
6.NS.C.2	Locate a rational number as a point on the number line. a) Locate rational numbers on a horizontal or vertical number line. b) Write, interpret, and explain problems of ordering rational numbers. c) Understand that a number and its opposite (additive inverse) are located on opposite sides of zero on the number line.			
6.NS.C.3	Understand that the absolute value of a rational number is its distance from 0 on the number line.			
6.NS.C.4	Extend prior knowledge to generate equivalent representation of rational numbers between fractions, decimals, and percentages (limited to terminating decimals and/or benchmark fractions of $\frac{1}{3}$ and $\frac{2}{3}$).			
Apply and extend previous understandings of arithmetic to algebraic expressions.		Apply and extend previous understandings of arithmetic to algebraic expressions.		
6.EE.A.1	Describe the difference between an expression and an equation.	Not applicable.	Not applicable.	Not applicable.

6.EE1.A.2	<p>Create and evaluate expressions involving variables and whole number exponents.</p> <ol style="list-style-type: none"> a) Identify parts of an expression using mathematical terminology. b) Evaluate expressions at specific values of the variables. c) Evaluate non-negative rational number expressions. d) Write and evaluate algebraic expressions. e) Understand the meaning of the variable in the context of the situation. 	EE.6.EE.1-2	Identify equivalent number sentences.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Combine sets. • Compare sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of addition. • Demonstrate the concept of subtraction. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Represent addition with equations. • Represent the unknown in an equation. • Represent subtraction with equations. <p>Target:</p> <ul style="list-style-type: none"> • Evaluate if equations are true or false. • Recognize equivalent algebraic expressions. <p>Successor:</p> <ul style="list-style-type: none"> • Use properties of addition to create an equivalent algebraic expression.
6.EE1.A.3	Identify and generate equivalent algebraic expressions using mathematical properties.	EE.6.EE.3	Apply the properties of addition to identify equivalent numerical expressions.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Compare sets. • Combine sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Represent the unknown in an equation. • Represent subtraction with equations. • Represent addition with equations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Evaluate if equations are true or false. • Apply associative property of addition. • Apply commutative property of addition. <p>Target:</p> <ul style="list-style-type: none"> • Recognize equivalent algebraic expression. • Use properties of addition to create an equivalent algebraic expression. <p>Successor:</p> <ul style="list-style-type: none"> • Use properties of operations to generate equivalent expressions involving addition. • Use properties of operations to generate equivalent expressions involving subtraction.

Reason about and solve one-variable equations and inequalities.		Reason about and solve one-variable equations and equalities.		
6.EE1.B.1	Use substitution to determine whether a given number in a specified set makes a one-variable equation or inequality true.	EE.6.EE.5-7	Match an equation to a real-world problem in which variables are used to represent numbers.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Partition sets. • Combine sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Represent subtraction with equations. • Represent addition with equations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Represent expressions with variables. • Represent the unknown in an equation. <p>Target:</p> <ul style="list-style-type: none"> • Represent real-world problems as equations. <p>Successor:</p> <ul style="list-style-type: none"> • Solve real-world problems using equations with non-negative rational numbers.
6.EE1.B.2	Understand that if any solutions exist, the solution set for an equation or inequality consists of values that make the equation or inequality true.			
6.EE1.B.3	Write and solve equations using variables to represent quantities, and understand the meaning of the variable in the context of the situation.			
6.EE1.B.4	Solve one-step linear equations in one variable involving non-negative rational numbers.			
6.EE1.B.5	Recognize that inequalities may have infinitely many solutions. <ul style="list-style-type: none"> a) Write an inequality of the form $x > c$, $x < c$, $x \geq c$, or $x \leq c$ to represent a constraint or condition. b) Graph the solution set of an inequality. 	Not applicable.	Not applicable.	Not applicable.

Represent and analyze quantitative relationships between dependent and independent variables.		Represent and analyze quantitative relationships between dependent and independent variables.		
6.EE.C.1	<p>Identify and describe relationships between two variables that change in relationship to one another.</p> <p>a) Write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable.</p> <p>b) Analyze the relationship between the dependent and independent variables using graphs, tables, and equations, and relate these representations to each other.</p>	Not applicable.	Not applicable.	Not applicable.
Solve problems involving area, surface area and volume.				
6.GM.A.1	Find the area of polygons by composing or decomposing the shapes into rectangles or triangles.	EE.6.G.1	Solve real-world and mathematical problems about area using unit squares.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize some. Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Explain unit square. Explain area. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Calculate area by counting unit squares. Calculate area of a rectangle with tiling. <p>Target:</p> <ul style="list-style-type: none"> Solve word problems involving area of rectangles. <p>Successor:</p> <ul style="list-style-type: none"> Relate tiling and formula as methods for calculating area of a rectangle. Calculate area for rectangles with formula.

6.GM.A.2	<p>Find the volume of right rectangular prisms.</p> <p>a) Understand that the volume of a right rectangular prism can be found by filling the prism with multiple layers of the base.</p> <p>b) Apply $V = l * w * h$ and $V = Bh$ to find the volume of right rectangular prisms.</p>	EE.6.G.2	Solve real-world and mathematical problems about volume using unit cubes.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize enclosure. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Explain volume. Explain a unit cube. Explain volume as a composition of cube units. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Calculate volume by counting unit cubes. Calculate volume of a right rectangular prism by packing unit cubes. <p>Target:</p> <ul style="list-style-type: none"> Solve word problems involving volume of rectangular prisms. <p>Successor:</p> <ul style="list-style-type: none"> Calculate volume of right rectangular prisms with formula.
6.GM.A.3	<p>Solve problems by graphing points in all four quadrants of the Cartesian coordinate plane.</p> <p>a) Understand signs of numbers in ordered pairs as indicating locations in quadrants of the Cartesian coordinate plane.</p> <p>b) Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</p> <p>c) Find distances between points with the same first coordinate or the same second coordinate.</p> <p>d) Construct polygons in the Cartesian coordinate plane.</p>	Not applicable.	Not applicable.	Not applicable.

6.GM.A.4	Solve problems using nets. a) Represent three-dimensional figures using nets made up of rectangles and triangles. b) Use nets to find the surface area of three-dimensional figures whose sides are made up of rectangles and triangles.	Not applicable.	Not applicable.	Not applicable.
Develop understanding of statistical variability.		Develop understanding of statistical variability.		
6.DSP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.	EE.6.SP.1-2	Display data on a graph or table that shows variability in the data.	This essential element is not currently being assessed.
6.DSP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread and overall shape.			
6.DSP.A.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary from a single number.	Not applicable.	Not applicable.	Not applicable.
Summarize and describe distributions.		Summarize and describe distributions.		
6.DSP.B.1	Display and interpret data. a) Use dot plots, histograms, and box plots to display and interpret numerical data. b) Create and interpret circle graphs.	Not applicable.	Not applicable.	Not applicable.

<p>6.DSP.B.2</p>	<p>Summarize numerical data sets in relation to the context.</p> <ol style="list-style-type: none"> a) Report the number of observations. b) Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. c) Give quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context of the data. d) Analyze the choice of measures of center and variability based on the shape of the data distribution and/or the context of the data. 	<p>EE.6.SP.5</p>	<p>Summarize data distributions shown in graphs or tables.</p>	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Classify. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize that distribution of data can be described by overall shape of a graph. • Recognize the structure of a line plot (dot plot). <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize outliers. • Recognize peaks in data distribution. • Recognize symmetric distribution. • Analyze the overall shape of the data distribution. <p>Target:</p> <ul style="list-style-type: none"> • Summarize data by overall shape. <p>Successor:</p> <ul style="list-style-type: none"> • Use the overall shape of data distribution to recognize appropriate measures of center or spread.
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7th Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Grade 7: Essential Elements
Analyze proportional relationships and use them to solve problems.		Analyze proportional relationships and use them to solve real-world and mathematical problems.		
7.RP.A.1	Compute unit rates, including those that involve complex fractions, with like or different units.	EE.7.RP.1-3	Use a ratio to model or describe a relationship.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize subset. • Recognize set. • Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize fraction. • Explain unit fraction. • Partition any shape into equal parts. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Explain ratio. • Recognize many to 1 ratio. <p>Target:</p> <ul style="list-style-type: none"> • Recognize many to many ratio. • Represent many to many ratio. <p>Successor:</p> <ul style="list-style-type: none"> • Explain rates as ratio.
7.RP.A.2	Recognize and represent proportional relationships between quantities. <ul style="list-style-type: none"> a) Determine when two quantities are in a proportional relationship. b) Identify and/or compute the constant of proportionality (unit rate). c) Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. d) Recognize that the graph of any proportional relationship will pass through the origin. 			
7.RP.A.3	Solve problems involving ratios, rates, percentages, and proportional relationships.			

Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.		Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers.		
7.NS.A.1	<p>Apply and extend previous understanding of numbers to add and subtract rational numbers.</p> <ol style="list-style-type: none"> Add and subtract rational numbers. Represent addition and subtraction on a horizontal or vertical number line. Describe situations and show that a number and its opposite have a sum of 0 (additive inverses). Understand subtraction of rational numbers as adding the additive inverse. Determine the distance between two rational numbers on the number line is the absolute value of their difference. Interpret sums and differences of rational numbers. 	EE.7.NS.1	Add fractions with like denominators (halves, thirds, fourths, and tenths) with sums less than or equal to one.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize parts of a given whole or a unit. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain the concept of addition and subtraction of fractions. Decompose a fraction into a sum of unit fraction with the same denominator. <p>Target:</p> <ul style="list-style-type: none"> Add fractions with common denominators. <p>Successor:</p> <ul style="list-style-type: none"> Add or subtract fractions with denominators of 10 and 100.

7.NS.A.2	Apply and extend previous understandings of numbers to multiply and divide rational numbers.	EE.7.NS.2	Not applicable.	Not applicable.
	<p>a) Multiply and divide rational numbers.</p> <p>b) Determine that a number and its reciprocal have a product of 1 (multiplicative inverse).</p>	EE.7.NS.2.a	Solve multiplication problems with products to 100.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Solve repeated addition problems. Represent repeated addition with an equation. Explain repeated addition. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Demonstrate the concept of multiplication. <p>Target:</p> <ul style="list-style-type: none"> Multiply by 1, 2, 3, 4, 5, 6, 7, 8, 9, and/or 10. <p>Successor:</p> <ul style="list-style-type: none"> Divide by 1, 2, 3, 4, 5, 6, 7, 8, 9, and/or 10. Apply the relationship between multiplication and division.
	<p>c) Understand that every quotient of integers (with non-zero divisor) is a rational number.</p> <p>d) Convert a rational number to a decimal.</p>	EE.7.NS.2.b	Solve division problems with divisors up to five and also with a divisor of 10 without remainders.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize subset. Recognize set. Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Solve repeated subtraction problems. Represent repeated subtraction with an equation. Explain repeated subtraction. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Demonstrate the concept of division. <p>Target:</p> <ul style="list-style-type: none"> Divide by 1, 2, 3, 4, 5, and/or 10. <p>Successor:</p> <ul style="list-style-type: none"> Explain the relationship between multiplication and division.

	<p>e) Understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat.</p>	<p>EE.7.NS.2.c-d</p>	<p>Express a fraction with a denominator of 10 as a decimal.</p>	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize separateness. • Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize whole on a set model. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize tenths in a set model. • Recognize one tenth in a set model. <p>Target:</p> <ul style="list-style-type: none"> • Explain the decimal point. • Represent a fraction with a denominator of 10 as a decimal. <p>Successor:</p> <ul style="list-style-type: none"> • Explain place value for tenths. • Compare two decimals to tenths using symbols.
	<p>f) Interpret products and quotients of rational numbers by describing real-world contexts.</p>			
<p>7.NS.A.3</p>	<p>Solve problems involving the four arithmetic operations with rational numbers.</p>	<p>EE.7.NS.3</p>	<p>Compare quantities represented as decimals in real-world examples to tenths.</p>	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize separateness. • Recognize set. • Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize one tenth in a set model. • Recognize tenths in a set model. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Represent a decimal to tenths as a fraction. <p>Target:</p> <ul style="list-style-type: none"> • Compare two decimals to tenths using symbols. <p>Successor:</p> <ul style="list-style-type: none"> • Compare two decimals to hundredths using symbols.

Use properties of operations to generate equivalent expressions.		Use properties of operations to generate equivalent expressions.		
7.EE.A.1	Apply properties of operations to simplify and to factor linear algebraic expressions with rational coefficients.	EE.7.EE.1	Use the properties of operations as strategies to demonstrate that expressions are equivalent.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Partition sets. • Combine sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Model associativity of multiplication. • Model additive commutativity. • Model associativity of addition. • Model multiplicative commutativity. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Apply the associative property of multiplication. • Apply commutative property of addition. • Apply associative property of addition. • Apply the commutative property of multiplication. <p>Target:</p> <ul style="list-style-type: none"> • Use properties of operations to generate equivalent expressions involving subtraction. • Use properties of operations to generate equivalent expressions involving addition. <p>Successor:</p> <ul style="list-style-type: none"> • Use equivalent expressions in real-world contexts.

7.EE1.A.2	Understand how to use equivalent expressions to clarify quantities in a problem.	EE.7.EE.2	Identify an arithmetic sequence of whole numbers with a whole number common difference.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Classify. • Contrast objects. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize symbolic patterns. • Recognize sequence. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize growing patterns. • Recognize shrinking patterns. <p>Target:</p> <ul style="list-style-type: none"> • Recognize arithmetic sequences. <p>Successor:</p> <ul style="list-style-type: none"> • Recognize the recursive rule for arithmetic sequences.
Solve problems using numerical and algebraic expressions and equations.		Solve real-life and mathematical problems using numerical and algebraic expressions and equations.		
7.EE1.B.3	Solve multi-step problems posed with rational numbers. <ul style="list-style-type: none"> a) Convert between equivalent forms of the same number. b) Assess the reasonableness of answers using mental computation and estimation strategies. 	Not applicable.	Not applicable.	Not applicable.

7.EE1.B.4	<p>Write and/or solve linear equations and inequalities in one variable.</p> <ul style="list-style-type: none">a) Write and/or solve equations of the form $x + p = q$ and $px = q$ in which p and q are rational numbers.b) Write and/or solve two-step equations of the form $px + q = r$ and $p(x + q) = r$, where p, q and r are rational numbers, and interpret the meaning of the solution in the context of the problem.c) Write, solve, and/or graph inequalities of the form $px + q > r$ or $px + q < r$, where p, q and r are rational numbers.	EE.7.EE.4	Use the concept of equality with models to solve one-step addition and subtraction equations.	This essential element is not currently being assessed.
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Draw and describe geometrical figures and describe the relationships between them.		Draw, construct, and describe geometrical figures and describe the relationships between them.		
7.GM.A.1	Solve problems involving scale drawings of real objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale.	EE.7.G.1	Match two similar geometric shapes that are proportional in size and in the same orientation.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Attend. Notice what is new. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize same. Recognize different. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Match the same two-dimensional shape with same size and same orientation. Match the same three-dimensional shapes with same size and same orientation. <p>Target:</p> <ul style="list-style-type: none"> Match the same two-dimensional shape with different sizes and same orientation. Match the same three-dimensional shapes with different size and same orientation. <p>Successor:</p> <ul style="list-style-type: none"> Match the same two-dimensional shapes with different size and different orientation. Match the same three-dimensional shapes with different size and different orientation.

7.GM.A.2	<p>Use a variety of tools to construct geometric shapes.</p> <p>a) Determine if provided constraints will create a unique triangle through construction.</p> <p>b) Construct special quadrilaterals given specific parameters.</p>	EE.7.G.2	Recognize geometric shapes with given conditions.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize same. • Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize squares. • Recognize circles. • Recognize triangles. • Recognize rectangles. • Recognize cubes. • Recognize cones. • Recognize cylinders. • Recognize spheres. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Describe attributes of shapes. <p>Target:</p> <ul style="list-style-type: none"> • Recognize shapes with specified attributes. <p>Successor:</p> <ul style="list-style-type: none"> • Classify shapes with specified attributes.
7.GM.A.3	Describe two-dimensional cross sections of pyramids, prisms, cones, and cylinders.	EE.7.G.3	Match a two-dimensional shape with a three-dimensional shape that shares an attribute.	This essential element is not currently being assessed.
7.GM.A.4	<p>Understand concepts of circles.</p> <p>a) Analyze the relationships among the circumference, the radius, the diameter, the area and Pi in a circle.</p> <p>b) Know and apply the formulas for circumference and area of circles to solve problems.</p>	EE.7.G.4	Determine the perimeter of a rectangle by adding the measures of the sides.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Describe measurable attributes. • Recognize measurable attributes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Explain length. • Explain perimeter. <p>Target:</p> <ul style="list-style-type: none"> • Calculate the perimeter of a rectangle by counting unit lengths on a grid. • Calculate perimeter by adding all the side lengths. <p>Successor:</p> <ul style="list-style-type: none"> • Use coordinates to calculate perimeters of polygons.

Apply and extend previous understanding of angle measure, area and volume.		Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.		
7.GM.B.5	Use angle properties to write and solve equations for an unknown angle.	EE.7.G.5	Recognize angles that are acute, obtuse, and right.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize line. Recognize point. Recognize ray. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize angle. <p>Target:</p> <ul style="list-style-type: none"> Recognize obtuse angles. Recognize acute angles. Recognize right angles. <p>Successor:</p> <ul style="list-style-type: none"> Compare angles to a right angle.
7.GM.B.6	Understand the relationship between area, surface area, and volume. <ul style="list-style-type: none"> a) Find the area of triangles, quadrilaterals, and other polygons composed of triangles and rectangles. b) Find the volume and surface area of prisms, pyramids, and cylinders. 	EE.7.G.6	Determine the area of a rectangle using the formula for length x width, and confirm the result using tiling or partitioning into unit squares.	This essential element is not currently being assessed.

