

**Curriculum Development Course at a Glance
Planning for 4th Grade Mathematics**

Content Area	Mathematics	Grade Level	4 th Grade
Course Name/Course Code			
Standard	Grade Level Expectations (GLE)	GLE Code	
1. Number Sense, Properties, and Operations	1. The decimal number system to the hundredths place describes place value patterns and relationships that are repeated in large and small numbers and forms the foundation for efficient algorithms	MA10-GR.4-S.1-GLE.1	
	2. Different models and representations can be used to compare fractional parts	MA10-GR.4-S.1-GLE.2	
	3. Formulate, represent, and use algorithms to compute with flexibility, accuracy, and efficiency	MA10-GR.4-S.1-GLE.3	
2. Patterns, Functions, and Algebraic Structures	1. Number patterns and relationships can be represented by symbols	MA10-GR.4-S.2-GLE.1	
3. Data Analysis, Statistics, and Probability	1. Visual displays are used to represent data	MA10-GR.4-S.3-GLE.1	
4. Shape, Dimension, and Geometric Relationships	1. Appropriate measurement tools, units, and systems are used to measure different attributes of objects and time	MA10-GR.4-S.4-GLE.1	
	2. Geometric figures in the plane and in space are described and analyzed by their attributes	MA10-GR.4-S.4-GLE.2	
<p>Colorado 21st Century Skills</p> <p>Critical Thinking and Reasoning: <i>Thinking Deeply, Thinking Differently</i></p> <p>Information Literacy: <i>Untangling the Web</i></p> <p>Collaboration: <i>Working Together, Learning Together</i></p> <p>Self-Direction: <i>Own Your Learning</i></p> <p>Invention: <i>Creating Solutions</i></p>		<p>Mathematical Practices:</p> <ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. 	
Unit Titles	Length of Unit/Contact Hours	Unit Number/Sequence	
Shape Up	3 weeks	1	
Operation...What's my Function?	8 weeks	2	
Measurement Madness	4 weeks	3	
Fraction Frenzy	5 weeks	4	
What's My Number	5 weeks	5	

Curriculum Development Overview
Unit Planning for 4th Grade Mathematics

Unit Title	Shape Up		Length of Unit	3 weeks
Focusing Lens(es)	Form and Function	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.4-S.4-GLE.2	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> What would life be like in a two-dimensional world? (MA10-GR.4-S.4-GLE.2-IQ.4) 			
Unit Strands	Shape, Dimension, and Geometric Relationships			
Concepts	Line, Point, line segment, angles (right, acute, obtuse), perpendicular lines, parallel lines, infinite, length, endpoints, rotation, sides, intersect, shape, line symmetry, congruent, partitioning, polygons, classification, categorize, right triangles			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Points, lines, line segments, and rays designate locations in space and provide the building blocks for creating and understanding shapes (MA10-GR.4-S.4-GLE.2-EO.a, b)	What is a line? What is a line segment? What are rays? How are lines, line segments and rays similar? How are they different?	What examples in the real world can we find of lines and line segments?
Lines that point in the same direction and share no points in common (parallel) and lines the share one point in common and form a right angle (perpendicular) determine the classification of many geometric shapes (MA10-GR.4-S.4-GLE.2-EO.a, b)	How are parallel and perpendicular lines related? Why do angles matter when drawing perpendicular lines?	How do people use parallel and perpendicular lines every day?
Most basic geometric shapes possess lines of symmetry that divide the shape into two mirror images (MA10-GR.4-S.4-GLE.2-EO.d)	What is a line of symmetry? What is congruency? How can a mirror help you find lines of symmetry?	Why does a circle have multiple (infinite) lines of symmetry? Where do lines of symmetry appear in nature?
The rotation (or spread) from one ray to another ray sharing the same common endpoint determines the size and classification of an angle (MA10-GR.4-S.4-GLE.2-EO.a, b)	How do you name an angle? What are three types of angles? What is an angle?	How are angles formed? Why is an angle described as a measure of rotation? How do angle sizes change the form of a shape?

