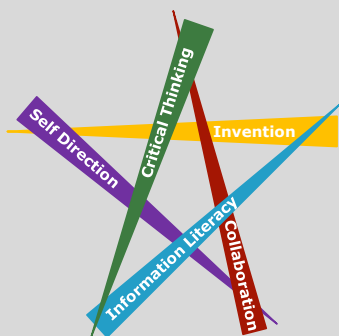


**Curriculum Development Course at a Glance
Planning for 6th Grade Mathematics**

Content Area	Mathematics	Grade Level	6 th Grade
Course Name/Course Code			
Standard	Grade Level Expectations (GLE)	GLE Code	
1. Number Sense, Properties, and Operations	1. Quantities can be expressed and compared using ratios and rates	MA10-GR.6-S.1-GLE.1	
	2. Formulate, represent, and use algorithms with positive rational numbers with flexibility, accuracy, and efficiency	MA10-GR.6-S.1-GLE.2	
	3. In the real number system, rational numbers have a unique location on the number line and in space	MA10-GR.6-S.1-GLE.3	
2. Patterns, Functions, and Algebraic Structures	1. Algebraic expressions can be used to generalize properties of arithmetic	MA10-GR.6-S.2-GLE.1	
	2. Variables are used to represent unknown quantities within equations and inequalities	MA10-GR.6-S.2-GLE.2	
3. Data Analysis, Statistics, and Probability	1. Visual displays and summary statistics of one-variable data condense the information in data sets into usable knowledge	MA10-GR.6-S.3-GLE.1	
4. Shape, Dimension, and Geometric Relationships	1. Objects in space and their parts and attributes can be measured and analyzed	MA10-GR.6-S.4-GLE.1	

Colorado 21st Century Skills



Critical Thinking and Reasoning: *Thinking Deeply, Thinking Differently*

Information Literacy: *Untangling the Web*

Collaboration: *Working Together, Learning Together*

Self-Direction: *Own Your Learning*

Invention: *Creating Solutions*

Mathematical Practices:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Unit Titles	Length of Unit/Contact Hours	Unit Number/Sequence
No Drama Be Rational	5 weeks	1 (continue to practice fluency skills throughout the year)
Very Variable	6 weeks	2`
Rockin' Ratios	8 weeks	3
Know the 411	5 weeks	4
Go Figure!	4 weeks	5

Curriculum Development Overview
Unit Planning for 6th Grade Mathematics

Unit Title	No Drama Be Rational		Length of Unit	5 weeks
Focusing Lens(es)	Comparison Location	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.6-S.1-GLE.2 MA10-GR.6-S.1-GLE.3	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> • Why are there negative numbers? (MA10-GR.6-S.1-GLE.3-IQ.1) • Are there more rational numbers or integers? (MA10-GR.6-S.1-GLE.3-IQ.3) 			
Unit Strands	The Number System			
Concepts	Fluency, operations, multi-digit numbers, decimal numbers, standard algorithm, estimation, reasonableness, positive, negative, quantities, opposite, direction, values, magnitude, vertical, horizontal, number lines, rational numbers, inequalities, number line diagrams, absolute value, ordered pairs, location, reflection, axes			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Fluency with the four operations on multi-digit number and decimal numbers requires strategic application of the standard algorithm and other tools including estimation strategies to assess reasonableness of answers. (MA10-GR.6-S.1-GLE.2-EO.a, b)	How do the algorithms for decimals compare to the algorithms for whole numbers? (MA10-GR.6-S.1-GLE.2-IQ.2)	Why is estimating to assess the reasonableness of answers an important when using standard algorithms?
Positive and negative numbers can represent quantities in real world contexts having opposite directions or values. (MA10-GR.6-S.1-GLE.3-EO.a.i)	When a + or – sign is not used in front a number is the number positive or negative? What are examples of real world situations involving positive and negative numbers?	Why is it important to explain the meaning of 0 in situations involving positive and negative numbers?
Locating rational numbers on horizontal and vertical number lines requires attention to both components of a number, the magnitude (distance from zero) and direction. (MA10-GR.6-S.1-GLE.3-EO.b.i, b.ii, b.iii, b.iv, b.v)	How is directionality represented in rational numbers? What does it mean for two numbers to be opposites? What number is its own opposite? How do you locate rational numbers on a horizontal and vertical number line? What is a rational number?	Why is it helpful for numbers to represent both magnitudes and directionality? Why are -1.5 and 1.5 an equal distance from zero on a number line? Why is the opposite of the opposite of a number the number itself?