Use random sampling to draw inferences about a population.		Use random sampling to draw inferences about a population.		
7.DSP.A.1	<p>Understand that statistics can be used to gain information about a population by examining a sample of the population.</p> <ul style="list-style-type: none"> a) Understand that a sample is a subset of a population. b) Understand that generalizations from a sample are valid only if the sample is representative of the population. c) Understand that random sampling is used to produce representative samples and support valid inferences. 	EE.7.SP.1-2	Answer a question related to the collected data from an experiment, given a model of data, or from data collected by the student.	This essential element is not currently being assessed.
7.DSP.A.2	Use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest.			

Draw informal comparative inferences about two populations.		Draw informal comparative inferences about two populations.		
7.DSP.B.3	Analyze different data distributions using statistical measures.	EE.7.SP.3	Compare two sets of data within a single data display such as a picture graph, line plot, or bar graph.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Classify. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize the structure of a bar graph. • Recognize the structure of a line plot (dot plot). • Recognize the structure of a picture graph. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize peaks in data distribution. • Recognize symmetric distribution. • Recognize outliers. • Recognize variability in a data set. <p>Target:</p> <ul style="list-style-type: none"> • Use visual overlap of two sets of data to compare variability of two populations. • Compare differences in shape of 2 or more sets of data. <p>Successor:</p> <ul style="list-style-type: none"> • Draw inferences by comparing two data sets.
7.DSP.B.4	Compare the numerical measures of center, measures of frequency, and measures of variability from two random samples to draw inferences about the population.	Not applicable.	Not applicable.	Not applicable.

Develop, use and evaluate probability models.		Investigate chance processes, and develop, use, and evaluate probability models.		
7.DSP.C.5	<p>Investigate the probability of chance events.</p> <ol style="list-style-type: none"> Determine probabilities of simple events. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. 	EE.7.SP.5-7	Describe the probability of events occurring as possible or impossible.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Classify. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize outcomes of an event. <p>Target:</p> <ul style="list-style-type: none"> Classify events as possible or impossible. <p>Successor:</p> <ul style="list-style-type: none"> Recognize probability as the likelihood of an event.
7.DSP.C.6	<p>Investigate the relationship between theoretical and experimental probabilities for simple events.</p> <ol style="list-style-type: none"> Predict outcomes using theoretical probability. Perform experiments that model theoretical probability. Compare theoretical and experimental probabilities. 			
7.DSP.C.7	<p>Explain possible discrepancies between a developed probability model and observed frequencies.</p> <ol style="list-style-type: none"> Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. 			

7.DSP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams and simulations. a) Represent the sample space of a compound event. b) Design and use a simulation to generate frequencies for compound events.	Not applicable.	Not applicable.	Not applicable.
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8th Grade Mathematics

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Grade 8: Essential Elements
Know that there are numbers that are not rational, and approximate them by rational numbers.		Know that there are numbers that are not rational, and approximate them by rational numbers.		
8.NS.A.1	<p>Explore the real number system.</p> <ul style="list-style-type: none"> a) Know the difference between rational and irrational numbers. b) Understand that all rational numbers have a decimal expansion that terminates or repeats. c) Convert decimal which repeat into fractions and fractions into repeating decimals d) Generate equivalent representations of rational numbers. 	EE.8.NS.1	Subtract fractions with like denominators (halves, thirds, fourths, and tenths) with minuends less than or equal to one.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize separateness. • Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize parts of a given whole or unit. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Decompose a fraction into a sum of unit fractions with the same denominator. • Explain the concept of addition and subtraction of fractions. <p>Target:</p> <ul style="list-style-type: none"> • Subtract fractions with common denominators. <p>Successor:</p> <ul style="list-style-type: none"> • Add or subtract fractions with denominators of 10 and 100.

8.NS.A.2	Estimate the value and compare the size of irrational numbers and approximate their locations on a number line.	EE.8.NS.2.a	Express a fraction with a denominator of 100 as a decimal.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Partition sets into equal subsets. Explain unit fraction. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain the decimal point. Represent a fraction with a denominator of 10 as a decimal. <p>Target:</p> <ul style="list-style-type: none"> Represent a fraction with a denominator of 100 as a decimal. <p>Successor:</p> <ul style="list-style-type: none"> Compare two decimals to the tenths using symbols. Compare two decimals to hundredths using symbols.
		EE.8.NS.2.b	Compare quantities represented as decimals in real-world examples to hundredths.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize one tenth in a set model. Recognize tenths in a set model. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Represent a decimal to tenths as a fraction. Represent a decimal to hundredths as a fraction. <p>Target:</p> <ul style="list-style-type: none"> Compare two decimals to hundredths using symbols. <p>Successor:</p> <ul style="list-style-type: none"> Compare two decimals to thousandths and beyond using decimals.

Work with radicals and integer exponents.		Work with radicals and integer exponents.	
8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent expressions.	EE.8.EE.1	Identify the meaning of an exponent (limited to exponents of 2 and 3).
			<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Combine. • Combine sets. • Demonstrate the concept of addition. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain repeated addition. • Represent repeated addition with a model. • Solve repeated addition problems. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of multiplication. • Explain multiplication problems. • Explain product. <p>Target:</p> <ul style="list-style-type: none"> • Recognize exponents. <p>Successor:</p> <ul style="list-style-type: none"> • Explain product of powers property of exponents. • Apply zero exponent property. • Explain power of product property of exponents. • Explain quotient of powers property of exponents.

8.EE1.A.2	<p>Investigate concepts of square and cube roots.</p> <ol style="list-style-type: none"> Solve equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of perfect squares less than or equal to 625 and cube roots of perfect cubes less than or equal to 1000. Recognize that square roots of non-perfect squares are irrational. 	EE.8.EE.2	Identify a geometric sequence of whole numbers with a whole number common ratio.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Classify. Contrast object. Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize symbolic patterns. Recognize sequence. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize shrinking patterns. Recognize growing patterns. <p>Target:</p> <ul style="list-style-type: none"> Recognize geometric sequences. <p>Successor:</p> <ul style="list-style-type: none"> Recognize the recursive rule for geometric sequences.
8.EE1.A.3	Express very large and very small quantities in scientific notation and approximate how many times larger one is than the other.	EE.8.EE.3-4	Compose and decompose whole numbers up to 999.	This essential element is not currently being assessed.
8.EE1.A.4	<p>Use scientific notation to solve problems.</p> <ol style="list-style-type: none"> Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurement of very large or very small quantities. 			

Understand the connection between proportional relationships, lines and linear equations.		Understand the connection between proportional relationships, lines, and linear equations.		
8.EE1.B.1	Graph proportional relationships. a) Interpret the unit rate as the slope of the graph. b) Compare two different proportional relationships.	EE.8.EE.5-6	Graph a simple ratio by connecting the origin to a point representing the ration in the form of y/x . <i>for example, when given a ratio in standard form (2:1), convert to 2/1, and plot the point (1, 2)</i>	This essential element is not currently being assessed.
8.EE1.B.2	Apply concepts of slope and y-intercept to graphs, equations and proportional relationships. a) Explain why the slope (m) is the same between any two distinct points on a non-vertical line in the Cartesian coordinate plane. b) Derive the equation $y=mx$ for a line through the origin and the equation $y = mx+b$ for a line intercepting the vertical axis at b.			
Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.		Analyze and solve linear equations and pairs of simultaneous linear equations.		
8.EE1.C.1	Solve linear equations and inequalities in one variable. a) Create and identify linear equations with one solution, infinitely many solutions, or no solutions. b) Solve linear equations and inequalities with rational number coefficients, including equations and inequalities whose solution require expanding expressions using the distributive property and combining like terms.	EE.8.EE.7	Solve simple algebraic equations with one variable using addition and subtraction.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Combine sets. Partition sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Demonstrate the concept of addition. Demonstrate the concept of subtraction. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Determine the unknown in an addition equation. Determine the unknown in a subtraction equation. <p>Target:</p> <ul style="list-style-type: none"> Solve linear equations in one variable. <p>Successor:</p> <ul style="list-style-type: none"> Solve linear inequalities in 1 variable.

8.EE.C.2	<p>Analyze and solve systems of linear equations.</p> <ul style="list-style-type: none"> a) Graph systems of linear equations and recognize the intersection as the solution to the system. b) Explain why solution(s) to a system of two linear equations in two variables correspond to point(s) of intersection of the graphs. c) Explain why systems of linear equations can have one solution, no solution or infinitely many solutions. d) Solve systems of two linear equations. 	Not applicable.	Not applicable.	Not applicable.
Understand congruence and similarity using physical models, transparencies, or geometry software.		Understand congruence and similarity using physical models, transparencies, or geometry software.		
8.GM.A.1	<p>Verify experimentally the congruence properties of rigid transformations.</p> <ul style="list-style-type: none"> a) Verify that angle measure, betweenness, collinearity and distance are preserved under rigid transformations. b) Investigate if orientation is preserved under rigid transformations. 	EE.8.G.1	Recognize translations, rotations, and reflections of shapes.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize the defining attributes of a shape. • Recognize the non-defining attributes of a shape. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Explain transformations. <p>Target:</p> <ul style="list-style-type: none"> • Recognize translation. • Recognize reflection. • Recognize rotation. <p>Successor:</p> <ul style="list-style-type: none"> • Explain the properties of lines and line segments in transformations. • Explain the properties of angles in transformations. • Explain the properties of parallel lines in transformations.