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Angles (right, acute, obtuse) facilitate the classification and categorization of shapes (MA10-GR.4-S.4-GLE.2-EO.c)	What is the difference between acute, right and obtuse angles? What is the role of a right angle in classifying triangles? Is a square still a square if it's titled on its side? (MA10-GR.4-S.4-GLE.2-IQ.2)	Why does a square have both perpendicular and parallel lines? How are perpendicular and parallel lines and angles used to classify and categorize shapes? Why is it helpful to classify things like angles or shapes? (MA10-GR.4-S.4-GLE.2-IQ.5)
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Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. (MA10-GR.4-S.4-GLE.2-EO.a) • Identify points, line segments, angles, and perpendicular and parallel lines in two-dimensional figures (MA10-GR.4-S.4-GLE.2-EO.b) • Classify and identify two-dimensional figures according to attributes of line relationships (parallel, perpendicular) or angle size (MA10-GR.4-S.4-GLE.2-EO.c) • Recognize right triangles as a category, and identify right triangles (MA10-GR.4-S.4-GLE.2-EO.c) • Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts • Identify line-symmetric figures and draw lines of symmetry (MA10-GR.4-S.4-GLE.2-EO.d) 	

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i>	
A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>A right triangle is a triangle with one right angle. I know this is a rectangle because it has 4 sides and 4 right angles.</i>
Academic Vocabulary:	Draw, identify, classify, recognize, describe, analyze, determine, category, categorize, construct
Technical Vocabulary:	Point, line, line segment, ray, angle, right, acute, obtuse, parallel, perpendicular, right triangle, symmetry, line of symmetry, two-dimensional, attributes, polygon, rotation, sides, endpoints, vertex, vertices, congruent, infinite

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Unit Title	Operation...What's my Function?		Length of Unit	8 weeks
Focusing Lens(es)	Interpretation Comparison	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.4-S.1-GLE.3 MA10-GR.4-S.2-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> • Why is one neither prime nor composite? (MA10-GR.4-S.2-GLE.1-EO.b) • Why don't we classify decimals or fractions as prime or composite? 			
Unit Strands	Number sense, Properties and Operations, Patterns, Functions and Algebraic Structures, Personal Financial Literacy			
Concepts	factor, whole number, multiplication, division, remainder, product, multiple, natural (counting) numbers, word problems, mental strategies, estimation, reasonableness, unknown, variable, prime, classification, composite, multiplicative comparison, additive comparison, times more, algorithms, equations, distributive property, partial products, partial quotients, rectangular arrays, area models			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Knowledge of factors and multiples allow mathematicians to classify all natural whole numbers greater than one as either prime or composite (MA10-GR.4-S.2-GLE.1-EO.b.i, b.ii, b.iii)	What is a multiple? What is a factor? How can you use factors and multiples to find out if a number is prime or composite? What characteristics can be used to classify numbers into different groups? (MA10-GR.4-S.2-GLE.1-IQ.2)	How does knowledge of factors and multiples help solve multiplication and division problems? Why is every natural number a multiple of each of its factor?
Multiplicative comparison(s) enable the interpretation of (word) problems that involve two quantities in which one is described as a multiple of the other (MA10-GR.4-S.1-GLE.3-EO.b.i, b.ii, b.iii)	How do you write a multiplicative comparison as an equation? How can you determine if a word problem involves a multiplicative or an additive comparison?	How is a multiplicative comparison different from an additive comparison? Why is division generally used to solve multiplicative comparisons and subtraction additive comparisons?
Word problems typically contain unknown quantities (which can be represented by letters when solving) and provide opportunities to strengthen the use of mental strategies and estimation when assessing the reasonableness of their solution(s) (MA10-GR.4-S.1-GLE.3-EO.b.v, b.vi)	What is a variable? What does it mean to estimate? How is rounding used when estimating?	How does estimation support finding more precise solutions? When is the "correct" answer not the most useful answer? (MA10-GR.4-S.1-GLE.3-IQ.3)

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Word problems that involve the division of whole numbers sometimes result in remainders that must be interpreted in order to provide an accurate solution (MA10-GR.4-S.1-GLE.3-EO.b.iv)	What do remainders mean and how are they used in solving word problems? (MA10-GR.4-S.1-GLE.3-IQ.2)	Why are there multiple ways to interpret a remainder?
Algorithms for multiplication of multi-digit numbers require application of the distributive property and the calculation of partial products (visually represented in rectangular arrays/area models) (MA10-GR.4-S.1-GLE.3-EO.a.ii, a.iv)	How can you use an area model to explain multi-digit multiplication? How can you make multiplication of large numbers easy? (MA10-GR.4-S.1-GLE.3-IQ.1)	Why do we break apart multi-digit numbers when multiplying them? How is the concept of place value used when multiplying multi-digit numbers?
Algorithms for division of multi-digit numbers require application of the distributive property and the calculation of partial quotients (visually represented in rectangular arrays/area models) (MA10-GR.4-S.1-GLE.3-EO.a.iii, a.iv)	How can you use an area model to explain multi-digit division? F) How can you make division of large numbers easy? (MA10-GR.4-S.1-GLE.3-IQ.1)	Why do we break apart multi-digit numbers when dividing them? How is the concept of place value used when dividing multi-digit numbers?