Curriculum Development Overview
Unit Planning for 6th Grade Mathematics

Statements of inequalities represent the relative position of two numbers on a number line diagram. (MA10-GR.6-S.1-GLE.3-EO.c.i, c.ii)	When comparing two numbers how can you tell by the direction they are from each other, which is smaller? How can you represent the comparison of two different quantities with inequalities?	Why is attention to the magnitude and directionality of a number important when making comparisons?
Interpreting absolute value of a rational number (e.g., its distance from zero) requires an examination of the magnitude of a number without its directionality. (MA10-GR.6-S.1-GLE.3-EO.c.iii)	What is the definition of absolute value?	Why is the absolute value of a positive number the number itself? Why is absolute value connected to real world contexts involving distance?
Taking absolute values of numbers in an inequality can reverse the inequality. (MA10-GR.6-S.1-GLE.3-EO.c.iv)	If $a < b$ when is the $ a < b $ and when is the $ a > b $? If $a > b$ when is the $ a > b $ and when is the $ a < b $?	Why does taking the absolute value of numbers in an equality sometimes affect the inequality?
Signs of numbers in ordered pairs indicate locations in one of four quadrants of the coordinate plane (MA10-GR.6-S.1-GLE.3-EO.b.iv, b.vi, d)	What is true of all coordinates in the 1st quadrant? 2nd quadrant? 3rd quadrant? 4th quadrant? How do the signs of coordinates differ when reflected across the horizontal axis? Vertical axis? Both axes?	Why are four quadrants necessary to represent ordered pairs of rational numbers? Why can changing the signs of numbers in an ordered pair be interpreted as a reflection across an axis on a coordinate plane?

Key Knowledge and Skills:
My students will...

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.

- Fluently divide multi-digit numbers using the standard algorithm (MA10-GR.6-S.1-GLE.2-EO.a)
- Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation (MA10-GR.6-S.1-GLE.2-EO.b)
- Understand positive and negative numbers are used together to describe quantities having opposite directions or values (MA10-GR.6-S.1-GLE.3-EO.a)
- Use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation (MA10-GR.6-S.1-GLE.3-EO.a.i)
- Understand a rational number as a point on the number line (MA10-GR.6-S.1-GLE.3-EO.b.i)
- Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself (MA10-GR.6-S.1-GLE.3-EO.b.ii, b.iii)
- Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane (MA10-GR.6-S.1-GLE.3-EO.b.iv)
- Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes (MA10-GR.6-S.1-GLE.3-EO.bi.v)
- Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane (MA10-GR.6-S.1-GLE.3-EO.bv, b.vi)
- Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram (MA10-GR.6-S.1-GLE.3-EO.c.i)
- Write, interpret, and explain statements of order for rational numbers in real-world contexts (MA10-GR.6-S.1-GLE.3-EO.c.ii)
- Understand the absolute value of a rational number as its distance from 0 on the number line (MA10-GR.6-S.1-GLE.3-EO.c.iii)
- Interpret absolute value as magnitude for a positive or negative quantity in a real-world situation (MA10-GR.6-S.1-GLE.3-EO.c.iii)
- Distinguish comparisons of absolute value from statements about order (MA10-GR.6-S.1-GLE.3-EO.c.iv)

Curriculum Development Overview
Unit Planning for 6th Grade Mathematics

<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>Every rational number is a point on a number line and has an opposite number that is equal distance from zero on the number line and can compared with other rational numbers.</i></p>
<p>Academic Vocabulary:</p>	<p>Fluency, multi-digit numbers, reasonableness, decimal numbers, coordinate axes, opposite, opposite of the opposite, positive and negative numbers, direction, vertical, horizontal, location, interpret, compare,</p>
<p>Technical Vocabulary:</p>	<p>operations, standard algorithm, estimation, quantities, values, magnitude, number lines, rational numbers, inequalities, number line diagrams, absolute value, ordered pairs, reflection, axes, order</p>

