

WGSD Curriculum – Math 6th Grade

In Grade 6, instructional time will focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations and (4) developing understanding of statistical thinking.

While the content learning goals describe the mathematics students should be able to understand and do, the first eight learning goals (The Standards for Mathematical Practice) describe how students should engage with these mathematical concepts and skills as they grow in mathematical maturity and expertise. Teachers will connect the mathematical practices to mathematical content in all mathematics instruction. These learning goals merit the most time, resources, innovation, and focus necessary to qualitatively improve the instruction, assessment, and student achievement in mathematics.

WGSD Curriculum – Math 6th Grade
Mathematical Practices

High Priority Standards CCSS.Math.Practice.MP1	
<p><u>Learning Goal</u></p> <p>Students will be able to make sense of problems and persevere in solving them.</p>	<p><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by:</p> <ul style="list-style-type: none"> ● Discussing, explaining, and solving a problem with multiple representations and in multiple ways. ● Struggling with various attempts over time. ● Learning from previous solution attempts. ● Checking answers using a different method or strategy. <p>2: Student demonstrates they are nearing proficiency by:</p> <ul style="list-style-type: none"> ● Explaining his/her thought processes when solving a problem and representing it in several ways. ● Trying several approaches to find a solution and seeking hints only if stuck. <p>1: Student demonstrates a limited understanding or skill with the learning goal by:</p> <ul style="list-style-type: none"> ● Explaining their thought processes when solving a problem one way. ● Staying with a challenging problem for more than one attempt.
<p><u>Learning Targets</u></p> <ul style="list-style-type: none"> ● Explain the meaning of a problem and look for efficient ways to solve it ● Use concrete objects or pictures to help conceptualize and solve problems ● Check their thinking by asking themselves, “Does this make sense?” ● Listens to the strategies of others and tries different approaches ● Uses a different strategies to check answers ● Takes time to thoughtfully consider problems 	

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Learning Design

- Provides time and facilitates discussion in problem solutions
- Facilitates discourse in the classroom so that students UNDERSTAND the approaches of others
- Provides opportunities for students to explain themselves, the meaning of a problem, etc.
- Provides opportunities for students to connect concepts to “their” world
- Provides students TIME to think and become “patient” problem solvers
- Facilitates and encourages students to check their answers using different methods (not calculators)
- Provides problems that focus on relationships and are “generalizable”

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Mathematical Practices

High Priority Standards CCSS.Math.Practice.MP2	
<p><u>Learning Goal</u></p> <p>Students will be able to reason abstractly and quantitatively.</p>	<p><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by:</p> <ul style="list-style-type: none"> ● Converting situations into symbols to solve problems. ● Converting mathematical equations into meaningful situations. <p>2: Student demonstrates they are nearing proficiency by translating situations into symbols to solve problems.</p> <p>1: Student demonstrates a limited understanding or skill with the learning goal by reasoning with models or pictorial representations to solve problems.</p>
<p><u>Learning Targets</u></p> <ul style="list-style-type: none"> ● Recognize that a number represents a specific quantity ● Connect the quantity to written symbols and create a logical representation of the problem at hand ● Consider both the appropriate units involved and the meaning of quantities ● Write simple expressions that record calculations with numbers and symbols ● Represent or round numbers using place value concepts 	
<p><u>Learning Design</u></p> <ul style="list-style-type: none"> ● Provides a range of representations of math problem situations and encourages various solutions ● Provides opportunities for students to make sense of quantities and their relationships in problem situations ● Provides problems that require flexible use of properties of operations and objects ● Emphasizes quantitative reasoning which entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them and/or rules; and knowing and flexibly using different properties of operations and objects 	