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Interpret a multiplication equation as a comparison; represent verbal statements of multiplicative comparisons as multiplication equations (MA10-GR.4-S.1-GLE.3-EO.b.i, b.ii) • Multiply or divide to solve word problems involving multiplicative comparisons using drawings and equations with a symbol for the unknown number to represent the problem (MA10-GR.4-S.1-GLE.3-EO.b.iii) • Distinguish between multiplicative and additive comparisons (MA10-GR.4-S.1-GLE.3-EO.b.iii) • Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted and represent the word problems using equations with a letter standing for the unknown quantity (MA10-GR.4-S.1-GLE.3-EO.b.iv, b.v) • Assess the reasonableness of answers using mental computation and estimation strategies including rounding (MA10-GR.4-S.1-GLE.3-EO.b.vi) • Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations (MA10-GR.4-S.1-GLE.3-EO.a.ii) • Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division (MA10-GR.4-S.1-GLE.3-EO.a.iii) • Illustrate and explain multiplication and division calculation by using equations, rectangular arrays, and/or area models (MA10-GR.4-S.1-GLE.3-EO.a.iv) • Find all factor pairs for a whole number in the range from 1 to 100 (MA10-GR.4-S.2-GLE.1-EO.b.i) • Recognize that a whole is a multiple of each of its factors. (MA10-GR.4-S.2-GLE.1-EO.b.ii) • Determine whether a given whole number in the range 1 to 100 is a multiple of a given one-digit number (MA10-GR.4-S.2-GLE.1-EO.b.iii) • Determine whether a given whole number in the range 1 to 100 is prime or composite (MA10-GR.4-S.2-GLE.1-EO.b.ii) • Use the four operations to analyze the relationship between choice and opportunity cost (MA10-GR.4-S.1-GLE.3-EO.b.vii)* 	

***Denotes connection to Personal Financial Literacy (PFL)**

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4th Grade, Mathematics

Complete Sample Curriculum – Posted: February 15, 2013

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<p>Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i></p>	
<p>A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):</p>	<p><i>When I solve the problem of how many buses are needed for 230 students if each bus holds 40 students, I first estimate that I will need less than 10 which would hold 400 students but more than 5 which would hold 200 students. Five buses would leave a remainder of 30 students; in this situation I interpret the remainder to mean I will need another bus or 6 buses.</i></p>
<p>Academic Vocabulary:</p>	<p>Solve, represent, multiply, divide, add, subtract, assess, unknown, variable, classification,</p>
<p>Technical Vocabulary:</p>	<p>Factor, whole number, remainder, product, multiple, natural numbers, counting numbers, mental strategies, estimation, reasonableness, word problems, prime, composite, multiplicative comparison, times more, algorithms, equations, rectangular arrays, area models</p>