8.GM.A.2	<p>Understand that two-dimensional figures are congruent if a series of rigid transformations can be performed to map the pre-image of the image.</p> <p>a) Describe a possible sequence of rigid transformations between two congruent figures.</p>	EE.8.G.2	Identify shapes that are congruent.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Recognize same. • Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Match the same two-dimensional shape with same size and same orientation. • Match the same two-dimensional shape with different sizes and same orientation. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Describe attributes of shapes. • Analyze shapes to identify common attributes. • Explain attribute relationships between shapes. <p>Target:</p> <ul style="list-style-type: none"> • Recognize congruent figures. <p>Successor:</p> <ul style="list-style-type: none"> • Explain the relationship between congruent figures and transformation. • Use a sequence of transformations to describe congruence of 2 given figures.
8.GM.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	Not applicable.	Not applicable.	Not applicable.

8.GM.A.4	<p>Understand that two-dimensional figures are similar if a series of transformations (rotations, reflections, translations, and dilations) can be performed to map the pre-image to the image.</p> <p>a) Describe a possible sequence of transformations between two similar figures.</p>	EE.8.G.4	Identify similar shapes with and without rotation.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize same. Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Match the same three-dimensional shapes with different size and same orientation. Match the same two-dimensional shapes with different size and same orientation. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize similar figures. Recognize rotation. <p>Target:</p> <ul style="list-style-type: none"> Explain the relationship between similar figures and transformation. <p>Successor:</p> <ul style="list-style-type: none"> Use a sequence of transformations to describe similarity of 2 given figures.
8.GM.A.5	<p>Explore angle relationships and establish informal arguments.</p> <p>a) Derive the sum of the interior angles of a triangle.</p> <p>b) Explore the relationship between the interior and exterior angles of a triangle.</p> <p>c) Construct and explore the angles created when parallel lines are cut by a transversal.</p> <p>d) Use the properties of similar figures to solve problems.</p>	EE.8.G.5	Compare any angle to a right angle, and describe the angle as greater than, less than, or congruent to a right angle.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize angle. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize obtuse angles. Recognize acute angles. Recognize right angles. <p>Target:</p> <ul style="list-style-type: none"> Compare angles to a right angle. <p>Successor:</p> <ul style="list-style-type: none"> Explain complementary angles.
Understand and apply the Pythagorean Theorem.		Understand and apply the Pythagorean Theorem.		
8.GM.B.1	Use models to demonstrate a proof of the Pythagorean Theorem and its converse.	Not applicable.	Not applicable.	Not applicable.

8.GM.B.2	Use the Pythagorean Theorem to determine unknown side lengths in right triangles in problems in two- and three-dimensional contexts.	Not applicable.	Not applicable.	Not applicable.
8.GM.B.3	Use the Pythagorean Theorem to find the distance between points in a Cartesian coordinate system.	Not applicable.	Not applicable.	Not applicable.
Solve problems involving volumes of cones, pyramids, and spheres.		Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.		
8.GM.C.1	<p>Solve problems involving surface area and volume.</p> <p>a) Understand the concept of surface area and find surface area of pyramids.</p> <p>b) Understand the concept of volume and find the volume of pyramids, cones, and spheres.</p>	EE.8.G.9	Use the formulas for perimeter, area, and volume to solve real-world and mathematical problems (limited to perimeter and area of rectangles and volume of rectangular prisms).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize measureable attributes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain volume. Explain area. Explain length. Explain perimeter. <p>Target:</p> <ul style="list-style-type: none"> Calculate volume of right rectangular prisms with formula. Calculate area for rectangles with formula. Calculate the perimeter of parallelograms with formula. <p>Successor:</p> <ul style="list-style-type: none"> Solve word problems involving volume of rectangular prisms. Solve word problems involving area of rectangles. Solve word problems involving perimeter of polygons.

Investigate patterns of association in bivariate data.		Investigate patterns of association in bivariate data.		
8.DSP.A.1	Construct and interpret scatter plots of bivariate measurement data to investigate patterns of association between two quantities.	Not applicable.	Not applicable.	Not applicable.
8.DSP.A.2	Generate and use a trend line for bivariate data, and informally assess the fit of the line.	Not applicable.	Not applicable.	Not applicable.
8.DSP.A.3	Interpret the parameters of a linear model of bivariate measurement data to solve problems.	Not applicable.	Not applicable.	Not applicable.

<p>8.DSP.A.4</p>	<p>Understand the patterns of association in bivariate categorical data displayed in a two-way table.</p> <ul style="list-style-type: none"> a) Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. b) Use relative frequencies calculated for rows or columns to describe possible association between the two variables. 	<p>EE.8.SP.4</p>	<p>Construct a graph or table from given categorical data, and compare data categorized in the graph or table.</p>	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Classify. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize the structure of a bar graph. • Recognize the structure of a picture graph. • Recognize the structure of a line plot (dot plot). • Recognize the structure of tally chart. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Use bar graphs to read the data. • Use picture graphs to read the data. • Use line plots (dot plots) to read the data. • Use tally charts to read the data. <p>Target:</p> <ul style="list-style-type: none"> • Use graphs to read between the data. • Use tally chart to read between the data. • Represent data using bar graph. • Represent data using picture graph. • Represent data using line plot (dot plot). • Represent data using tally charts. <p>Successor:</p> <ul style="list-style-type: none"> • Use graphs to read beyond the data. • Use tally charts to read beyond the data.
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Define, evaluate and compare functions.		Define, evaluate and compare functions.	
8.F.A.1	<p>Explore the concept of functions (The use of function notation is not required.).</p> <ol style="list-style-type: none"> Understand that a function assigns to each input exactly one output. Determine if a relation is a function. Graph a function. 	<p>EE.8.F.1-3</p> <p>Given a function table containing at least 2 complete ordered pairs, identify a missing number that completes another ordered pair (limited to linear functions).</p>	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Arrange objects in pairs. Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize growing patterns. Recognize shrinking patterns. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Extend a symbolic pattern by applying the rule. Explain coordinate pairs (ordered pairs). <p>Target:</p> <ul style="list-style-type: none"> Generate ordered pairs from 2 distinct numerical patterns. <p>Successor:</p> <ul style="list-style-type: none"> Recognize covariation. Recognize correspondence (function).
8.F.A.2	<p>Compare characteristics of two functions each represented in a different way.</p>		
8.F.A.3	<p>Investigate the differences between linear and nonlinear functions.</p> <ol style="list-style-type: none"> Interpret the equation $y = mx + b$ as defining a linear function, whose parameters are the slope (m) and the y-intercept (b). Recognize that the graph of a linear function has a constant rate of change. Give examples of nonlinear functions. 		

Use functions to model relationships between quantities.		Use functions to model relationships between quantities.		
8.F.B.1	<p>Use functions to model linear relationships between quantities.</p> <ol style="list-style-type: none"> Explain the parameters of a linear function based on the context of a problem. Determine the parameters of a linear function. Determine the x-intercept of a linear function. 	EE.8.F.4	Determine the values or rule of a function using a graph or a table.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Arrange objects in pairs. Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Generate ordered pairs from 2 distinct numerical patterns. Extend a symbolic pattern by applying the rule. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize direction of covariation. Recognize covariation. <p>Target:</p> <ul style="list-style-type: none"> Describe the function rule from the list of ordered pairs given in a table. Describe the function rule from a given graph. <p>Successor:</p> <ul style="list-style-type: none"> Recognize function.
8.F.B.2	Describe the functional relationship between two quantities from a graph or a verbal description.	EE.8.F.5	Describe how a graph represents a relationship between two quantities.	This essential element is not currently being assessed.

Algebra 1

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Algebra 1: Essential Elements
Extend and use properties of rational exponents.		Extend the properties of exponents to rational exponents.		
A1.NQ.A.1	Explain how the meaning of rational exponents extends from the properties of integer exponents.	EE.N-RN.1	Determine the value of a quantity that is squared or cubed.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Combine. Combine sets. Demonstrate the concept of addition. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Explain repeated addition. Represent repeated addition with a model. Solve repeated addition problems. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain product. Explain multiplication problems. Demonstrate the concept of multiplication. <p>Target:</p> <ul style="list-style-type: none"> Evaluate expressions with whole number exponents. <p>Successor:</p> <ul style="list-style-type: none"> Explain perfect cubes. Explain perfect squares.
A1.NQ.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents (Limit to rational exponents with a numerator of 1).	Not applicable.	Not applicable.	Not applicable.