Curriculum Development Overview
Unit Planning for 6th Grade Mathematics

Unit Title	Go Figure!		Length of Unit	4 weeks
Focusing Lens(es)	Application Tools	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.6-S.1-GLE.3 MA10-GR.6-S.4-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> Can a triangle and a parallelogram have the same area? (MA10-GR.6-S.4-GLE.1-EO.a) 			
Unit Strands	The Number System, Expressions and Equations, Geometry			
Concepts	Volume, three-dimensional figures, surface area, composing, decomposing, shapes, area, formula, x- and y- coordinates, coordinate plane, horizontal, vertical, line, graphing, distance, difference, fractional part, unit cube, equipartitioning, dimensions (length, width, height)			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Decomposing three-dimensional figures into nets facilitates calculation of surface area. (MA10-GR.6-S.4-GLE.1-EO.d.i, d.ii, d.iii)	What is a net? What is an edge? Face? Vertices?	How does a net represent surface area? Why can two figures with the same surface area have the same volumes and vice versa?
Composing and decomposing shapes maintains the attribute of area. (MA10-GR.6-S.4-GLE.1-EO.a.i, a.ii)	How can every parallelogram be decomposed and rearranged into a rectangle with the same height and base?	Why does decomposing a shape maintain area? Why is every triangle half of a parallelogram? Why is the formula for the area of a rectangle the basis for most area formulas?
On a coordinate plane, points with the same x-coordinate form a vertical line when connected, and points with the same y-coordinate form a horizontal line when connected. (MA10-GR.6-S.4-GLE.1-EO.c.ii)	How can you find the distance between two points that form a vertical or horizontal line on a coordinate plane? Without graphing, how can you tell if two points will form a vertical or horizontal line?	Why do points with one matching coordinate form horizontal or vertical lines when connected? Why is the length of non-horizontal or vertical line on a coordinate grid determined by the number of squares it passes through?
The equipartitions of a unit cube into smaller components using a composition of splits along each dimension provides a visual representation of the value of fractional amounts (length, width, and height). (MA10-GR.6-S.4-GLE.1-EO.b.i, b.ii)	What is the size of a right rectangular prism with side lengths of $\frac{1}{5}$, $\frac{1}{2}$, and $\frac{1}{4}$ units? What is the formula of right rectangular prism volume?	How does packing a right rectangular prism with fractional edge lengths by unit cubes of the appropriate unit fraction edge lengths help show that the volume of the prism is the same as would be found by multiplying the edge lengths?

Curriculum Development Overview
Unit Planning for 6th 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>
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- Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane and include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinates. (MA10-GR.6-S.1-GLE.3-EO.d)
- Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. (MA10-GR.6-S.4-GLE.1-EO.a.i, a.ii)
- Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism and apply the formulas $V = l w h$ and $V = B h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. (MA10-GR.6-S.4-GLE.1-EO.b.i, b.ii, b.ii)
- Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate and apply these techniques in the context of solving real-world and mathematical problems. (MA10-GR.6-S.4-GLE.1-EO.c.i, c.ii)
- Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures and apply these techniques in the context of solving real-world and mathematical problems. (MA10-GR.6-S.4-GLE.1-EO.d.i, d.ii, d.iii)

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: *“Mark Twain exposes the hypocrisy of slavery through the use of satire.”*

A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>When graphing a polygon on the coordinate plane using ordered pairs, I can calculate the distance of the side lengths if the either the x or y coordinates are the same for the two vertices of a side.</i>
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Academic Vocabulary:	composing and decomposing, triangle, rectangle, horizontal, vertical, graph, distance, dimensions, length, width, height, draw,
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Technical Vocabulary:	vertices, edge, face, absolute value, net, polygon, parallelogram, quadrilaterals, rectangular prism, three-dimensional, volume, area, surface area, formula, coordinate plane, quadrant, ordered pairs, coordinates, difference, fractional part, unit cube
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Curriculum Development Overview
Unit Planning for 6th Grade Mathematics