*Denotes Personal Financial Literacy (PFL) connection

Curriculum Development Overview
Unit Planning for 4th Grade Mathematics

Unit Title	Measurement Madness		Length of Unit	4 weeks
Focusing Lens(es)	Rotation Units	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.4-S.4-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> • How do you decide when close is close enough? (MA10-GR.4-S.4-GLE.1-IQ.1) • What does it mean to do a 180? A 360? A 720? 			
Unit Strands	Measurement and Data			
Concepts	Angle measurement, fraction, circular arc, rays, angle, intersection, circle, vertex, degrees, unit, one-degree angle, iteration, measurement, decomposed, sum, additive, non-overlapping parts, perimeter, area, length, width, unknown, measurement systems, conversion, partition, measurement scale, number line diagram, distance, intervals of time, liquid volumes, masses of objects, money, division, addition, subtraction, multiplication, quotients			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
A circle provides a reference from which to measure individual angles by locating the vertex of an angle at the center of the circle (MA10-GR.4-S.4-GLE.1-EO.b.i)	How can we use the fraction of the circular arc between the two rays to measure an angle? What is the measure of an angle that is a quarter turn of a circle? Half turn? One complete turn?	Why does a angle with a measure of zero and an angle with a measure of 360 degrees look the same? What other angles look the same?
The degrees of the circle visually represent all of the iterations of one-degree angles with measurements between 1 and 360 degrees (MA10-GR.4-S.4-GLE.1-EO.b.i)	What tool can be used to measure angles?	Why is a one-degree angle 1/360 of a rotation around a circle?
As with whole numbers, mathematicians compose angles by joining/adding non-overlapping angles to form larger angles (sums) and decompose/separate angles into smaller angles (differences) (MA10-GR.4-S.4-GLE.1-EO.b.iii)	What is the additive property of angles?	How can you find the measure of an unknown angle using known angle?
Solution(s) to rectangular area/perimeter problems requires the knowledge of only two of a given rectangle's measurements of length, width, perimeter or area (MA10-GR.4-S.4-GLE.1-EO.a.v)	How do you find the area of a rectangle? How do you find the perimeter of a rectangle? How can you find the length of a rectangle if you know its area and width?	Why does the length and width of a rectangle determine both its area and perimeter? Why doesn't the perimeter of a rectangle determine the area and vice versa?

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Measurement systems embody varying size units wherein larger units are multiples of smaller units in the system (MA10-GR.4-S.4-GLE.1-EO.a.i, a.ii)	Using multiplicative comparison, how many times larger is foot than an inch? How can you convert from a larger unit of measurement to a smaller one?	Why are conversions in the metric system easier than those in the US customary system? Why are measurement conversions multiplicative rather than additive comparisons? Why do we convert units?
Number line diagrams often provide an efficient way to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money (MA10-GR.4-S.4-GLE.1-EO.a.iii, a.iv)	How can you represent quantities on a number line? What types of measurement problems are helpful to represent on a number line diagram? How can you use division to solve a problem involving the number of times a given measurement will fit into a larger measurement?	Why is a number line diagram an effective representation for solving measurement problems? Why can fractions be viewed as the answer to a division problem?

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Know relative sizes of measurements within a single measurement system (MA10-GR.4-S.4-GLE.1-EO.a.i) • Convert measurements within one measurement system from larger units to smaller units and record measurement equivalents in a two column table (MA10-GR.4-S.4-GLE.1-EO.a.ii) • Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money, including problems involving simple fractions or decimals, and problems that require expressing measurement given in a larger unit in terms of a smaller unit (MA10-GR.4-S.4-GLE.1-EO.a.iii) • Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale (MA10-GR.4-S.4-GLE.1-EO.a.iv) • Apply area and perimeter formula for rectangles in real world and mathematical problems (MA10-GR.4-S.4-GLE.1-EO.a.v) • Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint (MA10-GR.4-S.4-GLE.1-EO.b.i) • Understand an angle is measured with reference to a circle with its center and the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle (MA10-GR.4-S.4-GLE.1-EO.b.i) • Recognize an angle that turns through $\frac{1}{360}$ of a circle is called a “one-degree angle,” and can be used to measure angles (MA10-GR.4-S.4-GLE.1-EO.b.i) • Understand that an angle that turns through n one-degree angles is said to have an angle measure of n degrees (MA10-GR.4-S.4-GLE.1-EO.b.i) • Measure angles in whole-number degrees using a protractor and sketch angles of specified measure (MA10-GR.4-S.4-GLE.1-EO.b.ii) • Solve addition and subtraction problems to find unknown angles on diagram in real world and mathematical problems by using an equation with a symbol for the unknown angle measure (MA10-GR.4-S.4-GLE.1-EO.b.iv) • Solve division problems in which the measure b does not fit evenly into the quantity a, which leads to work with fractions greater than one and an awareness of the relationship between fractions and division or fractions as quotients (MA10-GR.4-S.4-GLE.1-EO.a.iv) 	

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<p>A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):</p>	<p><i>I know a 90 degree angle is one fourth of a turn around a circle and is sometimes called a square angle and a 180 degree angle is a half turn around a circle and is a straight line.</i> <i>When I convert from feet to inches I need to multiply the number of feet by 12 because there are 12 times as many inches as feet and I can show my conversions in a two-column table.</i></p>
<p>Academic Vocabulary:</p>	<p>Measure, record, convert, sketch, demonstrate, describe, apply, represent, express, dimensions, feet, inches, kilometer, meter, centimeter, kilogram, gram, pound, ounce, liter, milliliter, hour, minute, second, square angle</p>
<p>Technical Vocabulary:</p>	<p>Angle, fraction, intersection, vertex, degrees, iteration, sum, additive, perimeter, area, length, width, measurement systems, measurement scale, number line diagram, equivalent, distance, intervals of time, liquid volumes, masses of objects, money, division, addition, subtraction, multiplication, protractor, two column table</p>

