

<u>Grade, Subject/Course:</u> Grade 6, Math/6th Grade Math	
<u>Unit 1:</u> The Number System - Rational Numbers	__x__ Essential ____ Important ____ Compact
<u>Big Idea:</u> • The set of real numbers is infinite, and each real number can be associated with a unique point on a number line. • Objects in space can be oriented in an infinite number of ways, and an object's location in space can be described quantitatively.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> M06.A-N.3.1 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values and locations on the number line and coordinate plane. M06.A-N.3.2 Understand ordering and absolute value of rational numbers.	<u>Interdisciplinary Standards (if applicable):</u> N/A
<u>Essential Questions:</u> • Why do we use rational numbers to describe directions and values? • Why is coordinate graphing effective in locating points on a plane?	<u>Understandings:</u> • Positive and negative numbers are used together to describe quantities having opposite directions or values. • Each integer can be associated with a unique point on the number line, but there are many points on the number line that cannot be named by integers. • An integer and its opposite are the same distance from zero on the number line. • There is no greatest or least integer on the number line. • The rational numbers can be ordered and that the absolute value of a numbers • The Cartesian Coordinate System is a scheme that uses two perpendicular number lines intersecting at 0 on each to name the location of points in the plane; the system can be extended to name points in space. • Every point in the plane can be described uniquely by an ordered pair of numbers; the first number tells the distance to the left or right of zero on the horizontal number line; the second tells the distance above or below zero on the vertical number line.

<u>Knowledge:</u> • I can use positive and negative numbers to show real-world situations and explain what zero means in each case. • I can find the opposite of a number and explain that the opposite of the opposite is the original number (and that zero is its own opposite). • I can find and plot integers and other rational numbers on a number line and on a coordinate plane. • I can compare and order rational numbers in real-world situations and explain what the comparison means. • I can explain the absolute value of a number as its distance from zero and use it to describe the size of a quantity in a real-world situation. • I can solve real-world and math problems by plotting points in all four quadrants of a coordinate plane, and use coordinates and absolute value to find distances between points.	<u>Do/Skills:</u> • Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge). • Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., $-(-3) = 3$, and that 0 is its own opposite). • Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane. • Write, interpret, and explain statements of order of rational numbers in real-world contexts. Ex. Write $-3 \text{ degrees C} > -7 \text{ degrees C}$ to express the fact that -3 degrees C is warmer than -7 degrees C. • Interpret the absolute value of a rational number as its distance from 0 on the number line and as a magnitude for a positive or negative quantity in a real-world situation. Ex. For an account balance of -30 dollars, write $-30/ = 30$ to describe the size of the debt in dollars, and recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars. • Solve real-world and mathematical problems by plotting points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
<u>Vocabulary:</u> • Rational numbers • Opposites • Absolute value • Greater than • Less than • Greater than or equal to • Less than or equal to • Origin • Coordinate plane • Ordered pairs	<u>Core Resources:</u> • Class Notes • Digital Resources

• x-axis (vertical) • y-axis (horizontal) • coordinates • quadrants • positive numbers • negative numbers • integers • plotting points	
<u>Common Assessment(s):</u> • Vocabulary Quiz • Unit Test	<u>Supplemental Resources:</u> • Digital Resources

<u>Grade, Subject/Course:</u> Grade 6, Math/6th Grade Math	
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<u>Unit 2: The Number Systems- FRACTIONS</u>	<u> x </u> Essential <u> </u> Important <u> </u> Compact
<u>Big Idea:</u> - The use of equivalence in the operations of fractions simplifies calculations. - Basic facts and algorithms for operations with rational numbers use notions of equivalence to transform calculations into simpler ones.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> M06.A-N.1.1 Solve real-world and mathematical problems involving division of fractions. M06.A-N.2.2 Apply number theory concepts (specifically, factors and multiples).	<u>Interdisciplinary Standards (if applicable):</u> N/A
<u>Essential Questions:</u> - How are numbers used that are decomposed into their simplest form? - How are division and multiplication of fractions related?	<u>Understandings:</u> - Every composite number can be expressed as the product of prime numbers in exactly one way, disregarding the order of the factors. - The least common multiple can be used with the distributive property to express a sum of two whole numbers. - A fraction division calculation can be changed to an equivalent multiplication calculation.