Unit Title	Rockin' Ratios		Length of Unit	8 weeks
Focusing Lens(es)	Interpretation Relationships	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.6-S.1-GLE.1 MA10-GR.6-S.1-GLE.2 MA10-GR.6-S.2-GLE.2	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> At 10% simple interest, which will earn you more money investing \$1000 all at once or \$100 a month for one year? Two years? (MA10-GR.6-S.1-GLE.1-EO.c.vi) 			
Unit Strands	Ratios and Proportional Relationships, The Number System, Expressions and Equations, Personal Financial Literacy			
Concepts	Ratios, rates, relationships, quantity, multiplicative, ratio tables, graphs, percents, (greatest) common factor, (least) common multiple, comparison, additive, factor, multiple, constant, unit ratio, proportion, comparison, speed, equivalence, coordinate grid, measurement, conversion, division, fractions, quotient, product, sum, distributive property, operators, fair sharing, rate, measurement, scaling, array, area, equal groups, number line			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Ratios represent a constant multiplicative relationship between two quantities. (MA10-GR.6-S.1-GLE.1-EO.a)	What differentiates fractions from ratios? What type of relationship does a ratio describe? What are two ways to compare quantities? What types of actions on a ratio preserve the multiplicative relationship?	Why can the relationship between two quantities be the same (constant) even though the amount of each of the two quantities gets larger or smaller? Why would you compare quantities as ratios rather than as a difference?
Ratios typically express a relationship between two quantities with different units. (MA10-GR.6-S.1-GLE.1-EO.a, c.i, c.ii, c.viii)	How can ratio reasoning be used to convert measurements? What is a ratio table and how can you use it to make a graph?	How ratio relationships be represented in multiple ways?
Unit rates operate as single quantities. (MA10-GR.6-S.1-GLE.1-EO.b, c.ii, c.vi, c.vii)	What is a unit rate? What are methods for finding a unit rate? How does your choice of unit rate to calculate depend on the situation?	Why is it important to focus on the units for each part of a unit rate? How does a unit rate apply to saving and investing? Why are unit rates useful when solving word problems?
Real world problems for division of fractions often involve contexts such as fair sharing, rate, measurement, scaling, array, area, and equal groups. (MA10-GR.6-S.1-GLE.2-EO.f, g, h)	What are contexts involving division of fractions?	How does interpreting division of fraction problems within a context lead to multiple solution strategies?

Curriculum Development Overview
Unit Planning for 6th Grade Mathematics

<p>The distributive property uses the greatest common factor (GCF) to express the sums of whole numbers as multiple of a sum with no common factor (MA10-GR.6-S.1-GLE.2-EO.c, e)</p>	<p>How can a Venn diagram of the prime factorization of two numbers provides a means for easily finding the GCF of two numbers?</p>	<p>Why might it be helpful to express the sum of two numbers as the multiple of a sum with no common factors?</p>
<p>The least common multiple (LCM) provides an efficient means to add and subtract fractions with unlike denominators (MA10-GR.6-S.1-GLE.2-EO.d)</p>	<p>How can you use LCM to create equivalent fractions and ratios? How can a Venn diagram of the prime factorization of two numbers provides a means for easily finding the LCM of two numbers?</p>	<p>How does the LCM support the addition and subtraction of fractions? Why does the product of the LCM and GCF equal the product of the original two numbers?</p>
<p>As with unit rates, percents require a standardized value for one of the compared quantities. (MA10-GR.6-S.1-GLE.1-EO.c.iv, c.v)</p>	<p>How can you use a ratio table to solve percent problems How is a percent a ratio?</p>	<p>Why is it possible to have a percent greater than 100? Why is the second quantity in a percent standardized to 100?</p>
<p>Number lines express quantities with a referent unit of one and cannot express the quantitative relationships of ratios and percents. (MA10-GR.6-S.1-GLE.1-EO.a)</p>	<p>How are ratios different from fractions? (MA10-GR.6-S.1-GLE.1-IQ.1) What does it mean that fractions and decimals refer to a single amount of a quantity? What is the difference between quantity and number? (MA10-GR.6-S.1-GLE.1-IQ.2)</p>	<p>Why do ratios and percents not refer to single amounts of a quantity? Why is it misleading to say $75\% = 0.75$ or that 3:4 is always the same as the fraction $\frac{3}{4}$? Why do fractions, and not ratios, imply a referent of one?</p>