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Unit Title	Fraction Frenzy		Length of Unit	5 weeks
Focusing Lens(es)	Representation	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.4-S.1-GLE.2 MA10-GR.4-S.3-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> • What would the world be like without fractions? (MA10-GR.4-S.1-GLE.2-IQ.4) • Why are fractions useful? (MA10-GR.4-S.1-GLE.2-IQ.3) 			
Unit Strands	Number and Operations – Fractions, Measurement and Data			
Concepts	Increasing, decreasing, numerators, denominators, fractions, factor, equivalence, comparison, referent unit, whole, benchmark fractions, estimation, relative size, common denominator/numerator, decompose, sum, addition, subtraction, properties of operations, relationship, mixed number, equivalent fractions, decimals, word problems, joining, separating, unit fractions, multiple,			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Equivalent fractions describe the same part of a whole by using different fractional parts (MA10-GR.4-S.1-GLE.2-EO.a.i)	How can you show that $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions?	Why (or when) are equivalent fractions necessary or helpful?
Increasing or decreasing both the numerators and denominators of a fraction by the same factor creates equivalent fractions (MA10-GR.4-S.1-GLE.2-EO.a.i)	How can you justify two fractions are equivalent by using visual fraction models? What happens when you multiply both the numerator and denominator by the same number?	Why are there multiple names for the same fraction? How can different fractions represent the same quantity?(MA10-GR.4-S.1-GLE.2-IQ.1) Why do you need to know equivalent fractions?
Decisions about the size of a fraction relative to another fraction often involves the comparison of the fractions' denominators (if their numerators are equal), or numerators (if their denominators are equal) or the creation of common denominators or numerators for the fractions (MA10-GR.4-S.1-GLE.2-EO.a.iii)	What are examples of benchmark fractions and how are they useful in comparing the size of fractions? When do you need to find a common denominator or common numerator?	Why is it possible to compare fractions with either a common denominator or common numerator?
As with whole numbers, mathematicians compose fractions by joining/combining fractions (with the same denominator) as sums and decompose/separate fractions (with the same denominator) as differences in multiple ways (MA10-GR.4-S.1-GLE.2-EO.b.i.1)	How can you record decompositions of fractions with an equation? How can you justify decompositions of fractions using visual fraction models?	Why when you decompose fractions do you only break apart the numerator and not the denominator? How is decomposing fractions similar and different from decomposing whole numbers?

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<p>To add and subtract mixed numbers with like denominators requires the use of properties of operations (MA10-GR.4-S.1-GLE.2-EO.b.i.2)</p>	<p>How can you write the number 1 as a fraction? Any whole number? How can you rewrite a mixed number as an equivalent fraction? In a mixed number, what operation is happening between the whole number and the fraction?</p>	<p>Why might you need to rewrite a mixed number as an equivalent fraction in order to perform addition or subtraction?</p>
<p>Place value (and its understanding) provides an efficient means to express fractions with a denominator of 10 as an equivalent fraction with a denominator of 100 (MA10-GR.4-S.1-GLE.2-EO.a)</p>	<p>How can you add two fractions with a denominator of 10 and 100 respectively (e.g. $3/10 + 5/100$)?</p>	<p>Why is it easy to change a fraction with a denominator of 10 to 100?</p>
<p>Word problems and contexts involving joining and separating parts of the same (size) whole require the addition and subtraction of fractions (MA10-GR.4-S.1-GLE.2-EO.b.i.3)</p>	<p>How does solving the problem “How much pizza does Thomas have left if gives away half of his pizza at lunch and then eats half of what he has left?” require the use of fractions?</p>	<p>How word problems involving the addition and subtraction of fractions similar and different from those of whole numbers?</p>
<p>The multiplication of a fraction ($1/b$) by a whole number (a) creates a fraction that is a multiple of the original fraction (MA10-GR.4-S.1-GLE.2-EO.b.i, b.ii.1, 2)</p>	<p>How can the repeated addition of $1/4$, 3 times, show that $3/4$ is multiple of $1/4$? How can you multiply a whole number by a fraction? What different types of word problems represent the product of a whole number times a fraction? (MA10-GR.4-S.1-GLE.2-EO.b.ii.3)</p>	<p>When multiplying a whole number by a unit fraction is the result larger or smaller than the original whole number? Why is every fraction both a multiplication and division problem at the same time?</p>