<u>Knowledge:</u> • Develop and/or apply number theory concepts to find common factors and multiples. • Apply and extend previous understanding of multiplication and division to divide fractions by fractions	<u>Do/Skills:</u> • 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. • Apply the distributive property to express a sum of two whole numbers, 1 through 100, with a common factor as a multiple of a sum of two whole numbers with no common factor. Ex: Express $36 + 8$ as $4(9+2)$. • Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions.
<u>Vocabulary:</u> • Fraction • Reciprocal • Multiplicative inverses • Visual fraction model • Prime numbers • Composite numbers • Greatest common factor • Least common multiple • Relatively prime • Factors • Multiples distributive property • Prime factorization	<u>Core Resources:</u> • Class Notes • Digital Resources
<u>Common Assessment(s):</u> • Vocabulary Quiz • Unit Test	<u>Supplemental Resources:</u> • Digital Resources

<u>Grade, Subject/Course:</u> Grade 6, Math/6th Grade Math	
<u>Unit 3:</u> The Number System Whole Numbers and Decimals	__x__ Essential ____ Important ____ Compact
● Big Idea: For a given set of numbers there are relationships that are always true, and these are the rules that govern arithmetic and algebra. ● The use of equivalence in the operation of basic facts and procedures simplifies calculations.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> M06.A-N.2.1 Compute with multi-digit numbers using the four arithmetic operations with or without a calculator.	<u>Interdisciplinary Standards (if applicable):</u> N/A
<u>Essential Questions:</u> ● Why is it useful to break whole numbers and decimals into equal parts and how is it done? ● Why is it important to demonstrate fluency of decimal operations in real world situations and how is it shown? ● How can estimation be used to check accuracy of calculations?	<u>Understandings:</u> ● A standard division algorithm can be useful when solving real world problems that involve equal grouping by breaking whole numbers into equal parts with or without remainders (two digit divisors). ● Estimation is a useful tool in finding the reasonableness of calculations. ● Division using a decimal divisor is changed to an equivalent calculation with a whole number divisor by multiplying the divisor and dividend by an appropriate power of ten. ● Money amounts represented as decimals can be added and subtracted using the same algorithms as with whole numbers.
<u>Knowledge:</u> ● Identify and choose appropriate processes to compute fluently with multi digit numbers.	<u>Do/Skills:</u> ● Solve problems involving operations (all four operations) with whole numbers, decimals, (through thousandths), straight computation, or word problems. (including a sums, differences, products and quotients of whole numbers and decimals or decimals and decimals)

<u>Vocabulary:</u> • Divisor • Dividend • Quotient • Decimal • Tenths • Hundredths • Thousandths • Addend • Sum • Difference • Product • Decimal Point • Estimation • Rounding	<u>Core Resources:</u> • Class Notes • Digital Resources
<u>Common Assessment(s):</u> • Vocabulary Quiz • Unit Test	<u>Supplemental Resources:</u> • Digital Resources

<u>Grade, Subject/Course:</u> Grade 6, Math/6th Grade Math	
<u>Unit 4:</u> Expressions and Equations	<u> x </u> Essential <u> </u> Important <u> </u> Compact
<u>Big Idea:</u> •Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> M06.B-E.1.1 Identify, write, and evaluate numerical and algebraic expressions. M06.B-E.2.1 Create, solve, and interpret one-variable equations or inequalities in real-world and mathematical problems. M06.B-E.3.1 Use variables to represent two quantities in a real-world problem that change in relationship to one another.	<u>Interdisciplinary Standards (if applicable):</u> N/A
<u>Essential Questions:</u> • How are expressions rewritten to represent quantities in different ways? • How can verbal expressions/sentences and algebraic expressions/equations be translated? • How are equations that correspond to given situations or represent a given mathematical relationship written? • In what ways does the use of the order of operations have on solving an equation? • How can an unknown in an expression be found? • How are representations used to describe the relationship	<u>Understandings:</u> • Letters are used in mathematics to represent generalized properties, unknowns in equations, and relationships between quantities. • Algebraic expressions can be used to represent mathematical situations. • Exponents represent repeated multiplication of a factor. • A variable represents a number or sets of numbers in writing and reading an expression. • Order of operations dictates the correct process to arrive at the solution of an equation. • The distributive property can be used to write equivalent expressions. • There is more than one way to solve for the variable that will make the equation true. • An unknown variable can be found by solving an equal balance. • Inequalities can be used to represent real world and mathematical situations. • That there are multiple ways of representing the relationship between quantities (language, a table, an equation, or a graph).

