GRADE 7 MATHEMATICS - ACCELERATED

Overview:

Domains	**Ratios & Proportional Relationships**	**The Number System**	**Expressions and Equations**	**Geometry**	**Statistics and Probability**
Clusters	• Analyze proportional relationships and use them to solve real-world and mathematical problems	• Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers	• Use properties of operations to generate equivalent expressions • Solve real-life and mathematical problems using numerical and algebraic expressions and equations	• Draw, construct and describe geometrical figures and describe the relationships between them • Solve real-life and mathematical problems involving angle measure, area, surface and volume	• Use random sampling to draw inferences about a population • Draw informal comparative inferences about two populations • Investigate chance processes and develop, use and evaluate probability models

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

Major Thematic Grade 7 Units	**English Language Arts: across the content areas** • Reading • Writing • Speaking & Listening • Language • Characters with Character - What makes characters in historical fiction believable? • Perseverance - How do characters, real and fictional, use words and actions to demonstrate perseverance? • Literature Reflects Life - Is literature always a reflection of life?	**Science** • Cell Structure and Function • Energy and Life • Cell Reproduction and Genetics • Environmental Changes Through Time • Classification	**Social Studies** • Growth of Islam • African Kingdoms • Medieval China • Medieval Japan • Fall of Rome • Medieval Europe • Europe: Renaissance, Reformation, Scientific Revolution, Civilizations of the Americas

This course differs from the non-accelerated 7th Grade course in that it contains content from 8th grade. While coherence is retained, in that it logically builds from the 6th Grade, the additional content when compared to the non-accelerated course demands a faster pace for instruction and learning. Content is organized into four critical areas, or units. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

The critical areas are as follows:

Critical Area 1: Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems. They extend their mastery of the properties of operations to develop an understanding of integer exponents, and to work with numbers written in scientific notation.

Critical Area 2: Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y = mx + b$), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount $m \times A$. Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation.

Critical Area 3: Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

Critical Area 4: Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity, they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Domain: Ratios and Proportional Relationships
7.RP
Cluster: Analyze proportional relationships and use them to solve real-world and mathematical problems.

- Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
    - I can compute unit rates.

2. Recognize and represent proportional relationships between quantities including those represented in Montana American Indian cultural contexts.
    a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
    - I can determine if two quantities are proportional by using tables or graphs.

    b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
    - I can interpret the unit rate in tables, graphs, equations, diagrams, and verbal descriptions.

    c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. A contemporary American Indian example, analyze cost of beading materials; cost of cooking ingredients for family gatherings, community celebrations, etc.*
    - I can develop equations to represent proportional relationships.

    d. Explain what a point (*x*, *y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where r is the unit rate.
    - I can determine unit rate given two coordinate points.

3. Use proportional relationships to solve multistep ratio and percent problems within cultural contexts, including those of Montana American Indians (e.g., percent of increase and decrease of tribal land). *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*
    - I can evaluate real world situations using proportions.

<u>Domain: The Number System</u>
<u>7.NS</u>
Cluster: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
    a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*
    - I can describe situations in which the additive inverse has been used.

    b. Understand *p* + *q* as the number located a distance |*q*| from *p*, in the positive or negative direction depending on whether *q* is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

- I can analyze, through real-world contexts, the sum of two rational numbers.
- I can justify why additive inverses equal zero.

c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

- I can evaluate and apply, using real-world contexts, the difference of two rational numbers. For example, p-q = p+-q.

d. Apply properties of operations as strategies to add and subtract rational numbers.

- I can select and justify properties of addition and subtraction to find sums and differences of rational numbers.

2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

- I can interpret products of rational numbers by using properties of multiplication, particularly the distributive property.

b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

- I can interpret quotients of rational numbers (when the divisor is non-zero).

c. Apply properties of operations as strategies to multiply and divide rational numbers.

- I can select and justify properties of multiplication and division to find the product and quotient of rational numbers.

d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

- I can convert a rational number (in a/b form) to a decimal using multiple methods.

3. Solve real-world and mathematical problems from a variety of cultural contexts, including those of Montana American Indians, involving the four operations with rational numbers.

a. I can choose appropriate operations to evaluate real-world mathematical problems involving rational numbers.

Domain: The Number System
8.NS.
Cluster: Know that there are numbers that are not rational, and approximate them by rational numbers.

1. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

- I can demonstrate that every number has a decimal expansion.
- I can convert a rational number (a/b) into appropriate decimal notation.
- I can convert a repeating decimal number into simplified rational form.

2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
    - I can use the appropriate estimates of irrational numbers to compare, order on a number line, and find approximate values of variable expressions.