Use units to solve problems.		Reason quantitatively, and use units to solve problems.		
A1.NQ.B.1	Use units of measure as a way to understand and solve problems involving quantities. <ul style="list-style-type: none"> a) Identify, label, and use appropriate units of measure within a problem. b) Convert units and rates. c) Use units within problems. d) Choose and interpret the scale and the origin in graphs and data displays. 	EE.N-Q.1-3	Express quantities to the appropriate precision of measurement.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> ● Use perceptual subitizing. <p>Distal Precursor:</p> <ul style="list-style-type: none"> ● Round decimals to any place. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> ● Solve word problems involving multiplication with rational numbers. ● Solve word problems involving subtraction with rational numbers. ● Solve word problems involving addition with rational numbers. <p>Target:</p> <ul style="list-style-type: none"> ● Express numerical answers with a degree of precision appropriate for the problem context. <p>Successor:</p> <ul style="list-style-type: none"> ● Solve multi-step problems with rational numbers.
A1.NQ.B.2	Define and use appropriate quantities for representing a given context or problem.			
A1.NQ.B.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.			

Interpret and use structure.		Interpret the structure of expressions.		
A1.SSE.A.1	Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.	EE.A.SSE.1	Identify an algebraic expression involving one arithmetic operation to represent a real-world problem.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Combine sets. Partition sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Represent subtraction with equations. Represent addition with equations. Represent multiplication with equations. Represent division with equations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Represent the unknown in an equation. Represent expressions with variables. <p>Target:</p> <ul style="list-style-type: none"> Represent real-world problems as equations. Represent real-world problems as expressions. <p>Successor:</p> <ul style="list-style-type: none"> Solve real-world problems using equations with non-negative rational numbers.
A1.SSE.A.2	Analyze the structure of polynomials to create equivalent expressions or equations.	Not applicable.	Not applicable.	Not applicable.

A1.SSE.A.3	<p>Choose and produce equivalent forms of a quadratic expression or equations to reveal and explain properties.</p> <p>a) Find the zeros of a quadratic function by rewriting it in factored form.</p> <p>b) Find the maximum or minimum value of a quadratic function by completing the square.</p>	EE.A.SSE.3	Solve simple algebraic equations with one variable using multiplication and division.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Partition sets. • Combine sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Demonstrate the concept of division. • Demonstrate the concept of multiplication. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Determine the unknown in a division equation. • Determine the unknown in a multiplication equation. <p>Target:</p> <ul style="list-style-type: none"> • Solve linear equations in one variable. • Solve linear equations in 1 variable with rational number coefficients. <p>Successor:</p> <ul style="list-style-type: none"> • Solve linear inequalities in 1 variable.
Create equations that describe linear, quadratic, and exponential relationships.		Create equations that describe numbers or relationships.		
A1.CED.A.1	Create equations and inequalities in one variable, and use them to model and/or solve problems.	EE.A-CED.1	Create an equation involving one operation with one variable, and use it to solve a real-world problem.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Combine sets. • Partition sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Represent multiplication with equations. • Represent division with equations. • Represent subtraction with equations. • Represent addition with equations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Represent expressions with variables. • Represent the unknown in an equation. <p>Target:</p> <ul style="list-style-type: none"> • Solve real-world problems using equations with non-negative rational numbers. • Represent real-world problems as equations. <p>Successor:</p> <ul style="list-style-type: none"> • Solve rational equations in 1 variable.

A1.CED.A.2	Create and graph linear, quadratic, and exponential equations in two variables.	EE.A-CED.2-4	Solve one-step inequalities.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Partition sets. • Combine sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Represent division with equations. • Represent subtraction with equations. • Represent addition with equations. • Represent multiplication with equations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Solve linear equalities in one variable. <p>Target:</p> <ul style="list-style-type: none"> • Solve linear inequalities in 1 variable. • Represent solutions of inequalities on a number line. <p>Successor:</p> <ul style="list-style-type: none"> • Explain solution to a linear inequality in one variable.
A1.CED.A.3	Represent constraints by equations or inequalities and by systems of equations or inequalities, and interpret the data points as a solution or non-solution in a modeling context.			
A1.CED.A.4	Solve literal equations and formulas for a specified variable that highlights a quantity of interest.			
Understand solving equations as a process, and solve equations and inequalities in one variable.		Understand solving equations as a process of reasoning, and explain the reasoning.		
A1.REI.A.1	Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.	Not applicable.	Not applicable.	Not applicable.
A1.REI.A.2	<p>Solve problems involving quadratic equations.</p> <ul style="list-style-type: none"> a) Use the method of completing the square to create an equivalent quadratic equation. b) Derive the quadratic formula. c) Analyze different methods of solving quadratic equations. 	Not applicable.	Not applicable.	Not applicable.
Solve systems of equations.		Solve systems of equations.		
A1.REI.B.1	Solve a system of linear equations algebraically and/or graphically.	Not applicable.	Not applicable.	Not applicable.
A1.REI.B.2	Solve a system consisting of a linear equation and a quadratic equation algebraically and/or graphically.	Not applicable.	Not applicable.	Not applicable.

A1.REI.B.3	Justify that the technique of linear combination produces an equivalent system of equations.	Not applicable.	Not applicable.	Not applicable.
Represent and solve linear and exponential equations and inequalities graphically.		Represent and solve equations and inequalities graphically.		
A1.REI.C.1	Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.	EE.A-REI.10-12	Interpret the meaning of a point on the graph of a line. <i>For example, on a graph of pizza purchases, trace the graph to a point, and tell the number of pizzas purchased and the total cost of the pizzas.</i>	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Arrange objects in pairs. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain coordinate pairs (ordered pairs). • Explain x-coordinate. • Explain y-coordinate. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize covariation. • Recognize direction of covariation. • Describe rate of change in a graph. <p>Target:</p> <ul style="list-style-type: none"> • Analyze linear function graphs. • Interpret a point on the graph of a linear function. <p>Successor:</p> <ul style="list-style-type: none"> • Solve real-world problems by interpreting linear function graphs.
A1.REI.C.2	Graph the solution to a linear inequality in two variables.			
A1.REI.C.3	Solve problems involving a system of linear inequalities.			
Perform operations on polynomials.		Perform arithmetic operations on polynomials.		
A1.APR.A.1	Add, subtract, and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations.	Not applicable.	Not applicable.	Not applicable.
A1.APR.A.2	Divide polynomials by monomials.	Not applicable.	Not applicable.	Not applicable.

Understand the concept of a function and use function notation.		Understand the concept of a function and use function notation.		
A1.IF.A.1	<p>Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range.</p> <p>a) Represent a function using function notation.</p> <p>Understand that the graph of a function labeled f is the set of all ordered pairs (x,y) that satisfy the equation $y = f(x)$</p>	EE.F-IF.1-3	Use the concept of function to solve problems.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Order objects. • Arrange objects in pairs. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain x-coordinate. • Explain y-coordinate. • Explain coordinate pairs (ordered pairs). <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Describe the rate of change in a table. • Describe rate of change in a graph. <p>Target:</p> <ul style="list-style-type: none"> • Solve real-world problems by interpreting linear function graphs. • Solve real-world problems by interpreting linear function tables. <p>Successor:</p> <ul style="list-style-type: none"> • Use graphs to read beyond the data. • Use tables to predict function values.
A1.IF.A.2	Use function notation to evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.			

Interpret linear, quadratic, and exponential functions in terms of the context.		Interpret functions that arise in applications in terms of the context.		
A1.IF.B.1	Using tables, graphs, and verbal descriptions, interpret key characteristics of a function that model the relationship between two quantities.	EE.F-IF.4-6	Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Arrange objects in pairs. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain coordinate pairs (ordered pairs). • Explain x-coordinate. • Explain y-coordinate. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize covariation. • Recognize direction of covariation. • Describe rate of change in a graph. <p>Target:</p> <ul style="list-style-type: none"> • Compare two functions with different rate of change. • Analyze linear function graphs. <p>Successor:</p> <ul style="list-style-type: none"> • Solve real-world problems by interpreting linear function graphs. • Compare properties of 2 functions represented in the same way.
A1.IF.B.2	Relate the domain and range of a function to its graph, and where applicable, to the quantitative relationship it describes.			
A1.IF.B.3	Determine the average rate of change of a function over a specified interval and interpret the meaning.			
A1.IF.B.4	Interpret the parameters of a linear or exponential function in terms of the context.	Not applicable.	Not applicable.	Not applicable.
Analyze linear, quadratic, and exponential functions using different representations.		Analyze functions using different representations.		
A1.IF.C.1	Graph functions expressed symbolically and identify and interpret key features of the graph.	Not applicable.	Not applicable.	Not applicable.
A1.IF.C.2	Translate between different but equivalent forms of a function to reveal and explain properties of the function and interpret these in terms of a context.	Not applicable.	Not applicable.	Not applicable.
A1.IF.C.3	Compare the properties of two functions given different representations.	Not applicable.	Not applicable.	Not applicable.