between quantities?	
<u>Knowledge:</u> • Apply and extend previous understandings of arithmetic to algebraic expressions. • Understand the process of solving a one-variable equation or inequality and apply to real-world and mathematical problems. • Represent and analyze quantitative relationships between dependent and independent variables.	<u>Do/Skills:</u> • Write and evaluate numerical expressions involving whole-number exponents. • Write algebraic expressions from verbal descriptions. • Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity). For example, describe the expression $2(8 + 7)$ as a product of two factors. • Evaluate expressions at specific values of their variables, including expressions that arise from formulas used in real-world problems. • Apply the properties of operations to generate equivalent expressions, including: ○ Using the distributive property with $3(2 + x)$ to generate $6 + 3x$. ○ Applying the distributive property to $24x + 18y$ to generate $6(4x + 3y)$. ○ Using properties of operations with $y + y + y$ to produce $3y$. • Use substitution to determine whether a given number in a specified set makes an equation or inequality true. • Write algebraic expressions to represent real-world or mathematical problems. • 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 non-negative rational numbers. • 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/or represent solutions of such inequalities on number lines. • Write an equation to express the relationship between the dependent and independent variables. For example, in a problem involving motion at a constant speed of 65 units, write the equation $d = 65t$ to represent the relationship between distance and time. • Analyze the relationship between the dependent and independent variables using graphs and tables, and/or relate these to an equation.

Vocabulary:

- exponents
- base
- numerical expressions
- algebraic expressions
- evaluate
- sum
- difference
- product
- quotient
- term product
- factor
- quantity
- coefficient
- constant
- like terms
- equivalent expressions
- variables
- distributive property
- justifying solutions
- substitution
- inequalities
- equations
- greater than $>$
- less than $<$
- greater than or equal to $\geq$
- less than or equal to $\leq$
- relationship
- independent variable
- dependent variable

Core Resources:

- Class Notes
- Digital Resources

Common Assessment(s):

- Vocabulary Quiz
- Unit Test

Supplemental Resources:

- Digital Resources

<u>Grade, Subject/Course:</u> Sixth Grade Math	
<u>Unit 5:</u> Ratios and Proportional Relationships	<u> x </u> Essential <u> </u> Important <u> </u> Compact
<u>Big Idea:</u> Numbers, expressions and measures can be compared by their relative values.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> M06.A-R.1.1 Represent and/or solve real world and mathematical problems using rate, ratios, and/or percents.	<u>Interdisciplinary Standards (if applicable):</u> N/A
<u>Essential Questions:</u> - How can like and unlike quantities be compared? - How is the unit rate used in solving problems? - How is percent used to solve problems finding the whole?	<u>Understandings:</u> - A ratio is a multiplicative comparison of quantities; there are different types of comparisons that can be represented as ratios. - Ratios give the relative sizes of the quantities being compared, not necessarily the actual sizes. - Rates are special types of ratios where unlike quantities are being compared. - Ratios can be expressed as units by finding an equivalent ratio where the second term is one. - When you graph the terms of equal ratios as ordered pairs (first term, second term) and connect the points, the graph is a straight line. - A percent is a special type of ratio where a part is compared to a whole and the whole is 100.
<u>Knowledge:</u> Understand ratio concepts and use ratio reasoning to solve problems.	<u>Do/Skills:</u> - Use ratio language and notation. - Find the unit rate associated with a ratio and use rate language in the context of a ratio relationship. - Construct tables of equivalent ratios relating quantities and whole number measurements, find missing values in the tables, and/or plot the pairs of values on the coordinate plane. Use tables to compare ratios. - Solve unit rate problems including those involving unit pricing and constant speed. - Find percent of a quantity as a rate per 100 and solve problems involving finding the whole, given a part and the percentage.

<u>Vocabulary:</u> ● Ratio ● Rate ● Unit Rate ● Part to whole ratio ● Proportion ● Unit Price ● Percentage ● Equivalent Ratios	<u>Core Resources:</u> ● Class Notes ● Digital Resources
<u>Common Assessment(s):</u> ● Vocabulary Quiz ● Unit Assessment	<u>Supplemental Resources:</u> ● Digital Resources