<u>Domain: Expressions and Equations</u>
<u>7.EE</u>
Cluster: Use properties of operations to generate equivalent expressions.

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
    - I can correctly apply properties of operations in order to evaluate and expand linear expressions with coefficients.

2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*
    - I can rewrite an equation or expression to form an equivalent equation or expression.

Cluster: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*
    - I can evaluate multi-step algebraic expressions and equations using various tools.

4. Use variables to represent quantities in a real-world or mathematical problem, including those represented in Montana American Indian cultural contexts, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
    - I can construct variable equations and inequalities in order to solve multicultural real-world problems.

    a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*

- I can evaluate word problems with equations that compare algebraic solutions to arithmetic solutions identifying operations used.

b. Solve word problems leading to inequalities of the form *px* + *q* > *r* or *px* + *q* < *r*, where *p*, *q*, and *r* are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*

- I can solve and graph inequalities.
- I can analyze the solution set of an inequality.

<u>Domain: Expressions and Equations</u>
<u>8.EE</u>
Cluster: Work with radicals and integer exponents.

1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.
   - I can apply the properties of integer exponents to generate equivalent expressions.
2. Use square root and cube root symbols to represent solutions to equations of the form *x*2 = *p* and *x*3 = p, where *p* is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
   - I can express the solution to a square root or cube root problem in radical form.
   - I can evaluate the roots of small perfect squares and cubes.
   - I can predict when a small perfect square or cube root is rational or irrational.

3. Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 108 and the population of the world as 7 times 109, and determine that the world population is more than 20 times larger.*
   - I can use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or small quantities.
   - I can state how many times larger or smaller items are when quantities are in the form of a single digit times an integer power of 10.

4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
   - I can perform operations in scientific notation, decimal notation, or a combination of both scientific and decimal notation.
   - I can write measurements of very large and very small quantities in scientific notation and choose units of appropriate size for the given situation.
   - I can interpret the different formats of scientific notation that have been generated by technology.

Cluster: Understand the connections between proportional relationships, lines, and linear equations.

5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
   - I can graph proportional relationships identifying the unit rate as the slope of the graph.
   - I can compare two different proportional relationships represented in different ways and state the connections between them.

6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.
   - I can use similar triangles to explain why the slope "m" is the same between any two distinct points on a non-vertical line in the coordinate plane.
   - I can derive the equation y = m* x (+0) for a line through the origin.
   - I can derive the equation y = m* x + b for a line intercepting the vertical axis at b and cannot equal 0.

Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations.

7. Solve linear equations in one variable.
   a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
   - I can solve multi-step linear equations in one variable.
   - I can solve linear equations with the same variable on both sides of the equal sign.

   b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
   - I can solve multi-step linear equations in one variable that include rational number coefficients, distributive property, and collecting like terms.

8. Analyze and solve pairs of simultaneous linear equations.
   a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
   - I can graph two linear equations on the same coordinate plane and identify their point of intersection if possible.
   - I can defend that the point of intersection of two lines on the same coordinate plane is a solution for both equations.

   b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.*

- I can rewrite an equation into slope-intercept form.
- I can solve a system of two linear equations algebraically.
- I can estimate the solution of a system of linear equations by graphing.

c. Solve real-world and mathematical problems from a variety of cultural contexts, including those of Montana American Indians, leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

- I can solve real-world mathematical problems from a variety of cultures which involve systems of linear equations.

Domain: Geometry

7.G

Cluster: Draw construct, and describe geometrical figures and describe the relationships between them.

1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
    - I can reproduce a geometric figure using a different scale.
    - I can compute actual lengths and areas from a scale drawing.

2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
    - I can construct triangles using a variety of tools, given side and/or angle measurements.
    - I can classify unique triangles by their side and/or angle measurements. For example, isosceles, equilateral, scalene, obtuse, right, or acute.

3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
    - I can identify the polygon that results from a plane that cuts parallel or perpendicular to the base of a solid.

Domain: Geometry

8.G

Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

1. Verify experimentally the properties of rotations, reflections, and translations from a variety of cultural contexts, including those of Montana American Indians:
    a. Lines are taken to lines, and line segments to line segments of the same length.
    b. Angles are taken to angles of the same measure.
    c. Parallel lines are taken to parallel lines.
    - I can create and characterize reflections, rotations, and translations using a variety of tools.

2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
    - I can define congruency in two-dimensional figures giving examples and non-examples.

- I can describe the sequence of transformations between two congruent figures.

3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures from a variety of cultural contexts, including those of Montana American Indians: using coordinates.
   - I can describe the effect of transformations observed in Native American geometric patterns using coordinate notation.

4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
   - I can define similarity in two-dimensional figures giving examples and non-examples.
   - I can describe the sequence of transformations between two similar figures.

