Grade 6 – Expressions and Equations

Essential Questions:

1. How do you use patterns to understand mathematics and model situations?
2. What is algebra?
3. How are the horizontal and vertical axes related?
4. How do algebraic representations relate and compare to one another?
5. How can we communicate and generalize algebraic relationships?

Essential Vocabulary - exponents, , operations, sum, term, difference, product, factor, quotient, coefficient, value, variable, Order of Operations, expressions, distributive property, equivalent, equation, inequality, nonnegative rational numbers, inequality, infinite, number line diagram, quantities, dependent variable, independent variable, equation, ordered pairs, Montana American Indians

6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. numerical expressions involving whole-number exponents.	1. How to write and evaluate numerical expressions involving whole-number exponents	1. write and evaluate

6.EE.2- Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y.

b. 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. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole- number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = ½.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. expressions in which letters stand for numbers 2. expressions that record operations with numbers and with letters standing for numbers	1. how to write expressions from verbal descriptions using letters and numbers. Students understand order is important in writing subtraction and division problems. 2. how to use appropriate mathematical	1. write, read, and evaluate 2. write 3. identify 4. view 5. evaluate

3. parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient) 4. one or more parts of an expression as a single entity 5. expressions at specific values of their variables 6. expressions that arise from formulas used in real-world problems 7. arithmetic operations, including those involving whole- number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations)	language to write verbal expressions from algebraic expressions. 3. a. how to evaluate algebraic expressions, using order of operations as needed. b. how to write an expression and then evaluate for any number, given a context and the formula arising from the context.	6. include 7. perform
6.EE.3 Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.		
Grade 6 Enduring Understandings		
Students will know… 1. the properties of operations to generate equivalent expressions	***Students will understand…*** 1. How to apply the Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.	***Students will be able to…*** 1. apply
6.EE.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*		

Grade 6 Enduring Understandings		
Students will know… 1. When two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*	***Students will understand…*** 1. How to identify when two expressions are equivalent	***Students will be able to…*** 1. identify
6.EE.5 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? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.		
Grade 6 Enduring Understandings		
Students will know… 1. 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. 2. That substitution can be used to determine whether a given number in a specified set makes an equation or inequality true.	***Students will understand…*** 1. How to solve 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 2. How to use a substitution to determine whether a given number in a specifi8ed set makes an equation or inequality true.	***Students will be able to…*** 1. understand 2. use
6.EE.6 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.		
Grade 6 Enduring Understandings		
Students will know… 1. variables to represent numbers and write expressions when solving a real-world or mathematical problem\ 2. That a variable can represent an unknown number or nay number in a	***Students will understand…*** 1. How to use variable to represent numbers and write expressions when solving a real-world or mathematical problem. 2. Understand that a variable can represent an unknown number, or, depending on the	***Students will be able to…*** 1. use 2. understand

specified set	purpose at hand, any number in a specified set.	
6.EE.7 - 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.		
Grade 6 Enduring Understandings		
Students will know… 1. real world and mathematical problems 2. Equations where variables are all nonnegative rational numbers	***Students will understand…*** 1. How to solve real-world and mathematical problems 2. How to write and solve equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.	***Students will be able to…*** 1. solve 2. write
<u>Established Goals</u>: 6.EE.8 - Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.		
Grade 6 Enduring Understandings		
Students will know… 1. an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem 2. that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions 3. solutions of such inequalities on number line diagrams	***Students will understand…*** 1. how to represent many real-world situations by inequalities. 2. how to recognize inequalities and know they have infinitely many solutions. Students recognize that possible values can include fractions and decimals, which are represented on the number line by shading. Shading is extended through the arrow on a number line to show that an inequality has an infinite number of solutions. 3. how to write an inequality and represent solutions on a number line for various contextual situations.	***Students will be able to…*** 1. write 2. recognize 3. represent
6.EE.9 – Use variables to represent two quantities in a real-world problem from a variety of cultural contexts, including those of Montana		