Build new functions from existing functions (limited to linear, quadratic, and exponential).		Build new functions from existing functions.		
A1.BF.A.1	Analyze the effects of translations and scale changes on functions.	Not applicable.	Not applicable.	Not applicable.
Construct and compare linear, quadratic, and exponential models and solve problems.		Construct and compare linear, quadratic, and exponential models, and solve problems.		
A1.LQE.A.1	<p>Distinguish between situations that can be modeled with linear or exponential functions.</p> <p>a) Determine that linear functions change by equal differences over equal intervals.</p> <p>b) Recognize exponential situations in which a quantity grows or decays by a constant percent rate per unit interval.</p>	EE.F-LE.1-3	Model a simple linear function such as $y = mx$ to show that these functions increase by equal amounts over equal intervals.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Arrange objects in pairs. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain x-coordinate. • Explain y-coordinate. • Explain coordinate pairs (ordered pairs) <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize covariation. • Recognize direction of covariation. • Determine slope based on coordinate pairs. <p>Target:</p> <ul style="list-style-type: none"> • Explain average rate of change. • Determine rate of change of linear functions. <p>Successor:</p> <ul style="list-style-type: none"> • Recognize intervals where function is increasing. • Recognize intervals where function is decreasing. • Estimate average rate of change given graph.

A1.LQE.A.2	Describe, using graphs and tables, that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.	EE.F-BF.1	Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Order objects. • Arrange objects in pairs. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain y-coordinate. • Explain coordinate pairs (ordered pairs). • Explain x-coordinate. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize covariation. • Recognize direction of covariation. • Describe rate of change in a graph. <p>Target:</p> <ul style="list-style-type: none"> • Represent real-world problems as graphs. <p>Successor:</p> <ul style="list-style-type: none"> • Solve real-world problems by interpreting linear function graphs.
A1.LQE.A.3	Construct linear, quadratic, and exponential equations given graphs, verbal descriptions, or tables.			
Use arithmetic and geometric sequences.		Build a function that models a relationship between two quantities.		
A1.LQE.B.1	Write arithmetic and geometric sequences in recursive and explicit forms, and use them to model situations and translate between the two forms.	EE.F-BF.2	Determine an arithmetic sequence with whole numbers when provided a recursive rule.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Classify. • Contrast objects. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize symbolic patterns. • Recognize sequence. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize arithmetic sequences. • Recognize the recursive rule for arithmetic sequences. <p>Target:</p> <ul style="list-style-type: none"> • Extend an arithmetic sequence by applying the recursive rule. <p>Successor:</p> <ul style="list-style-type: none"> • Determine the term in an arithmetic sequence given the nth term formula.

A1.LQE.B.2	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the set of integers.	EE.F-IF.1-3	Use the concept of function to solve problems.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Order objects. • Arrange objects in pairs. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain x-coordinate. • Explain y-coordinate. • Explain coordinate pairs (ordered pairs) <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Describe the rate of change in a table. • Describe the rate of change in a graph. <p>Target:</p> <ul style="list-style-type: none"> • Solve real-world problems by interpreting linear function graphs. • Solve real-world problems by interpreting linear function tables. <p>Successor:</p> <ul style="list-style-type: none"> • Use graphs to read beyond the data. • Use tables to predict function values.
A1.LQE.B.3	Find the terms of sequences given an explicit or recursive formula.	Not applicable.	Not applicable.	Not applicable.

Summarize, represent, and interpret data		Summarize, represent, and interpret data on a single count or measurement variable.		
A1.DS.A.1	Analyze and interpret graphical displays of data.	EE.S-ID.1-2	Given data, construct a simple graph (line, pie, bar, or picture) or table, and interpret the data.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Classify. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize the structure of a bar graph. • Recognize the structure of a picture graph. • Recognize the structure of a line graph. • Recognize the structure of a pie chart. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Use bar graphs to read the data. • Use picture graphs to read the data. • Use line graphs to read the data. • Use pie charts to read the data. <p>Target:</p> <ul style="list-style-type: none"> • Use graphs to read beyond the data. • Represent data using bar graph. • Represent data using picture graph. • Represent data using line graph. • Represent data using pie charts. <p>Successor:</p> <ul style="list-style-type: none"> • Use graphs to read beyond the data.
A1.DS.A.2	Use statistics appropriate to the shape of the data distribution to compare center and spread of two or more different data sets.			

A1.DS.A.3	Interpret differences in shape, center and spread in the context of the data sets, accounting for possible effects of outliers.	EE.S-ID.3	Interpret general trends on a graph or chart.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> ● Order objects. ● Classify. <p>Distal Precursor:</p> <ul style="list-style-type: none"> ● Recognize the structure of a bar graph. ● Recognize the structure of a picture graph. ● Recognize the structure of a line plot (dot plot). ● Recognize the structure of a pie chart. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> ● Recognize symmetric distribution. ● Recognize outliers. ● Recognize peaks in data distribution. ● Recognize variability in a data set. <p>Target:</p> <ul style="list-style-type: none"> ● Analyze overall shape of the data distribution. ● Draw inferences by interpreting general trends on a graph or chart. <p>Successor:</p> <ul style="list-style-type: none"> ● Draw inferences by comparing two data sets.
A1.DS.A.4	<p>Summarize data in two-way frequency tables.</p> <ul style="list-style-type: none"> a) Interpret relative frequencies in the context of the data. b) Recognize possible associations and trends in the data. 	Not applicable.	Not applicable.	Not applicable.

A1.DS.A.5	<p>Construct a scatter plot of bivariate quantitative data describing how the variables are related; determine and use a function that models the relationship.</p> <ul style="list-style-type: none">a) Construct a linear function to model bivariate data represented on a scatter plot that minimizes residuals.b) Construct an exponential function to model bivariate data represented on a scatter plot that minimizes residuals.	Not applicable.	Not applicable.	Not applicable.
A1.DS.A.6	<p>Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.</p>	Not applicable.	Not applicable.	Not applicable.
A1.DS.A.7	<p>Determine and interpret the correlation coefficient for a linear association.</p>	Not applicable.	Not applicable.	Not applicable.
A1.DS.A.8	<p>Distinguish between correlation and causation.</p>	Not applicable.	Not applicable.	Not applicable.

Geometry

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Geometry: Essential Elements
Experiment with transformations in the plane.		Experiment with transformations in the plane.		
G.CO.A.1	Define angle, circle, perpendicular line, parallel line, line segment, and ray based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	EE.G-CO.1	Know the attributes of perpendicular lines, parallel lines, and line segments, angles, and circles.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> ● Recognize same. ● Recognize different. ● Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> ● Recognize point. ● Recognize ray. ● Recognize angle. ● Recognize right angles. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> ● Recognize circles. ● Recognize parallel lines/line segments. ● Recognize perpendicular lines/line segments. <p>Target:</p> <ul style="list-style-type: none"> ● Define circle. ● Explain angle. ● Explain perpendicular lines/line segments. ● Explain parallel lines/line segments. <p>Successor:</p> <ul style="list-style-type: none"> ● Explain straight angles. ● Explain adjacent angles. ● Explain vertical angles.
G.CO.A.2	Represent transformations in the plane, and describe them as functions that take points in the plane as inputs and give other points as outputs.	Not applicable.	Not applicable.	Not applicable.

G.CO.A.3	Describe the rotational symmetry and lines of symmetry of two-dimensional figures.	Not applicable.	Not applicable.	Not applicable.
G.CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	EE.G-CO.4-5	Given a geometric figure and a rotation, reflection, or translation of that figure, identify the components of the two figures that are congruent.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize same. Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Match the same three-dimensional shapes with same size and different orientation. Match the same two-dimensional shape with the same sizes and different orientations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize translation. Recognize rotation. Recognize reflection. Recognize congruent figures. <p>Target:</p> <ul style="list-style-type: none"> Explain the relationship between congruent figures and transformation. <p>Successor:</p> <ul style="list-style-type: none"> Use a sequence of transformations to describe congruence of 2 given figures.
G.CO.A.5	Demonstrate the ability to rotate, reflect, or translate a figure, and determine a possible sequence of transformations between two congruent figures.			

Understand congruence in terms of rigid motions.		Understand congruence in terms of rigid motions.		
G.CO.B.6	Develop the definition of congruence in terms of rigid motions.	EE.G-CO.6-8	Identify corresponding congruent and similar parts of shapes.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize same. Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Match the same two-dimensional shape with different sizes and same orientation. Match the same two-dimensional shape with same size and same orientation. Match the same three-dimensional shape with same size and same orientation. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize congruent figures. Recognize similar figures. <p>Target:</p> <ul style="list-style-type: none"> Explain congruent figures. Explain similar figures. <p>Successor:</p> <ul style="list-style-type: none"> Explain the relationship between congruent figures and transformation. Explain the relationship between similar figures and transformation.
G.CO.B.7	Develop the criteria for triangle congruence from the definition of congruence in terms of rigid motions.			
Prove geometric theorems.		Prove geometric theorems.		
G.CO.C.8	Prove theorems about lines and angles.	Not applicable.	Not applicable.	Not applicable.
G.CO.C.9	Prove theorems about triangles.	Not applicable.	Not applicable.	Not applicable.
G.CO.C.10	Prove theorems about polygons.	Not applicable.	Not applicable.	Not applicable.