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Unit Planning for 4th Grade Mathematics

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Explain why a fraction a/b is equivalent to a fraction $(n \times a) / (n \times b)$ by using visual fractions models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size (MA10-GR.4-S.1-GLE.2-EO.a.i) • Generate equivalent fractions (MA10-GR.4-S.1-GLE.2-EO.a.ii) • Compare two fractions with different numerators and different denominators by creating common denominators or numerators or comparing to a benchmark fraction and record the results of the comparisons with symbols $>$, $=$, $<$ and justify the conclusions (MA10-GR.4-S.1-GLE.2-EO.a.iii) • Recognize that comparisons are valid only when the two fractions refer to the same whole (MA10-GR.4-S.1-GLE.2-EO.a.iii) • Understand addition and subtraction of fractions as joining and separating parts referring to the same whole (MA10-GR.4-S.1-GLE.2-EO.b.i) • Decompose a fraction into a sum of fractions with the same denominator in more than one way, record each decomposition by an equation and justify the decomposition (MA10-GR.4-S.1-GLE.2-EO.b.i.1) • Add and subtract mixed numbers with like denominators (MA10-GR.4-S.1-GLE.2-EO.b.i.2) • Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators (MA10-GR.4-S.1-GLE.2-EO.b.i.3) • Understand a fraction a/b as a multiple of $1/b$ and a multiple of a/b as a multiple of $1/b$ (MA10-GR.4-S.1-GLE.2-EO.b.ii.1) • Multiply a fraction by a whole number and solve word problems involving multiplication of a fraction by a whole number (MA10-GR.4-S.1-GLE.2-EO.b.ii) • Express a fraction with denominator of 10 as an equivalent fraction with a denominator 100, and use this technique to add two fractions with respective denominators 10 and 100 (MA10-GR.4-S.1-GLE.1-EO.b.i) • Make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$) and solve problems involving addition and subtraction of fractions by using information presented in line plots (MA10-GR.4-S.3-GLE.1-EO.a, b) 	

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i>	
A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>I can compare two fractions by having first determining if there are smaller or larger than a benchmark fraction like $\frac{1}{2}$ or finding a common numerator or denominator; if two fractions have the same numerator then the fraction with the smaller denominator is larger and vice versa if they have same denominator.</i>
Academic Vocabulary:	Apply, explain, generate, compare, express, understand, increasing, decreasing, estimation
Technical Vocabulary:	Solve, equivalent, mixed numbers, numerator, denominator, unit fraction, benchmark fraction, whole, part, multiple, equivalent fractions, common numerator, common denominator, decompose, sum, addition, subtraction, joining, separating

Curriculum Development Overview
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Unit Title	What's My Number		Length of Unit	5 weeks
Focusing Lens(es)	Comparison Structure	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.4-S.1-GLE.1, MA10-GR.4-S.1-GLE.3 MA10-GR.4-S.2-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> • Is there a decimal closest to one? Why? (MA10-GR.4-S.1-GLE.1-IQ.3) • Why isn't there a "oneths" place in decimal fractions? (MA10-GR.4-S.1-GLE.1-IQ.1) • What would change if we used a base-8 number system? What would our numbers look like? 			
Unit Strands	Operations and Algebraic Thinking, Number and Operations in Base Ten, Number and Operations – Fractions, Measurement and Data			
Concepts	Patterns, representation, tables, rules, standard algorithm, addition, subtraction, efficiency, fluency, place value, ten times, digit, equivalent forms, comparison, magnitude, larger, greater, equal, rounding, precision, denominator, fraction, powers of 10, decimal, numerator			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
The standard algorithm for addition and subtraction provides an efficient method for developing fluency with addition and subtraction of multi-digit numbers (MA10-GR.4-S.1-GLE.3-EO.a.i)	How does an understanding of place value support the standard algorithm for addition and subtraction?	Why is fluency with multi-digit addition and subtraction important?
In a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right (MA10-GR.4-S.1-GLE.1-EO.a.i)	What would determine the value of a digit? What is the role of place value in comparing two multi digit numbers?	How does the value of a digit change when you change place value?
The concept of place value allows mathematicians to write and describe numbers in a variety of equivalent forms (MA10-GR.4-S.1-GLE.1-EO.a.ii)	How can you write a number in expanded form? How can you use base-ten blocks to represent a number?	Why is the digit zero important in our number system?
Increases to the number of digits in a whole number always result in increases to the magnitude of the number (MA10-GR.4-S.1-GLE.1-EO.a.iii)	How can you compare the size of two multi-digit numbers? How do you know for certain when one multi-digit number is larger, smaller, or equal to another multi-digit number?	Why do we compare whole numbers with the same number of digits by starting on the left rather than the right of the number?