Curriculum Development Overview
Unit Planning for 6th 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"> • Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities (MA10-GR.6-S.1-GLE.1-EO.a) • Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship (MA10-GR.6-S.1-GLE.1-EO.b) • Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. (MA10-GR.6-S.1-GLE.1-EO.c) • Make tables of equivalent ratios relating quantities with whole number measurements and plot the pairs of values on the coordinate plane. (MA10-GR.6-S.1-GLE.1-EO.c.i) • Find missing values in tables of equivalent ratios and use the tables to compare ratios. (MA10-GR.6-S.1-GLE.1-EO.c.ii) • Solve unit rate problems including those involving unit pricing and constant speed. (MA10-GR.6-S.1-GLE.1-EO.c.iii) • Find a percent of a quantity as a rate per 100 and solve problems involving finding the whole, given a part and the percent. (MA10-GR.6-S.1-GLE.1-EO.c.iv, c.v) • Use ratio reasoning to convert measurement units and manipulate and transform units appropriately when multiplying or dividing quantities. (MA10-GR.6-S.1-GLE.1-EO.c.viii) • Interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions by using visual fraction models and equations to represent the problem. (MA10-GR.6-S.1-GLE.2-EO.f, g, h) • Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. (MA10-GR.6-S.1-GLE.2-EO.d) • Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. (MA10-GR.6-S.1-GLE.2-EO.e) • Use common fractions and percents to calculate parts of whole numbers in problem situations, including comparisons of savings rates a different financial institutions. (MA10-GR.6-S.1-GLE.1-EO.c.iv)* • Express the comparison of two whole number quantities using differences, part-to-part ratios, and part to whole ratios in real contexts, including investing and saving. (MA10-GR.6-S.1-GLE.1-EO.c.vii)* 	

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A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>When comparing the prices of two items it is helpful to look at the unit ratio or unit price for each item and ratio tables can help me find the unit prices for each item.</i>
Academic Vocabulary:	savings rate, simple interest, percent, compare, multiply, divide, graphs, speed, measurement, fractions
Technical Vocabulary:	ratios, rates, part-to-part ratios, part-to-whole ratio, ratio tables, (greatest) common factor, (least) common multiple, factor multiple, unit ratio, unit rate, equivalence, fair sharing, rate, measurement, scaling, array, area, equal groups, coordinate grid, conversion, quotient, product, sum, distributive property, number line

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

Curriculum Development Overview
Unit Planning for 6th Grade Mathematics

Unit Title	Very Variable		Length of Unit	6 weeks
Focusing Lens(es)	Structure Modeling	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.6-S.2-GLE.1 MA10-GR.6-S.2-GLE.2	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> Why do we call letters meant to symbolize unknown quantities variables, do they always vary? (MA10-GR.6-S.2-GLE.2-EO.b) 			
Unit Strands	Expressions and Equations			
Concepts	exponents, multiplication, symbolizing, base, substitution, variable, inequalities, equations, solutions, values, order of operations, commutative, associate, distributive, equivalent, numeric expressions, algebraic expressions, characteristics, term, coefficient, sum, factor, quotient, product, constraint, condition, infinite, number line diagram, independent, dependent			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Exponents symbolize repeated multiplication; the base represents the quantity being repeatedly multiplied and the exponent defines the number of repeated multiplications. (MA10-GR.6-S.2-GLE.1-EO.a)	What does a base and exponent represent? In order of operations, which comes should be performed first exponents or multiplication and division?	How is multiplication symbolizing repeated addition similar and different from exponents symbolizing repeated multiplication? Why isn't $(2+3)3$ equal to $23+33$?
Using order of operations and the commutative, associate, and distributive properties generates equivalent expressions. (MA10-GR.6-S.2-GLE.1-EO.b.iv, c)	Which property justifies that $2k+6$ is equivalent to $2(k+3)$? How do you simplify a given expression?	Why do the order of operations exist? (MA10-GR.6-S.2-GLE.1-IQ.4)
Algebraic expressions contain variables that represent either a single unknown or a quantity that varies (changes). (MA10-GR.6-S.2-GLE.1-EO.b.i, c)	What is the difference between an algebraic and numeric expression? If we didn't have variables, what would we use? (MA10-GR.6-S.2-GLE.1-IQ.1) What purpose do algebraic expressions serve? (MA10-GR.6-S.2-GLE.1-IQ.2)	Why is it helpful to record operations with numbers and letters standing for numbers? Why are there advantages to being able to describe a pattern using variables? (MA10-GR.6-S.2-GLE.1-IQ.3)