American Indians, 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. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. variables represent two quantities in a real-world problem from a variety of cultural contexts, including those of Montana American Indians, that change in relationship to one another 2. an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable 3. the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation	1. how to use variables to represent two quantities in a real-world problem that change in relationship to one another 2. how to write an equation to express the quantity of the dependent variable as effected by the independent variable 3. that the relationship between two variables begins with the distinction between dependent and independent variables and that: a. the independent variable is the variable that can be changed b. the dependent variable is the variable that is affected by the change in the independent variable c. the independent variable is graphed on the x-axis d. the dependent variable is graphed on the y-axis	1. use 2. write 3. analyze

Grade 6 - Geometry

Essential Questions:

1. Why are geometry and geometric figures relevant and important?
2. How can geometric ideas be communicated using a variety of representations? ******(i.e maps, grids, charts, spreadsheets)
3. How can geometry be used to solve problems about real-world situations, spatial relationships, and logical reasoning?

Essential Vocabulary: volume, right rectangular prism, fractional lengths, unit cubes, formula, length, width, height, base, polygon, coordinate plane, vertices, coordinates, first coordinate, second coordinate

We want students to understand that geometry is all around us in 2D or 3D figures. Geometric figures have certain properties and can be transformed, compared, measure, constructed, three dimensional figures, nets, surface area

6.G.1 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, with cultural contexts, including those of Montana American Indians; for example, use Montana American Indian designs to decompose shapes and find the area.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. the area of right triangles, other triangles, special quadrilaterals, and polygons 2. rectangles 3. triangles and other shapes 4. techniques in the context of solving real-world and mathematical problems, with cultural contexts, including those of Montana American Indians; for example, use Montana American Indian designs to decompose shapes and find the area.	1. Students continue to understand that area is the number of squares needed to cover a plane figure. Finding the area of triangles is introduced in relationship to the area of rectangles – a rectangle can be decomposed into two congruent triangles. Therefore, the area of the triangle is ½ the area of the rectangle. The area of a rectangle can be found by multiplying base x height; therefore, the area of the triangle is ½ bh or (b x h)/2. Students decompose shapes into rectangles and triangles to determine the area. For example, a trapezoid can be decomposed into triangles and rectangles (see figure below). Using the trapezoid's dimensions, the area of the individual triangle(s) and rectangle can be found and then added together. 2. Students should know the formulas for rectangles and triangles. "Knowing the formula" does not mean memorization of	1. find 2. compose 3. decompose 4. apply

	the formula. To "know" means to have an understanding of ***why*** the formula works and how the formula relates to the measure (area) and the figure. This understanding should be for *all* students.	

6.G.2 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. 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.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths 2. volume is the same as would be found by multiplying the edge lengths of the prism 3. 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.	1. that the unit cube will have fractional edge lengths. (ie. ½ • ½ • ½) Students find the volume of the right rectangular prism with these unit cubes. 2. "Know the formula" does not mean memorization of the formula. To "know" means to have an understanding of ***why*** the formula works and how the formula relates to the measure (volume) and the figure. This understanding should be for *all* students.	1. find 2. show 3. apply

6.G.3 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. Apply these techniques in the context of solving real-world and mathematical problems.

Grade 6th Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. polygons in the coordinate plane given coordinates for the vertices 2. coordinates 3. length of a side joining points with the same first coordinate or the same second coordinate 4. these techniques in the context of solving real-world and mathematical problems	1. Students are given the coordinates of polygons to draw in the coordinate plane. If both *x*-coordinates are the same (2, -1) and (2, 4), then students recognize that a vertical line has been created and the distance between these coordinates is the distance between -1 and 4, or 5. 2. If both the y-coordinates are the same (-5,	1. draw 2. use 3. find 4. apply