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High Priority Standards CCSS.Math.Practice.MP3	
<p><u>Learning Goal</u></p> <p>Students will be able to construct viable arguments and critique the reasoning of others.</p>	<p><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by:</p> <ul style="list-style-type: none"> ● Justifying and explaining, with accurate language and vocabulary, why his/her solution is correct. ● Comparing his/her strategy to other students’ strategies, asking questions, and making connections with his/her own thinking. ● Explaining the reasoning of others. <p>2: Student demonstrates they are nearing proficiency by:</p> <ul style="list-style-type: none"> ● Explaining his/her thinking and the thinking of others with accurate vocabulary. ● Explaining other students’ solutions and identifying strengths and weaknesses of the strategy. <p>1: Student demonstrates a limited understanding or skill with the learning goal by:</p> <ul style="list-style-type: none"> ● Explaining his/her solution. ● Discussing other ideas, approaches, and strategies.
<p><u>Learning Targets</u></p> <ul style="list-style-type: none"> ● Construct arguments using concrete referents, such as objects, pictures, and drawings ● Refine their mathematical communication skills by answering questions like “How do you know?” and “Can you show me another way?” ● Refine their mathematical communication skills by asking others questions like “How do you know?” and “How did you get that?” ● Explain their thinking to others and respond to others’ thinking 	
<p><u>Learning Design</u></p> <ul style="list-style-type: none"> ● Provides ALL students opportunities to understand and use stated assumptions, definitions, and previously established results in constructing arguments ● Provides ample time for students to make conjectures and build a logical progression of statements to explore the truth of their conjectures ● Provides opportunities for students to construct arguments and critique arguments of peers ● Facilitates and guides students in recognizing and using counterexamples ● Encourages and facilitates students justifying their conclusions, communicating, and responding to the arguments of others ● Asks useful questions to clarify and/or improve students’ arguments 	

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High Priority Standards	
CCSS.Math.Practice.MP4, TILS 5.C.a: Recognize that there are a variety of ways to share information, TILS 5.C.c: Effectively share information	
<p><u>Learning Goal</u></p> <p>Students will be able to model with mathematics.</p>	<p style="text-align: center;"><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by:</p> <ul style="list-style-type: none"> ● Recognizing math in everyday situations. ● Using a variety of models, symbolic representations, and technology tools to represent the solution to a problem and accurately explain the solution representation. <p>2: Student demonstrates they are nearing proficiency by:</p> <ul style="list-style-type: none"> ● Recognize math in everyday situations, when prompted. ● Using models and symbols to represent and solve a problem. <p>1: Student demonstrates a limited understanding or skill with the learning goal by using models to represent and solve a problem with teacher support.</p>
<u>Learning Targets</u>	
<ul style="list-style-type: none"> ● Represents problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc. and use all of these representations as needed ● Connect different representations and explain the connections ● Evaluate results in the context of the situation and reflect on whether the results make sense ● Evaluate the utility of models to determine which models are most useful and efficient to solve problems 	
<u>Learning Design</u>	
<ul style="list-style-type: none"> ● Provides problem situations that apply to everyday life ● Provides rich tasks that focus on conceptual understanding, relationships, etc. 	

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High Priority Standards CCSS.Math.Practice.MP5	
<p><u>Learning Goal</u></p> <p>Students will be able to use appropriate tools strategically.</p>	<p><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by combining various tools to explore and solve a problem as well as justifying his/her tool selection and problem solution.</p> <p>2: Student demonstrates they are nearing proficiency by selecting from a variety of provided tools the ones that can be used to solve a problem and explaining his/her reasoning for the selection.</p> <p>1: Student demonstrates a limited understanding or skill with the learning goal by using the appropriate tool, when provided, to find a solution.</p>
<p><u>Learning Targets</u></p> <ul style="list-style-type: none"> ● Consider the available tools (including, but not limited to estimation, graph paper, manipulatives, table, list, etc.) when solving a mathematical problem and decide when certain tools might be helpful ● For example, they may use unit cubes to fill a rectangular prism and a ruler to measure the dimensions ● Use graph paper to accurately create graphs and solve problems or make predictions from real world data 	
<p><u>Learning Design</u></p> <ul style="list-style-type: none"> ● Provides a variety of tools and technology for students to explore to deepen their understanding of math concepts ● Provides problem solving tasks that require students to consider a variety of tools for solving (Tools might include pencil/paper, concrete models, manipulatives, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software, etc.) 	