<u>Grade, Subject/Course:</u> Grade 6, Math/6th Grade Math	
<u>Unit 6:</u> Geometry	<u> x </u> Essential <u> </u> Important <u> </u> Compact
<u>Big Idea:</u> Some attributes of objects are measurable and can be quantified using unit amounts.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> M06.C-G.1.1 Find area, surface area, and volume by applying formulas and using various strategies.	<u>Interdisciplinary Standards (if applicable):</u> N/A
<u>Essential Questions:</u> • Why is finding the area of any polygon important to problem solving? • Why is finding the space that a polyhedra takes up valuable to solving problems?	<u>Understandings:</u> • A polygon's area is unique to that polygon. • The area of an irregular or compound polygon can be found by decomposing that polygon into other polygons. • Volume is the amount of space an object takes up. • Coordinate graphing can be used to find the area of a polygon. • Nets of 3-D figures are plane figures. • Surface area is the area of faces of a 3-D figure added together. • Measurement involves a selected attribute of an object (area, volume, surface area) and a comparison of the object measured against a unit of the same attribute.
<u>Knowledge:</u> • Apply appropriate tools to solve real world and mathematical problems involving area, surface area, and volume.	<u>Do/Skills:</u> • Determine the area of triangles and special quadrilaterals (square, rectangle, parallelogram, rhombus, trapezoid) with formulas provided. • Determine the area of irregular or compound polygons. • Determine the volume of right rectangular prisms with fractional edge lengths with formulas provided. • Given the coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals) with formulas provided. • Represent 3-D figures using nets made up of rectangles and triangles. • Determine the surface area of triangular and rectangular prisms (including cubes) with formulas provided.

Vocabulary:

- Square
- Trapezoid
- Rectangle
- Parallelogram
- Right Angle
- Parallel Lines
- Cube
- Rectangular Prism
- Face
- Edge
- Vertex
- Net
- Base
- Height
- Formula
- Composite Shape (compound polygon)
- Area
- Square Units
- Perimeter
- Surface Area
- Volume
- Cubic Units
- Triangular Prism
- Square Pyramid
- Triangular Pyramid

Core Resources:

- Class notes
- Digital Resources

<u>Common Assessment(s):</u> • Vocabulary Quiz • Unit Test	<u>Supplemental Resources:</u> • Digital Resources
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<u>Grade, Subject/Course:</u> Grade 6, Math/6th Grade Math	
<u>Unit 7:</u> Statistics and Probability	__x__ Essential ____ Important ____ Compact
<u>Big Idea:</u> • Data can be represented visually using tables, charts, and graphs. • The type of data determines the best choice of visual representation. • There are special numerical measures that describe the center and spread of numerical data sets.	
<u>PA Core Content Standards/Anchors (or National Standards):</u> M06.D-S.1.1 Display, analyze, and summarize numerical data sets in relation to their context.	<u>Interdisciplinary Standards (if applicable):</u> N/A
<u>Essential Questions:</u> • How can numerical data be displayed? • Why are measures of central tendency used and how are they found? • How can gathered data be described?	<u>Understandings:</u> • We can show data in lots of different ways, depending on what kind of information we collected. • The best way to describe the “middle” of our data (mean, median, or mode) depends on the kind of data we have and the question we’re trying to answer. • Extreme numbers (outliers) can change the mean, median, and mode in different ways. • Numbers can tell us how data is spread out, which helps us understand it better. • The way we show our data can help us see overall trends and notice anything unusual.

<u>Knowledge:</u> • I can show numbers on different kinds of number line graphs, like dot plots, histograms, and box-and-whisker plots. • I can find the mean, median, and mode of a data set, and figure out how spread out the data is using range, interquartile range, or mean absolute deviation. • I can describe patterns I see in data and point out anything that doesn't fit the pattern, based on where the data came from. • I can choose the best way to describe the center and spread of data by looking at the shape of the data and thinking about where it came from.	<u>Do/Skills:</u> • Display numerical data in plots on a number line, including dot plots, histograms, and box-and-whisker plots. • Determine quantitative measures of central tendencies (e.g., median, mean, and/or mode) and variability (e.g., range, interquartile range, and/or mean absolute deviation). • Describe any overall pattern and any deviations from the overall pattern with reference to the context in which the data were gathered. • Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
<u>Vocabulary:</u> • Line plots • Histogram • Box-and-whisker plots • Median • Mean • Mode • Range • Interquartile range • Mean absolute deviation • Measure of center • Data distribution • Outlier	<u>Core Resources:</u> • Class Notes • Digital Resources

<u>Common Assessment(s):</u> • Vocabulary Quiz • Unit Test	<u>Supplemental Resources:</u> • Digital Resources
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