Make geometric constructions.		Make geometric constructions.		
G.CO.D.11	Construct geometric figures using various tools and methods.	Not applicable.	Not applicable.	Not applicable.
Understand similarity in terms of similarity transformations.		Understand similarity in terms of similarity transformations.		
G.SRT.A.1	Construct and analyze scale changes of geometric figures.	Not applicable.	Not applicable.	Not applicable.
G.SRT.A.2	Use the definition of similarity to decide if figures are similar and to solve problems involving similar figures.	Not applicable.	Not applicable.	Not applicable.
G.SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	Not applicable.	Not applicable.	Not applicable.
Prove theorems involving similarity		Prove theorems involving similarity		
G.SRT.B.4	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Not applicable.	Not applicable.	Not applicable.
Define trigonometric ratios, and solve problems involving right triangles.		Define trigonometric ratios, and solve problems involving right triangles.		
G.SRT.C.6	Understand that side ratios in right triangles define the trigonometric ratios for acute angles.	Not applicable.	Not applicable.	Not applicable.
G.SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.	Not applicable.	Not applicable.	Not applicable.
G.SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles.	Not applicable.	Not applicable.	Not applicable.

G.SRT.C.9	Derive the formula $A = \frac{1}{2}ab \sin(c)$ for the area of a triangle.	Not applicable.	Not applicable.	Not applicable.
Understand and apply theorems about circles.		Understand and apply theorems about circles.		
G.C.A.1	Prove that all circles are similar using similarity transformations.	Not applicable.	Not applicable.	Not applicable.
G.C.A.2	Identify and describe relationships among inscribed angles, radii, and chords of circles.	Not applicable.	Not applicable.	Not applicable.
G.C.A.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	Not applicable.	Not applicable.	Not applicable.
Find arc lengths and areas of sectors of circles.		Find arc lengths and areas of sectors of circles.		
G.C.B.4	Derive the formula for the length of an arc of a circle.	Not applicable.	Not applicable.	Not applicable.
G.C.B.5	Derive the formula for the area of a sector of a circle.	Not applicable.	Not applicable.	Not applicable.
Translate between the geometric description and the equation for a conic section.		Translate between the geometric description and the equation for a conic section.		
G.GPE.A.1	Derive the equation of a circle.	Not applicable.	Not applicable.	Not applicable.
G.GPE.A.2	Derive the equation of a parabola given a focus and directrix.	Not applicable.	Not applicable.	Not applicable.

Use coordinates to prove geometric theorems algebraically.		Use coordinates to prove simple geometric theorems algebraically.		
G.GPE.B.3	Use coordinates to prove geometric theorems algebraically.	Not applicable.	Not applicable.	Not applicable.
G.GPE.B.4	Prove the slope criteria for parallel and perpendicular lines and use them to solve problems.	Not applicable.	Not applicable.	Not applicable.
G.GPE.B.5	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	Not applicable.	Not applicable.	Not applicable.
G.GPE.B.6	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	EE.G-GPE.7	Find perimeters and areas of squares and rectangles to solve real-world problems.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize measurable attributes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Calculate perimeter by adding all the side lengths. Calculate area by counting unit squares. <p>Target:</p> <ul style="list-style-type: none"> Solve world problems involving perimeter of polygons. Solve word problems involving area of rectangles. <p>Successor:</p> <ul style="list-style-type: none"> Mathematize contextual situation involving perimeter of polygons. Mathematize contextual situations involving area of polygons.

Explain volume formulas and use them to solve problems.		Explain volume formulas and use them to solve problems.		
G.GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.	EE.G-GMD.1-3	Make a prediction about the volume of a container, the area of a figure, and the perimeter of a figure, and then test the prediction using formulas or models.	This essential element is not currently being assessed.
G.GMD.A.2	Use volume formulas for cylinders, pyramids, cones, spheres, and composite figures to solve problems.	Not applicable.	Not applicable.	Not applicable.
Visualize relationships between two-dimensional and three-dimensional objects.		Visualize relationships between two-dimensional and three-dimensional objects.		
G.GMD.B.3	Identify the shapes of two-dimensional cross-sections of three-dimensional objects.	EE.G-GMD.4	Identify the shapes of two-dimensional cross – sections of three-dimensional objects.	This essential element is not currently being assessed.
G.GMD.B.4	Identify three-dimensional objects generated by transformations of two-dimensional objects.			

Apply geometric concepts in modeling situations.		Apply geometric concepts in modeling situations.		
G.MG.A.1	Use geometric shapes, their measures and their properties to describe objects.	EE.G-MG.1-3	Use properties of geometric shapes to describe real-life objects.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize same. Recognize different. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Match the same two-dimensional shape with same size and same orientation. Match the same two-dimensional shape with different size and same orientation. Match the same three-dimensional shapes with same size and same orientation. Match the same three-dimensional shapes with same size and same orientation. Match the same three-dimensional shapes with different size and same orientation. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Recognize squares, circles, triangles, rectangles, cubes, cones, cylinders, and/or spheres. <p>Target:</p> <ul style="list-style-type: none"> Use geometric shapes to describe objects. <p>Successor:</p> <ul style="list-style-type: none"> Use geometric methods to solve design problems.
G.MG.A.2	Apply concepts of density based on area and volume in modeling situations.			
G.MG.A.3	Apply geometric methods to solve design mathematical modeling problems.			

Understand independence and conditional probability and use them to interpret data.		Understand independence and conditional probability, and use them to interpret data.		
G.CP.A.1	Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections or complements of other events.	EE.S-CP.1-5	Identify when events are independent or dependent.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Compare objects for sameness. • Arrange objects in pairs. • Contrast objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Classify. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize possible outcomes. • Explain simple events. • Recognize impossible outcomes. <p>Target:</p> <ul style="list-style-type: none"> • Determine if 2 events are independent or dependent. <p>Successor:</p> <ul style="list-style-type: none"> • Explain compound events.
G.CP.A.2	Understand the definition of independent events and use it to solve problems.			
G.CP.A.3	Calculate conditional probabilities of events.			
G.CP.A.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.			
G.CP.A.5	Recognize and explain the concepts of conditional probability and independence in a context.			
G.CP.A.6	Apply and interpret the Addition Rule for calculating probabilities.	Not applicable.	Not applicable.	Not applicable.
G.CP.A.7	Apply and interpret the general Multiplication Rule in a uniform probability model.	Not applicable.	Not applicable.	Not applicable.
G.CP.A.8	Use permutations and combinations to solve problems.	Not applicable.	Not applicable.	Not applicable.

Algebra 2

MISSOURI LEARNING STANDARDS: GRADE-LEVEL EXPECTATIONS		DLM ESSENTIAL ELEMENTS		DLM LINKAGE LEVELS
CODE	Expectation	Code	Essential Element	Algebra 2: Essential Elements
Extend and use the relationship between rational exponents and radicals.		Extend the properties of exponents to rational exponents.		
A2.NQ.A.1	Extend the system of powers and roots to include rational exponents.	EE.N-RN.1	Determine the value of a quantity that is squared or cubed.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Combine. Combine sets. Demonstrate the concept of addition. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Explain repeated addition. Represent repeated addition with a model. Solve repeated addition problems. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Explain product. Explain multiplication problems. Demonstrate the concept of multiplication. <p>Target:</p> <ul style="list-style-type: none"> Evaluate expressions with whole number exponents. <p>Successor:</p> <ul style="list-style-type: none"> Explain perfect cubes. Explain perfect squares.
A2.NQ.A.2	Create and recognize equivalent expressions involving radical and exponential forms of expressions.	Not applicable.	Not applicable.	Not applicable.
A2.NQ.A.3	Add, subtract, multiply, and divide radical expressions.	Not applicable.	Not applicable.	Not applicable.
A2.NQ.A.4	Solve equations involving rational exponents and/or radicals and identify situations where extraneous solutions may result.	Not applicable.	Not applicable.	Not applicable.

Use complex numbers.		Perform arithmetic operations with complex numbers.		
A2.NQ.B.1	Represent complex numbers.	Not applicable.	Not applicable.	Not applicable.
A2.NQ.B.2	Add, subtract, multiply, and divide complex numbers.	EE.N-CN.2.a	Use the commutative, associative, and distributive properties to add, subtract, and multiply whole numbers.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. Recognize set. Recognize subset. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Combine sets. Demonstrate the concept of addition. Combine. Demonstrate the concept of multiplication. Solve repeated addition problems. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Add 1 and 1. Add 1 to 2, 3, and/or 4. Add within 5. Add within 10. Add within 20. Multiply by 1, 2, 3, 4, 5, and/or 10. <p>Target:</p> <ul style="list-style-type: none"> Apply associative property of addition. Apply commutative property of addition. Apply the commutative property of multiplication. Apply the associative property of multiplication. Apply the distributive property. <p>Successor:</p> <ul style="list-style-type: none"> Explain the associative property of addition. Explain the commutative property of addition. Explain the commutative property of multiplication. Explain the distributive property. Explain the associative property of multiplication.