	4) and (2, 4), then students recognize that a horizontal line has been created and the distance between these coordinates is the distance between -5 and 2, or 7. Using this understanding, student solve real-world and mathematical problems, including finding the area of quadrilaterals and triangles. This standard can be taught in conjunction with 6.G.1 to help students develop the formula for the triangle by using the squares of the coordinate grid. Given a triangle, students can make the corresponding square or rectangle and realize the triangle is ½. 3. Students progress from counting the squares to making a rectangle and recognizing the triangle as ½ to the development of the formula for the area of a triangle.	
6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.		
Grade 6 Enduring Understandings		
Students will know… 1. three-dimensional figures 2. Nets made up of rectangles and triangles, and use the nets to find the surface area of these figures 3. Techniques in the context of solving real-world and mathematical problems.	***Students will understand…*** 1. How to represent three-dimensional figures 2. How to use nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. 3. How to apply techniques in the context of real-world and mathematical problems.	***Students will be able to…*** 1. represent 2. use 3. apply

Grade 6 – Number Sense

Essential Questions:

1. Why do we use numbers, what are their properties, and how does our number system function?
2. Why do we use estimation and when is it appropriate?
3. What makes a strategy effective and efficient and the solution reasonable?
4. How do numbers relate and compare to one another?

Essential Vocabulary – fractions, numerator, denominator, division, quotient, dividend, divisor, multiplication, equations, division, divisor, dividend, standard algorithm, decimal terminating, repeating decimal, add, subtract, multiply, divide, rational number, irrational number, whole, number, factor, multiple, greatest common factor (GCF), least common multiple (LCM), distributive property, positive numbers, negative numbers, quantities, point, coordinate axes, plane, ordered pairs, coordinate planes, quadrants, integers, horizontal number line diagram, vertical number line diagram, absolute value, inequality, rational numbers, number line, positive quantity, negative quantity, quadrants, coordinate plane,

We want students to understand that all numbers have parts, values, uses, types, and we use operations and patterns to work with them.

6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. quotients of fractions 2. word problems involving division of fractions by fractions 3. fractional models and equations to represent the problem 4. quotient 5. relationship between multiplication and division	1. how to interpret and compute quotients of fractions 2. how to solve word problems involving division of fractions by fractions 3. how to create word problems involving division of fractions by fractions 4. how to use fraction models and equations to represent the problem	1. interpret and compute 2. solve 3. use 4. show 5. use

6.NS.2 Fluently divide multi-digit numbers using the standard algorithm.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. multi-digit numbers 2. standard algorithm for division	1. how to become fluent in the use of the standard division algorithm	1. divide 2. use

6.NS.3: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. multi-digit decimals 2. standard algorithm for each operation	1. how to become fluent in the use of the standard algorithms for each operation.	1. add, subtract, multiply, and divide 2. use

6.NS.4: 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. 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. For example, express 36 + 8 as 4 (9 + 2).

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. greatest common factor of two whole numbers less than or equal to 100 2. least common multiple of two whole numbers less than or equal to 12 3. distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two while numbers with no common factor	1. how to find the greatest common factor of two whole numbers between 1 and 100. 2. how to find the least common multiple of two whole numbers less than or equal to 12. 3. common factor and the distributive property to find the sum of two whole numbers.	1. find 2. use

6.NS.5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. positive and negative numbers are used together to describe quantities. 2. positive and negative numbers to represent quantities in real-world contexts 3. the meaning of 0 in real-world contexts	1. how to use rational numbers (fractions, decimals, and integers) to represent real-world contexts and understand the meaning of 0 in each situation.	1. understand 2. use 3. explain

6.NS.6: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
a. 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, e.g., – (–3) = 3, and that 0 is its own opposite
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
c. 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.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. A. rational number as a point on the number line B. signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane 2. number line diagrams and coordinate axes to represent points on the line and in the plane with negative number coordinates 3. A. opposite signs of numbers as indicating locations on opposite sides of 0 on the number line B. two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes 4. A. integers and other rational numbers on a horizontal or vertical number line diagram B. pairs of integers and other rational numbers on a coordinate plane	1. how to extend the number line to represent all rational numbers and recognize that number lines may be either horizontal or vertical (ie. thermometer). 2. how to recognize a number and its opposite that are equidistance from zero (reflections about the zero). 3. that the point where the *x*-axis and *y*-axis intersect is the origin. 4. how to recognize the four quadrants and are able to identify the quadrant for an ordered pair based on the signs of the coordinates 5. the relationship between two ordered pairs differing only by signs as reflections across one or both axes 6. how to plot all rational numbers on a number line (either vertical or horizontal) 7. how to identify the values of given points on a number line.	1. understand 2. extend 3. recognize 4. find and position