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High Priority Standards CCSS.Math.Practice.MP6	
<p><u>Learning Goal</u></p> <p>Students will be able to attend to precision.</p>	<p style="text-align: center;"><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by using appropriate symbols, vocabulary, and labeling to communicate effectively and exchange ideas.</p> <p>2: Student demonstrates they are nearing proficiency by incorporating appropriate vocabulary and symbols in most mathematical communications.</p> <p>1: Student demonstrates a limited understanding or skill with the learning goal by communicating his/her reasoning and solution to others, with support.</p>
<p><u>Learning Targets</u></p> <ul style="list-style-type: none"> ● Use clear and precise language in their discussions with others and in their own reasoning ● Specify units of measure and state the meaning of the symbols used ● Report answers that appropriately address the context of a problem 	
<p><u>Learning Design</u></p> <ul style="list-style-type: none"> ● Facilitates, encourages and expects precision in communication ● Provides opportunities for students to explain and/or write their reasoning to others 	

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High Priority Standards CCSS.Math.Practice.MP7	
<p><u>Learning Goal</u></p> <p>Students will be able to look for and make use of structure.</p>	<p><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by:</p> <ul style="list-style-type: none"> ● Noticing mathematical expressions as component parts. ● Using mathematical generalizations to identify the most efficient solution to mathematical tasks. <p>2: Student demonstrates they are nearing proficiency by composing and decomposing number situations and relationships in order to simplify solutions.</p> <p>1: Student demonstrates a limited understanding or skill with the learning goal by looking for structure or patterns within mathematics to help him/her solve problems efficiently.</p>
<p><u>Learning Targets</u></p> <ul style="list-style-type: none"> ● Look closely to discover a pattern or structure <ul style="list-style-type: none"> ○ For instance, students use properties of operations as strategies to add, subtract, multiply and divide with whole numbers, fractions, and decimals. ● Examine numerical patterns and relate them to a rule or a graphical representation 	
<p><u>Learning Design</u></p> <ul style="list-style-type: none"> ● Provides opportunities and time for students to explore patterns and relationships to solve problems ● Provides rich tasks and facilitates pattern seeking and understanding of relationships in numbers rather than following a set of steps and/or procedures 	

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High Priority Standards CCSS.Math.Practice.MP8	
<p><u>Learning Goal</u></p> <p>Students will be able to look for and express regularity in repeated reasoning.</p>	<p><u>Proficiency Scale</u></p> <p>4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.</p> <p>3: Student demonstrates mastery with the learning goal as evidenced by:</p> <ul style="list-style-type: none"> ● Connecting prior knowledge to an unfamiliar mathematical situation. ● Creating a model or equation that unifies the various aspects of a problem. ● Noticing patterns, making generalizations, and predicting patterns. <p>2: Student demonstrates they are nearing proficiency by finding and explaining patterns.</p> <p>1: Student demonstrates a limited understanding or skill with the learning goal by connecting prior knowledge to new situations and noticing patterns with prompting from a teacher or peer.</p>
<p><u>Learning Targets</u></p> <ul style="list-style-type: none"> ● Notice repetitive actions in computation and look for more shortcut methods ● Use repeated reasoning to understand algorithms and make generalizations about patterns 	
<p><u>Learning Design</u></p> <ul style="list-style-type: none"> ● Provides problem situations that allow students to explore regularity and repeated reasoning ● Provides rich tasks that encourage students to use repeated reasoning to form generalizations and provides opportunities for students to communicate these generalizations 	

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The Number System

High Priority Standards

6.NS.A.1 Compute and interpret quotients of positive fractions. a) Solve problems involving division of fractions by fractions.

Learning Goal

Students will be able to multiply and divide fractions by fractions.