**Curriculum Development Overview
Unit Planning for 6th Grade Mathematics**

<p>The structure and characteristics of mathematical expressions (term, coefficient, sum, factor, quotient and product and equations) help predict mathematical behaviors and model mathematical situations. (MA10-GR.6-S.2-GLE.1-EO.b.ii)</p>	<p>What does the word term mean in relation to expressions? How can you determine the number of terms in an expression? What is a coefficient? What is a constant?</p>	<p>How does understanding the structure of expressions support the simplification of expressions? Why is it helpful to sometimes view terms of an expression as a single entity and other times as separate entities?</p>
<p>Mathematicians can ascertain the equivalence of two algebraic expressions if, for any value substituted for the variable, the values of two expressions are equal. (MA10-GR.6-S.2-GLE.1-EO.d) and (MA10-GR.6-S.2-GLE.2-EO.a)</p>	<p>How can you determine if two expressions are equivalent? If an equation has multiple instances of the same variable, does the same value need to be substituted for all of them? Do all equations have one unique solution? (2.2.IQ1)</p>	<p>Why is only one counter-example (a value for the variable that yields unequal results for the two expressions) needed to disprove the equivalence of two expressions? How might simplifying two expressions help determine if they are equivalent? Why is a solution(s) to an equation or inequality the value(s) that make them true?</p>
<p>An inequality of the form $x > c$ or $x < c$ represents a constraint or condition in a real-world or mathematical problem and inequalities of this form have infinitely many solutions. (MA10-GR.6-S.2-GLE.2-EO.e, f)</p>	<p>How can you show an infinite amount of solutions on a number line?</p>	<p>Why does an inequality have an infinite number of solutions?</p>
<p>Dependent and independent variables represent two quantities that change in relationship to one another. (MA10-GR.6-S.2-GLE.2-EO.g)</p>	<p>How can you represent the relationship between dependent and independent variables in a table? graph?</p>	<p>Why are coordinate pairs used to represent solutions to two variable equations? How can you determine if a variable is independent or dependent? (MA10-GR.6-S.2-GLE.2-IQ.2)</p>

Curriculum Development Overview
Unit Planning for 6th 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"> • Write and evaluate numerical expressions involving whole-number exponents. (MA10-GR.6-S.2-GLE.1-EO.a) • Write expressions that record operations with numbers and with letters standing for numbers. (MA10-GR.6-S.2-GLE.1-EO.b.i) • Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity (MA10-GR.6-S.2-GLE.1-EO.b.ii) • Evaluate expressions at specific values of their variables; including expressions that arise from formulas used in real-world problems and perform arithmetic operations, involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order. (MA10-GR.6-S.2-GLE.1-EO.b.iii, b.iv) • Apply the properties of operations to generate equivalent expressions. (MA10-GR.6-S.2-GLE.1-EO.c) • Identify when two expressions are equivalent. (MA10-GR.6-S.2-GLE.1-EO.d) • Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MA10-GR.6-S.2-GLE.2-EO.c, c.i) • Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? (MA10-GR.6-S.2-GLE.2-EO.a) • Use substitution to determine whether a given number in a specified set makes an equation or inequality true. (MA10-GR.6-S.2-GLE.2-EO.b) • Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers. (MA10-GR.6-S.2-GLE.2-EO.d) • Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem and recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. (MA10-GR.6-S.2-GLE.2-EO.e, f) • Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. (MA10-GR.6-S.2-GLE.2-EO.g, g.i, g.ii) • Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MA10-GR.6-S.2-GLE.2-EO.g.iii) 	

<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>	
A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>Algebraic inequalities have infinitely many solutions because there are infinitely many values on a number line between any two points.</i>
Academic Vocabulary:	Multiplication, characteristics, identify, apply, solve, represent
Technical Vocabulary:	Exponents, base, substitution, variable, inequalities, equations, solutions, order of operations, commutative, associate, distributive, numeric expressions, algebraic expressions, term, coefficient, sum, factor, quotient, product, constraint, condition, infinite, number line diagram, values, equivalent, evaluate, independent, dependent