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Number patterns (like shape patterns) follow rules which facilitate further exploration of different features of the pattern (MA10-GR.4-S.2-GLE.1-EO.a)	How can we predict the next element in a pattern? (MA10-GR.4-S.2-GLE.1-IQ.2) How can we use (input/output) tables to make predictions based on patterns? (MA10-GR.4-S.2-GLE.1-RA.1)	Why do we use symbols to represent missing numbers? (MA10-GR.4-S.2-GLE.1-IQ.3) Why is finding an unknown quantity important? (MA10-GR.4-S.2-GLE.1-IQ.4)
The accurate rounding of multi-digit numbers depends on (knowledge of) place value and requires attention to context (MA10-GR.4-S.1-GLE.1-EO.a.iv)	How are numbers rounded? How does context help you decide which number (which place value in a multi-digit number) to round?	Why does the number five round up rather than down?
The conversion of a fraction with a denominator of 10 or 100 (or any power of ten) to a decimal produces a number that is 10 or 100 times less than numerator of the original fraction (MA10-GR.4-S.1-GLE.1-EO.b.1, b.ii)	How can we use division to convert fractions with denominators of 10 or 100? How do equivalent fractions help explain different equivalent decimal forms of the same quantity?	Why does placing zeros at the end of a number with decimal places not change the value of the number? Why is 0.7 equivalent to 0.70? Why is every decimal easily written as a fraction but not every fraction is easily written as a decimal?
Additional numbers to the right of the decimal do not necessarily increase the value of a decimal in comparison to another decimal (MA10-GR.4-S.1-GLE.1-EO.b.iii)	How does the comparison of decimals differ from the comparison of whole numbers? How can you use the concept of equivalent fractions to compare two decimals?	How can a number with greater decimal digits be less than one with fewer decimal digits? (MA10-GR.4-S.1-GLE.1-IQ.2)

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Generate a number or shape pattern that follows a given rule and identify apparent features of the pattern that were not explicit in the rule itself (MA10-GR.4-S.2-GLE.1-EO.a) • Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right MA10-GR.4-S.1-GLE.1-EO.a.i) • Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form (MA10-GR.4-S.1-GLE.1-EO.a.ii) • Use decimal notation for fractions with denominators 10 and 100 (MA10-GR.4-S.1-GLE.1-EO.b.ii) • Compare two multi-digit numbers based on meanings of the digits in each place and compare two decimals to hundredths by reasoning about their size; and record comparisons by using $<$, $=$ or $>$ symbols, and justify the comparisons (MA10-GR.4-S.1-GLE.1-EO.a.iii, b.iii) • Recognize that comparisons are only valid when the quantities refer to the same whole (MA10-GR.4-S.1-GLE.1-EO.a.iii, b.iii) • Use place value understanding to round multi-digit whole numbers to any place (MA10-GR.4-S.1-GLE.1-EO.a.iv) • Fluently add and subtract multi-digit whole numbers using the standard algorithm (MA10-GR.4-S.1-GLE.3-EO.a.i) 	

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<p>A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):</p>	<p><i>Multi-digit numbers can be written in expanded form.</i> <i><, >, = are used to show the comparison of multi-digit numbers.</i> <i>Numbers can be represented with base-ten numerals, expanded form or number names.</i></p>
<p>Academic Vocabulary:</p>	<p>Compare, generate, identify, recognize, represent, efficient, addition, subtraction, larger, smaller, greater than, less than, equal to, precision, patterns, tables,</p>
<p>Technical Vocabulary:</p>	<p>Place value, multi-digit whole number, expanded form, hundredths, tenths, decimals, rules, standard algorithm, ten times, digit, equivalent forms, magnitude, rounding, fraction, denominator, numerator, number names</p>