Proficiency Scale

- 4: Demonstrates an in-depth inference or advanced application, or innovates with the learning goal.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- Applying and extending previous understandings of multiplication and division to divide a fraction by a fraction.
 - Using visual models in settings where smaller fractions are divided by larger fractions.
 - Applying the fact that a fraction multiplied or divided by 1 in the form of a/a is equivalent to the original fraction.
- 2: Student demonstrates they are nearing proficiency by:
- Recognizing and recalling specific vocabulary, such as: factor, product, dividend, divisor, quotient, mixed number, improper fraction, numerator, denominator, reciprocal.
 - Performing processes such as:
 - Applying and extending previous understandings of multiplication and division to divide a whole number by a fraction between 0 and 1.
 - Dividing a mixed number by a whole number.
 - Connecting to a visual model.
- 1: Student demonstrates a limited understanding or skill with the learning goal by:
- Applying and extending previous understandings of multiplication to multiply a fraction by a fraction and being able to connect to a visual model.
 - Applying and extending previous understandings of division to divide a fraction by a whole number and being able to connect to a visual model.
 - Describing the effect that a fraction greater than or less than 1 has on a whole number when multiplied.
 - Using or creating visual models when multiplying a whole number by a fraction between 0 and 1.

Learning Targets

- Apply and extend previous understandings of multiplication and division to fractions.
- 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 $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) 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?

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Number Sense and Operations

High Priority Standards

6.NS.B.2 Demonstrate fluency with division of multi-digit whole numbers.

6.NS.B.3 Demonstrate fluency with addition, subtraction, multiplication and division of decimals.

6.NS.B.4 Find common factors and multiples. a) Find the greatest common factor (GCF) and the least common multiple (LCM). b) Use the distributive property to express a sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers.

Learning Goal

Students will be able to compute fluently with multi-digit numbers and find common factors and multiples.

Proficiency Scale

- 4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- Dividing multi-digit numbers fluently.
 - Adding, subtracting, multiplying, and dividing multi-digit decimal numbers.
 - Finding the greatest common factor of two numbers less than or equal to 100.
 - Finding the least common multiple of two whole numbers less than or equal to 12.
 - Making generalizations regarding multiples and factors of sets of numbers .
- 2: Student demonstrates they are nearing proficiency by:
- Recognizing and recalling specific vocabulary, such as: addend, sum, difference, product, dividend, divisor, quotient, common factor, GCF, common multiple, LCM, distributive property.
 - Performing processes such as:
 - Dividing multi-digit whole numbers.
 - Adding and subtracting multi-digit decimal numbers.
 - Finding common factors of two numbers less than or equal to 100.
 - Finding multiples of two numbers less than or equal to 12.
- 1: Student demonstrates a limited understanding or skill with the learning goal by:
- Adding, subtracting, and multiplying multi-digit whole numbers and decimals to hundredths.
 - Using the distributive property to express the sum of two whole numbers with a common factor.

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Learning Targets

- Fluently divide multi-digit numbers using a standard algorithm
- Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation
- Find the greatest common factor of two whole numbers less than or equal to 100
- Find 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
 - *For example, express $36 + 8$ as $4(9 + 2)$*

Learning Design

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Number Sense and Operations

High Priority Standards

6.NS.C.5 Use positive and negative numbers to represent quantities.

6.NS.C.6 Locate a rational number as a point on the number line. a. Locate rational numbers on a horizontal or vertical number line. b. Write, interpret and explain problems of ordering of rational numbers. c. Understand that a number and its opposite (additive inverse) are located on opposite sides of zero on the number line.

6.NS.C.7 Understand that the absolute value of a rational number is its distance from 0 on the number line.

6.NS.C.8 Extend prior knowledge to generate equivalent representations of rational numbers between fractions, decimals and percentages (limited to terminating decimals and/or benchmark fractions of $\frac{1}{3}$ and $\frac{2}{3}$).