Curriculum Development Overview
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Unit Title	Know the 411		Length of Unit	5 weeks
Focusing Lens(es)	Interpretation Validity	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.6-S.3-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> Why is the more than one type of average? (MA10-GR.6-S.3-GLE.1.EO.a) 			
Unit Strands	Statistics and Probability			
Concepts	Statistical question, data, data collection, measures of center (mean, median), spread, measures of variability (interquartile range, mean absolute deviation), distribution, overall shape, visual displays, graphs (number lines, dot plots, histograms, box plots), equipartition, fair share, typicality, balance point, absolute value, range, outliers, interpretation, attributes, units, measurement			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
A statistical question anticipates variability in data and the data collected. (MA10-GR.6-S.3-GLE.1-EO.a, b)	What are ways of describing variability in data? How is the shape of a data distribution connected to the location of the mean and median? When is one data display better than another? (MA10-GR.6-S.3-GLE.1-IQ.2) What makes a good statistical question? (MA10-GR.6-S.3-GLE.1-IQ.4)	How do different types of visual displays show the overall shape, center and spread of a set of data? Why are there so many ways to describe data? (MA10-GR.6-S.3-GLE.1-IQ.1)
Single numbers can describe measures of center and measures of variation (how the values of the data set vary) for a numerical data set. (MA10-GR.6-S.3-GLE.1-EO.c)	What are ways of describing measures of center with a single number? Variation? When is one statistical measure better than another? (MA10-GR.6-S.3-GLE.1-IQ.3)	Why is it helpful to describe numerous data values with single numbers?
The median represents a measure of center that equipartitions the total number of data points in a data set into two equal groups. (MA10-GR.6-S.3-GLE.1-EO.d.ii.3)	What happens to the median when you either remove or add data points smaller, larger or the same as the median? What percent of data is below the median?	When is the median a better measure of center for a data set than the mean?

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The mean brings together ideas of fair share, typicality, and balance point among the values of a data set. (MA10-GR.6-S.3-GLE.1-EO.d.ii.3)	What happens to the mean when you either remove or add a data point smaller, larger or the same as the mean?	Why is the mean described as a balance point of a data set?
Mean absolute deviation, as a measure of variability, provides the foundation for standard deviation. (MA10-GR.6-S.3-GLE.1-EO.d.ii.3)	What is the mean absolute deviation?	Why is it necessary to sum the absolute values differences to the mean rather than positive and negative differences to create a measure of variability? Why is the mean absolute deviation a measure of variability?
Box plots provide a visual representation of the spread (range) of a set data which facilitates assessing the data's variability (MA10-GR.6-S.3-GLE.1-EO.d.i)	How is the "lower quartile" like a median of the lower half a data set? How is the "upper quartile" like a median of the upper half a data set?	How does the interquartile range provide a measure of variability that is based on the median? How is a box plot representation of data similar/different from a histogram?
Meaningfully interpreting data and avoiding errors in interpretation requires an analysis of the attributes measured, methods of measurement, measurement units, and the number of measurements/observations. (MA10-GR.6-S.3-GLE.1-EO.d.ii.1, d.ii.2, d.ii.3, d.ii.4)	Which types of data displays allow you to determine the number of observations in a data set?	Why is it important to ensure attributes are measured with the same units and under the same conditions? Why is it important to know the number of observations when considering a statistical question?

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"> • Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. (MA10-GR.6-S.3-GLE.1-EO.a) • 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 with a single number. (MA10-GR.6-S.3-GLE.1-EO.c) • Understand a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape (MA10-GR.6-S.3-GLE.1-EO.b) • Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MA10-GR.6-S.3-GLE.1-EO.d.i) • Summarize numerical data sets in relation to their context, such as by • Reporting the number of observations. (MA10-GR.6-S.3-GLE.1-EO.d.ii.1) • Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. (MA10-GR.6-S.3-GLE.1-EO.d.ii.2) • Giving 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 in which the data were gathered. (MA10-GR.6-S.3-GLE.1-EO.d.ii.3) • Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (MA10-GR.6-S.3-GLE.1-EO.d.ii.4) 	

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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>If I add a data point below the mean it will lower the mean but the median may also lower but it could also stay the same if the median is a data point and there are several data points of that value.</i></p>
<p>Academic Vocabulary:</p>	<p>data, data collection, average, distribution, spread, overall shape, visual displays, graphs, fair share, typicality, balance point, interpret, attributes, measurement, display, summarize,</p>
<p>Technical Vocabulary:</p>	<p>statistical question, measures of center (mean, median), measures of variability (interquartile range, mean absolute deviation), number lines, dot plots, histograms, box plots, equipartition, absolute value, range, outliers, units,</p>