6.NS.7: Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3oC > –7oC to express the fact that –3oC is warmer than –7oC.*

c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.*

d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. A) ordering of rational numbers 2. B) absolute value of rational numbers as its distance from 0 on the number line 3. statements of inequality as statements about the relative position of two numbers on a number line 4. statements of order for rational numbers in real-world contexts	1. how to identify the absolute value of a number as the distance from zero but understand that although the value of -7 is less than -3, the absolute value (distance) of -7 is greater than the absolute value (distance) of -3. 2. how to use inequalities to express the relationship between two rational numbers, understanding that the value of numbers is smaller moving to the left on a number line. 3. how to write statements using < or > to compare rational number in context. 4. absolute value as the distance from zero and recognize the symbols | | as representing absolute value. 5. that when working with positive numbers, the absolute value (distance from zero) of the number and the value of the number is the same; therefore, ordering is not problematic. 6. as the negative number increases (moves to the left on a number line), the value of the number decreases.	1. understand 2. interpret 3. write, interpret, and explain 4. distinguish

6.NS.8: Solve real-world and mathematical problems from a variety of cultural contexts, including those of Montana American Indians, by graphing 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.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. real-world and mathematical problems from a variety of cultural contexts, including those of Montana American Indians, by graphing points in all four quadrants of the coordinate plane 2. use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate	1. how to find the distance between points whose ordered pairs have the same x-coordinate (vertical) or same y-coordinate (horizontal). 2. coordinates could also be in two quadrants.	1. solve 2. include

Grade 6 – Ratio and Proportions

Essential Questions:

6. Why do we use numbers, what are their properties, and how does our number system function?
7. Why do we use estimation and when is it appropriate?
8. What makes a strategy effective and efficient and the solution reasonable?
9. How do numbers relate and compare to one another?

Essential Vocabulary – ratio, ratio language, ratio relationship, quantities, unit rate, rate language, ratio reasoning, equivalent ratios, rate, rate reasoning, tape diagrams, double number line diagrams, equations, quantities, value, coordinate planes, unit rate problems, unit pricing, constant speed, percent

6.RP.1- Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. the concept of a ratio 2. ratio language 3. a ratio relationship between two quantities	1. a ratio is the comparison of two quantities or measures. 2. the comparison can be part-to-whole or part-to-part. 3. each of these ratios when expressed in the following forms: 6/15, 6 to 15 or 6:15. These values can be reduced to 2/5, 2 to 5 or 2:5; however, students would need to understand how the reduced values relate to the original numbers, 6/15 and 2/5.	1. understand 2. use 3. describe

6.RP.2- Understand the concept of a unit rate a/b associated with a ratio a:b with b not equal to 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. the concept of a unit rate a/b associated with a ratio a:b with b not equal to 0. 2. rate language in the context of a ratio relationship.	1. a unit rate expresses a ratio as part-to-one. For example, if there are 2 cookies for 3 students, each student receives 2/3 of a cookie, so the unit rate is 2/3:1. If a car	1. understand 2. use

	travels 240 miles in 4 hours, the car travels 60 miles per hour (60:1). 2. the unit rate from various contextual situations.	

6.RP.3- Use ratio and rate reasoning to solve real-world and mathematical problems from variety of cultural contexts, including those of Montana American Indians, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
a. Make tables of equivalent ratios relating quantities with whole- number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*
c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. a. ratio and rate reasoning b. tables c. ratio reasoning 2. a. real-world and mathematical problems from variety of cultural contexts, including those of Montana American Indians b. unit rate problems including those involving unit pricing and constant speed c. problems involving finding the whole, given a part and the percent 3. tables of equivalent ratios 4. quantities with whole-number measurements 5. a. missing values in the table b. percent of a quantity as a rate per 100 6. pairs of values on the coordinate plane 7. ratios 8. measurement units 9. units appropriately when multiplying or dividing quantities	1. how ratios and rates can be used in ratio tables and graphs to solve problems in various contexts (especially those of Montana American Indians) including measurement, prices, and geometry. 2. how to begin using multiplicative reasoning to solve problems in a table. When working with ratio tables and graphs, whole number measurements are the expectation for this standard. 3. how to recognize the use of ratios, unit rate and multiplication in solving problems, which could allow for the use of fractions and decimals. 4. a. that percentages are a rate per 100. b. how to use percentages to find the part when given the percent, by recognizing that the whole is being divided into 100 parts and then taking a part of them (the percent).	1. use 2. solve 3. make 4. relate 5. find 6. plot 7. compare 8. convert 9. manipulate and transform