6.GM.A.3 Solve problems by graphing points in all four quadrants of the Cartesian coordinate plane. a. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the Cartesian coordinate plane. b. Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find distances between points with the same first coordinate or the same second coordinate. d. Construct polygons in the Cartesian coordinate plane.

Learning Goal

Students will understand the system of rational numbers.

Proficiency Scale

4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.

3: Student demonstrates mastery with the learning goal as evidenced by:

- Explaining absolute value and ordering by using number lines and models.
- Placing points with rational coordinates on a coordinate plane.
- Solving problems involving the distance between points when they share a coordinate.
- Relating reflection across axes to changes in sign.
- Generating equivalent representations of rational numbers between fractions, decimals and percentages (limited to terminating decimals and/or benchmark fractions of $\frac{1}{3}$ and $\frac{2}{3}$).

2: Student demonstrates they are nearing proficiency by:

- Recognizing and recalling specific vocabulary, such as: absolute value, coordinates, coordinate plane, integer, rational number, quadrant, axis (axes), additive inverse.
- Performing processes such as:
 - Placing all rational numbers on a number line.
 - Ordering rational numbers and interpreting statements of their order in the context of a situation.
 - Explaining the absolute value of a number as its distance from zero on a number line.
 - Relating changes in sign to placements on opposite sides of zero on the number line.
 - Understanding the sum of a number and its opposite (additive inverse) will always be zero.
 - Placing integer pairs on a coordinate plane with various axis increments.

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- Understanding signs of numbers in ordered pairs as indicating locations in quadrants of the Cartesian coordinate plane.

1: Student demonstrates a limited understanding or skill with the learning goal by:

- Using positive and negative numbers to represent quantities in real-world contexts.
- Placing all integers on a number line.
- Placing integer pairs on a coordinate plane with one-unit increments on both axes.

Learning Targets

- 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
- 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
 - 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
 - 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
 - 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
- Understand ordering and absolute value of rational numbers
 - Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram
 - 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
 - Write, interpret, and explain statements of order for rational numbers in real-world contexts
 - For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C
 - Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation
- Solve real-world and mathematical problems 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

Learning Design

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Ratios & Proportional Relationships

High Priority Standards

6.RP.A.1 Understand a ratio as a comparison of two quantities and represent these comparisons.

6.RP.A.2 Understand the concept of a unit rate associated with a ratio, and describe the meaning of unit rate.

6.RP.A.3 Solve problems involving ratios and rates. a. Create tables of equivalent ratios, find missing values in the tables and plot the pairs of values on the Cartesian coordinate plane. b. Solve unit rate problems. c. Solve percent problems. d. Convert measurement units within and between two systems of measurement.

Learning Goal

Students will understand ratio concepts and use ratio reasoning to solve problems.

Proficiency Scale

- 4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- Solving real-world problems involving ratios and rates utilizing strategies such as tables of equivalent ratios, tape diagrams, bar models, double number line diagrams and/or equations.
 - Solving percent problems by finding the whole, given a part and the percent.
 - Describing a ratio relationship between any two number quantities (denominators less than or equal to 12).
 - Converting measurement units between two systems of measurement.
- 2: Student demonstrates they are nearing proficiency by:
- Recognizing and recalling specific vocabulary, such as: ratio, rate, unit rate, proportion, percent.
 - Performing processes such as:
 - Using ratio reasoning to solve problems.
 - Using unit rates to solve problems, including unit pricing and constant speed.
 - Describing the concept of unit rate.
 - Solving one-step problems requiring ratio reasoning.
- 1: Student demonstrates a limited understanding or skill with the learning goal by:
- Describing a ratio relationship between two whole number quantities.
 - Finding missing values in tables and plotting the pairs of values on the Cartesian coordinate plane.
 - Finding a percent as a rate per hundred.
 - Converting measurement units within the same system of measurement.

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Learning Targets

- 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.”
- 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
 - For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”¹
- 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
 - 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
 - Solve unit rate problems including those involving unit pricing and constant speed
 - For example, if it took 4 hours to mow 7 lawns, then at that rate, how many lawns could be mowed in 32 hours? At what rate were lawns being mowed?
 - 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
 - Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities

Learning Design

¹ Expectations for unit rates in this grade are limited to non-complex fractions.