		EE.N-CN.2.b	Solve real-world problems involving addition and subtraction of decimals, using models when needed.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize set. Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize a unity. Explain ten as a composition of ten ones. Explain place value for ones and tens. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Add 2 decimals with digits in the tenths place. Subtract 2 decimals with digits in the tenths place. <p>Target:</p> <ul style="list-style-type: none"> Solve word problems involving addition with rational numbers. Solve word problems involving subtraction with rational numbers. <p>Successor:</p> <ul style="list-style-type: none"> Solve multi-step problems with rational numbers.
		EE.N-CN.2.c	Solve real-world problems involving multiplication of decimals and whole numbers, using models when needed.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize separateness. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Recognize a unit. Explain place value for ones and tens. Explain ten as a composition of ten ones. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Multiply 2 decimals with digits in the tenths place. <p>Target:</p> <ul style="list-style-type: none"> Solve word problems involving multiplication with rational numbers. <p>Successor:</p> <ul style="list-style-type: none"> Solve multi-step problems with rational numbers.
A2.NQ.B.3	Know and apply the Fundamental Theorem of Algebra.	Not applicable.	Not applicable.	Not applicable.

Define and use logarithms.		Construct and compare linear, quadratic, and exponential models, and solve problems.		
A2.SSE.A.1	Develop the definition of logarithms based on properties of exponents.	Not applicable.	Not applicable.	Not applicable.
A2.SSE.A.2	Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic equations.	Not applicable.	Not applicable.	Not applicable.
A2.SSE.A.3	Use properties of logarithms to solve equations or find equivalent expressions.	Not applicable.	Not applicable.	Not applicable.
A2.SSE.A.4	Understand why logarithmic scales are used, and use them to solve problems.	Not applicable.	Not applicable.	Not applicable.
Solve equations and inequalities.		Create equations that describe numbers or relationships.		
A2.REI.A.1	Create and solve equations and inequalities including those that involve absolute value.	EE.A-CED.1	Create an equation involving one operation with one variable, and use it to solve a real-world problem.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Combine sets. Partition sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Represent multiplication with equations. Represent division with equations. Represent subtraction with equations. Represent addition with equations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Represent expressions with variables. Represent the unknown in an equation. <p>Target:</p> <ul style="list-style-type: none"> Solve real-world problems using equations with non-negative rational numbers. Represent real-world problems as equations. <p>Successor:</p> <ul style="list-style-type: none"> Solve rational equations in 1 variable.
A2.REI.A.2	Solve rational equations where numerators and denominators are polynomials and where extraneous solutions may result.			

Solve general systems of equations and inequalities.		Solve systems of equations.		
A2.REI.B.1	Create and solve systems of equations that may include non-linear equations and inequalities.	Not applicable.	Not applicable.	Not applicable.
Perform operations on polynomials and rational expressions.		Understand the relationship between zeros and factors of polynomials.		
A2.APR.A.1	Extend the knowledge of factoring to include factors with complex coefficients.	Not applicable.	Not applicable.	Not applicable.
A2.APR.A.2	Understand the Remainder Theorem, and use it to solve problems.	Not applicable.	Not applicable.	Not applicable.
A2.APR.A.3	Find the least common multiple of two or more polynomials.	Not applicable.	Not applicable.	Not applicable.
A2.APR.A.4	Add, subtract, multiply, and divide rational expressions.	Not applicable.	Not applicable.	Not applicable.
A2.APR.A.5	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to sketch the function defined by the polynomial.	Not applicable.	Not applicable.	Not applicable.

Use and interpret functions.		Interpret functions that arise in applications in terms of the context.		
A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	EE.F-IF.4-6	Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Arrange objects in pairs. • Order objects. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain coordinate pairs (ordered pairs). • Explain x-coordinate. • Explain y-coordinate. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize covariation. • Recognize direction of covariation. • Describe rate of change in a graph. <p>Target:</p> <ul style="list-style-type: none"> • Compare two functions with different rate of change. • Analyze linear function graphs. <p>Successor:</p> <ul style="list-style-type: none"> • Solve real-world problems by interpreting linear function graphs. • Compare properties of 2 functions represented in the same way.
A2.IF.A.2	Translate between equivalent forms of functions.			

Create new functions from existing functions.		Build a function that models a relationship between two quantities.		
A2.BF.A.1	Create new functions by applying the four arithmetic operations and composition of functions (modifying the domain and range as necessary).	EE.F-BF.1	Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Order objects. • Arrange objects in pairs. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Explain y-coordinate. • Explain coordinate pairs (ordered pairs). • Explain x-coordinate. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize covariation. • Recognize direction of covariation. • Describe rate of change in a graph. <p>Target:</p> <ul style="list-style-type: none"> • Represent real-world problems as graphs. <p>Successor:</p> <ul style="list-style-type: none"> • Solve real-world problems by interpreting linear function graphs.
A2.BF.A.2	Derive inverses of functions, and compose the inverse with the original function to show that the functions are inverses.	Not applicable.	Not applicable.	Not applicable.
A2.BF.A.3	Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections, and dilations (expansions/compressions) for linear, quadratic, cubic, square, and cube root, absolute value, exponential, and logarithmic functions.	Not applicable.	Not applicable.	Not applicable.

Use functions to model real-world problems.		Create equations that describe numbers or relationships.		
A2.FM.A.1	Create functions and use them to solve applications of quadratic and exponential function modeling problems.	EE.A-CED.2-4	Solve one-step inequalities.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Partition sets. • Combine sets. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Represent division with equations. • Represent subtraction with equations. • Represent addition with equations. • Represent multiplication with equations. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Solve linear equalities in one variable. <p>Target:</p> <ul style="list-style-type: none"> • Solve linear inequalities in one variable. • Represent solutions of inequalities on a number line. <p>Successor:</p> <ul style="list-style-type: none"> • Explain solution to a linear inequality in one variable.

Make inferences and justify conclusions.		Make inferences and justify conclusions from sample surveys, experiments, and observational studies.		
A2.DS.A.1	Analyze how random sampling could be used to make inferences about population parameters.	EE.S-IC.1-2	Determine the likelihood of an event occurring when the outcomes are equally likely to occur.	<p>Initial Precursor:</p> <ul style="list-style-type: none"> • Compare objects for sameness. • Arrange objects in pairs. <p>Distal Precursor:</p> <ul style="list-style-type: none"> • Recognize outcomes of an event. • Recognize possible outcomes. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> • Recognize sample space. <p>Target:</p> <ul style="list-style-type: none"> • Determine theoretical probability of a simple event where all outcomes are equally likely. <p>Successor:</p> <ul style="list-style-type: none"> • Determine theoretical probability of simple event where some outcomes are more likely than others.
A2.DS.A.2	Determine whether a specified model is consistent with a given data set.			
A2.DS.A.3	Describe and explain the purposes, relationship to randomization, and differences among sample surveys, experiments, and observational studies.	Not applicable.	Not applicable.	Not applicable.
A2.DS.A.4	Use data from a sample to estimate characteristics of the population and recognize the meaning of the margin of error in these estimates.	Not applicable.	Not applicable.	Not applicable.
A2.DS.A.5	Describe and explain how the relative sizes of a sample and the population affect the margin of error of predictions.	Not applicable.	Not applicable.	Not applicable.
A2.DS.A.6	Analyze decisions and strategies using probability concepts.	Not applicable.	Not applicable.	Not applicable.
A2.DS.A.7	Evaluate reports based on data.	Not applicable.	Not applicable. See EE.S-ID.1-2.	Not applicable.

Fit a data set to a normal distribution.		Summarize, represent, and interpret data on a single count or measurement variable.		
A2.DS.B.8	Know and use the characteristics of normally distributed data sets; predict what percentage of the data will be above or below a given value that is a multiple of standard deviations above or below the mean.	EE.S-ID.4	Calculate the mean of a given data set (limit the number of data points to fewer than five).	<p>Initial Precursor:</p> <ul style="list-style-type: none"> Recognize attribute values. <p>Distal Precursor:</p> <ul style="list-style-type: none"> Classify. <p>Proximal Precursor:</p> <ul style="list-style-type: none"> Summarize data by the number of observations. <p>Target:</p> <ul style="list-style-type: none"> Calculate mean. <p>Successor:</p> <ul style="list-style-type: none"> Summarize data by measurement.
A2.DS.B.9	Fit a data set to a distribution using its mean and standard deviation to determine whether the data is approximately normally distributed.	Not applicable.	Not applicable.	Not applicable.