	c. how to find the whole, given a part and the percent. 5. a. how to convert measurement units using ratio reasoning b. how to manipulate and transform units appropriately when multiplying or dividing quantities.	

Grade 6 – Statistics and Probability

Essential Questions:

1. How can we gather, organize and display data to communicate and justify results in the real world?
2. How can we analyze data to make inferences and/or predictions, based on surveys, experiments, probability and observational studies?

Essential Vocabulary - statistical question, numerical data set, measure of variation, numerical data, plots, dot plots, histogram, box plot, quantitative measures

6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. a statistical question as one that anticipates variability in the data related to question and account for it in the answers	1. Students differentiate between statistical questions and those that are not. A statistical question is one that collects information that addresses differences in a population. The question is framed so that the responses will allow for the differences. For example, the question, "How tall am I?" is not a statistical question because there is only one response; however, the question, "How tall are the students in my class?" is a statistical question since the responses would allow for differences.	1. recognize

6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

Grade 6 Enduring Understandings

Students will know…	***Students will understand…***	***Students will be able to…***
1. That a set of data collected to answer a statistical question has a distribution 2. A set of data by its center, spread , and overall shape.	1. The distribution is the arrangement of the values of a data set. Distribution can be described using center (median or mean), and spread. Data collected can be represented on graphs, which will show	1. understand 2. describe

	the shape of the distribution of the data. Students examine the distribution of a data set and discuss the center, spread and overall shape with dot plots, histograms and box plots.	
6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.		
Grade 6 Enduring Understandings		
Students will know…	***Students will understand…***	***Students will be able to…***
1. 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.	1. How data sets contain many numerical values that can be summarized by one number such as a measure of center. The measure of center gives a numerical value to represent the center of the data (ie. midpoint of an ordered list or the balancing point). Another characteristic of a data set is the variability (or spread) of the values. Measures of variation are used to describe this characteristic	1. recognize
6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots		
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Students will know…	***Students will understand…***	***Students will be able to…***
1. Numerical data in plots on a number line, including dot plots, histograms, and box plots	1. Students display data set using number lines. Dot plots, histograms and box plots are three graphs to be used. • A dot plot is a graph that uses a point (dot) for each piece of data. The plot can be used with data sets that include fractions and decimals. • A histogram shows the distribution of continuous data using intervals on the number line. The height of	1. Display data

	each bar represents the number of data values in that interval. • A box plot shows the distribution of values in a data set by dividing the set into quartiles. The box plot is constructed from the five-number summary (minimum, lower quartile, median, upper quartile, and maximum). These values give a summary of the shape of a distribution. Students understand that the size of the box or whiskers represent the	
6.SP.5 Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. 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. d. 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.		
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Students will know… 1. Numerical data sets in relation to their context 2. The number of observations 3. The nature of the attribute under investigation, including how it was measured and its units of measurement 4. 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.	***Students will understand…*** 1. How to record/summarize the number of observations. • Using histograms, students determine the number of values between specified intervals. • Given a box plot and the total number of data values, students identify the number of data points that are represented by the box. Reporting of the number of observations must consider the attribute of the data sets, including units (when applicable). Given a set of data values, students	***Students will be able to…*** 1. summarize 2. report 3. describe 4. give 5. relate

5. the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	summarize the measure of center with the median or mean. 2. How to report their observations and how they collected their data (ex. Random sample) 3. How to describe the mean, median, and mode from a set of data. (deviation?)	