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Expressions, Equations and Inequalities

High Priority Standards

6.EE1.A.1 Describe the difference between an expression and an equation.

6.EE1.A.2 Create and evaluate expressions involving variables and whole number exponents. a. Identify parts of an expression using mathematical terminology. b. Evaluate expressions at specific values of the variables. c. Evaluate non-negative rational number expressions. d. Write and evaluate algebraic expressions. e. Understand the meaning of the variable in the context of the situation.

6.EE1.A.3 Identify and generate equivalent algebraic expressions using mathematical properties.

Learning Goal

Students will be able to apply arithmetic to algebraic expressions.

Proficiency Scale

- 4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- Writing and evaluating numerical expressions with whole number exponents and expressions from formulas in real-world problems.
 - Evaluating expressions with variables that include grouping symbols and whole number exponents.
 - Applying properties of operations to generate equivalent expressions.
- 2: Student demonstrates they are nearing proficiency by:
- Recognizing and recalling specific vocabulary, such as: coefficient, term, sum, product, difference, quotient, factor, variable, expression, exponent, base, order of operations, arithmetic properties (distributive, associative, commutative).
 - Performing processes such as:
 - Evaluating numerical expressions with whole number exponents.
 - Evaluating expressions with variables that do not contain exponents.
 - Writing one- and two-step algebraic expressions using variables.
 - Identifying equivalent expressions.
- 1: Student demonstrates a limited understanding or skill with the learning goal by:
- Describing the difference between an expression and an equation.
 - Evaluating numerical expressions without exponents.
 - Identifying parts of an expression.

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Learning Targets

- Write and evaluate numerical expressions involving whole-number exponents
- Write, read, and evaluate expressions in which letters stand for numbers
 - Write expressions that record operations with numbers and with letters standing for numbers
 - *For example, express the calculation “Subtract y from 5” as $5 - y$*
 - 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*
 - 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 $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$*
- 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 $3y$*
- 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*

Learning Design

WGSD Curriculum – Math 6th Grade
Expressions, Equations and Inequalities

High Priority Standards

- 6.EE1.B.4 Use substitution to determine whether a given number in a specified set makes a one-variable equation or inequality true.
6.EE1.B.5 Understand that if any solutions exist, the solution set for an equation or inequality consists of values that make the equation or inequality true.
6.EE1.B.6 Write and solve equations using variables to represent quantities, and understand the meaning of the variable in the context of the situation.
6.EE1.B.7 Solve one-step linear equations in one variable involving nonnegative rational numbers.
6.EE1.B.8 Recognize that inequalities may have infinitely many solutions. a. Write an inequality represent a constraint or condition. b. Graph the solution set of an inequality.

Learning Goal

Students will be able to reason about and solve one-variable equations and inequalities.

Proficiency Scale

- 4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- Solving one-step, one variable linear equations involving positive rational numbers.
 - Writing one-step, one variable linear equations involving positive rational numbers to represent real-world and mathematical problems.
 - Writing one-variable inequalities in the form $x > c$, $x < c$, $x \geq c$, or $x \leq c$ to represent real-world or mathematical problems.
 - Graphing solutions of inequalities on a number line.
- 2: Student demonstrates they are nearing proficiency by:
- Recognizing and recalling specific vocabulary, such as: expression, equation, inequality, variable, equal to, greater than, less than.
 - Performing processes such as:
 - Identifying and using variables when writing expressions and equations.
 - Understand the meaning of the variable in the context of the situation.
- 1: Student demonstrates a limited understanding or skill with the learning goal by using substitution to determine when a given number makes an equation or inequality true.

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Learning Targets

- 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
- 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 (*jac's example .. $p < 5$ so $p = \{0, 1, 2, 3, 4\}$*)
- 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
- 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

Learning Design

WGSD Curriculum – Math 6th Grade

Expressions, Equations and Inequalities

High Priority Standards

6.EE1.C.9 Identify and describe relationships between two variables that change in relationship to one another. a. Write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable. b. Analyze the relationship between the dependent and independent variables using graphs, tables and equations and relate these representations to each other.

Learning Goal

Students will be able to represent and analyze quantitative relationships between dependent and independent variables.

Proficiency Scale

4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.

3: Student demonstrates mastery with the learning goal as evidenced by using graphs, tables, or equations to analyze the relationship between dependent and independent variables and relating them to a linear equation.

2: Student demonstrates they are nearing proficiency by:

- Recognizing and recalling specific vocabulary, such as: dependent variable, independent variable, expressions, equations, coordinate plane, rational numbers, x-axis, y-axis, ordered pairs.
- Performing processes such as:
 - Using variables to represent and analyze two quantities that change in relationship to each other (*in the form $y = kx$ or $y = x + c$ or $y = x - c$ with rational numbers*).
 - Identifying and creating an equation that expresses one quantity in terms of another.
 - Using graphs and tables to represent a relationship.

1: Student demonstrates a limited understanding or skill with the learning goal by:

- Identifying a table that represents a relationship between two variables of the forms $y = kx$ and $y = x + c$ with rational numbers.
- Plotting points corresponding to equations on coordinate planes.

Learning Targets

- 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. 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*

Learning Design

WGSD Curriculum – Math 6th Grade

Geometry and Measurement

High Priority Standards

- 6.GM.A.1 Find the area of polygons by composing or decomposing the shapes into rectangles or triangles.
- 6.GM.A.2 Find the volume of right rectangular prisms. a. Understand that the volume of a right rectangular prism can be found by filling the prism with multiple layers of the base. b. Apply $V = l * w * h$ and $V = Bh$ to find the volume of right rectangular prisms.
- 6.GM.A.4 Solve problems using nets. a. Represent three-dimensional figures using nets made up of rectangles and triangles. b. Use nets to find the surface area of three-dimensional figures whose sides are made up of rectangles and triangles.
- 6.GM.A.3 Solve problems by graphing points in all four quadrants of the Cartesian coordinate plane. c. Find distances between points with the same first coordinate or the same second coordinate. d. Construct polygons in the Cartesian coordinate plane.

Learning Goal

Students will be able to solve real-world and mathematical problems involving area, surface area, and volume.

Proficiency Scale

- 4: Demonstrates an in-depth inference or advanced application, or innovates with the learning goal.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- Finding the area of polygons by composing and decomposing shapes into rectangles and triangles to solve real-world and mathematical problems.
 - Finding the volume of right rectangular prisms (using $V = l*w*h$ and $V = Bh$) with dimensions expressed as rational numbers .
 - Using nets to find the surface areas of three-dimensional shapes composed of rectangles and triangles.
 - Constructing polygons in the Cartesian coordinate plane.
- 2: Student demonstrates they are nearing proficiency by:
- Recognizing and recalling specific vocabulary, such as: triangle, quadrilateral, polygon, prism, vertex, edge, face, area, surface area, volume, net, coordinate plane.
 - Performing processes such as:
 - Finding the area of quadrilaterals and triangles.
 - Using coordinates to find the length of a side when they share a coordinate.
 - Representing 3-dimensional figures using nets made up of rectangles and triangles.
- 1: Student demonstrates a limited understanding or skill with the learning goal by:
- Finding areas of right triangles.
 - Finding the volume of right rectangular prisms with dimensions expressed as whole numbers.

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Learning Targets

- 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
- 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
- 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
- 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

Learning Design

WGSD Curriculum – Math 6th Grade
Data Analysis, Statistics and Probability

High Priority Standards

6.DSP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

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

6.DSP.A.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary from a single number.

Learning Goal

Students will develop understanding of statistical variability.

Proficiency Scale

4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.

3: Student demonstrates mastery with the learning goal as evidenced by:

- Posing statistical questions and understanding that the responses to a statistical question have a distribution described by its center, spread, and overall shape.
- Describing that a measure of center summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
- Identifying an appropriate measure of center (mean, median or mode) for the data with respect to a context.
- Recognizing the spread (range, interquartile range or mean absolute deviation) of the data with respect to a context.
- Recognizing the effect changes to the data have on the measures of center, spread, and overall shape of the data.

2: Student demonstrates they are nearing proficiency by:

- Recognizing and recalling specific vocabulary, such as: mean, median, mode, range, central tendency, center, spread, interquartile range, variability, outlier, mean absolute deviation (MAD).
- Performing processes such as:
 - Determining the overall shape (symmetrical or nonsymmetrical) of a set of data.
 - Classifying questions that lead to variable responses as statistical questions.
 - Describing the effects extreme data points (outliers) have on the measures of center.

1: Student demonstrates a limited understanding or skill with the learning goal by identifying questions that lead to variable responses posed in familiar contexts and recognizing that such questions are statistical questions.

WGSD Curriculum – Math 6th Grade

Learning Targets

- 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*
- 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
- 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

Learning Design

WGSD Curriculum – Math 6th Grade
Data Analysis, Statistics and Probability

High Priority Standards

6.DSP.B.4 Display and interpret data. a. Use dot plots, histograms and box plots to display and interpret numerical data. b. Create and interpret circle graphs.
 6.DSP.B.5 Summarize numerical data sets in relation to the context. a. Report the number of observations. b. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Give quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context of the data. d. Analyze the choice of measures of center and variability based on the shape of the data distribution and/or the context of the data.

Learning Goal

Students will be able to summarize and describe distributions.

Proficiency Scale

- 4: In addition to score 3.0 performance, the student demonstrates an in-depth inference or advanced application, or innovates with the learning goal.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- Creating and interpreting data using dot plots, histograms and box plots.
 - Creating circle graphs with whole number angle measurements.
 - Using the interquartile range along with the measures of center to describe overall patterns in a data distribution, such as symmetry and clusters, and any striking deviations.
 - Examining a data set in context and explaining the choice of the mean or median, as it relates to the data.
 - Determining variability by calculating range, interquartile range, and mean absolute deviation (MAD).
- 2: Student demonstrates they are nearing proficiency by:
- Recognizing and recalling specific vocabulary such as: mean, median, mode, range, interquartile range, measures of center, distribution, symmetry, cluster, deviation, mean absolute deviation, outlier, data point, number line, box plot, dot plot, histogram.
 - Performing processes such as:
 - Determining measures of center (mean, median, and mode).
 - Finding the mean, median, mode, and range from a dot plot.
 - Finding the median, quartiles, and range from a box plot.
 - Interpreting the data represented on a circle graph.
- 1: Student demonstrates a limited understanding or skill with the learning goal by summarizing numerical data from a dot plot, histogram, or box plot.

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Learning Targets

- Display numerical data in plots on a number line, including dot plots, histograms, and box plots
- Summarize numerical data sets in relation to their context, such as by:
 - Reporting the number of observations
 - Describing the nature of the attribute under investigation, including how it was measured and its units of measurement
 - 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
 - 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

Learning Design

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Sources:

<https://dese.mo.gov/sites/default/files/curr-math-mls%20expanded-expectations-grade-6.pdf>

<https://dese.mo.gov/media/pdf/asmt-math-g6-item-specs>

<http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/11/Smarter-Balanced-Math-ALDs.pdf>

<http://www.corestandards.org/Math>

<http://katm.org/wp/wp-content/uploads/flipbooks/>

http://itembank.marzanoresearch.com/search_details.aspx

<http://www.mathleadership.com/sitebuildercontent/sitebuilderfiles/standardsoftudentpracticeinmathematicsproficiencymatrix.pdf>

Standards for Mathematical Practices Observation Tool created by Melisa Hancock for KATM/KSDE CCSS Summer Academy 2011