5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
   - I can demonstrate the sum of interior angles of any triangle is equal to 180 degrees.
   - I can generalize the patterns and relationships found between the interior and exterior angles of any triangle.
   - I can summarize the patterns and relationships found among the angle created when parallel lines are cut by a transversal.
   - I can justify similarity between triangles using angle to angle correspondence.

Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
   - I can apply the formulas for the volumes of cones, cylinders, and spheres to solve real-world mathematical problems.

<u>Domain: Statistics and Probability</u>

<u>7.SP</u>

Cluster: Use random sampling to draw inferences about a population.

1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
   - I can explain generalizations about a population from a sample.
   - I can justify that random sampling produces valid inferences about representative samples.

2. Use data, including Montana American Indian demographic data, from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data, predict how many text messages your classmates receive in a day. Gauge how far off the estimate or prediction might be.*
   - I can deduce, from random samples, inferences about a population and compose multiple samples to draw conclusions.

Cluster: Draw informal comparative inferences about two populations.

3. Informally assess the degree of visual overlap of two numerical data distributions with similar variability's, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
   - I can assess the overlap of two data sets with similar variables and measure the mean absolute deviation of the data.

4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*
   - I can assess the measures of center and measures of variability from random samples to draw inferences about two populations.

Cluster: Investigate chance processes and develop, use, and evaluate probability models.

5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
   - I can explain the probability of an event as a number between zero and one.
   - I can evaluate if an event is likely or unlikely based on the probability written between zero and one.

6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. For example, when playing Montana American Indian Hand/Stick games, you can predict the approximate number of accurate guesses.*
   - I can analyze experimental probability data in order to predict future outcomes based on the relative frequency of an event.

7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
   - I can create and analyze a theoretical probability model.
   - I can compare theoretical probability model to the results of the experimental probability of that model.

   a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.*
   - I can create a probability model where all outcomes are equally likely.

   b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
   - I can create an experimental probability model to observe data generated from an experiment.

8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

   a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
   - I can conclude that the probability of a compound event is a fraction of the outcome in the sample space.

   b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.
   - I can create tables, tree diagrams, and organized lists for compound events.
   - I can identify the outcomes in the sample space.

   c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
   - I can design a probability model to generate frequencies for compound events.

Computations with rational numbers extend the rules for manipulating fractions to complex fractions.

Standards	Explanations and Examples
Students are expected to:	**The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.**
7.MP.1. Make sense of problems and persevere in solving them.	In grade 7, students solve problems involving ratios and rates and discuss how they solved them. Students solve real world problems through the application of algebraic and geometric concepts. Students seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves, “What is the most efficient way to solve the problem?”,

	"Does this make sense?", and "Can I solve the problem in a different way?".
7.MP.2. Reason abstractly and quantitatively.	In grade 7, students represent a wide variety of real world contexts through the use of real numbers and variables in mathematical expressions, equations, and inequalities. Students contextualize to understand the meaning of the number or variable as related to the problem and decontextualize to manipulate symbolic representations by applying properties of operations.
7.MP.3. Construct viable arguments and critique the reasoning of others.	In grade 7, students construct arguments using verbal or written explanations accompanied by expressions, equations, inequalities, models, and graphs, tables, and other data displays (i.e. box plots, dot plots, histograms, etc.). They further refine their mathematical communication skills through mathematical discussions in which they critically evaluate their own thinking and the thinking of other students. They pose questions like "How did you get that?", "Why is that true?" "Does that always work?". They explain their thinking to others and respond to others' thinking.
7.MP.4. Model with mathematics.	In grade 7, students model problem situations symbolically, graphically, tabularly, and contextually. Students form expressions, equations, or inequalities from real world contexts and connect symbolic and graphical representations. Students explore covariance and represent two quantities simultaneously. They use measures of center and variability and data displays (i.e. box plots and histograms) to draw inferences, make comparisons and formulate predictions. Students use experiments or simulations to generate data sets and create probability models. Students need many opportunities to connect and explain the connections between the different representations. They should be able to use all of these representations as appropriate to a problem context.
7.MP.5. Use appropriate tools strategically.	Students consider available tools (including estimation and technology) when solving a mathematical problem and decide when certain tools might be helpful. For instance, students in grade 7 may decide to represent similar data sets using dot plots with the same scale to visually compare the center and variability of the data. Students might use physical objects or applets to generate probability data and use graphing calculators or spreadsheets to manage and represent data in different forms.
7.MP.6. Attend to precision.	In grade 7, students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students define variables, specify units of measure, and label axes accurately. Students use appropriate terminology when referring to rates, ratios, probability models, geometric figures, data displays, and components of expressions, equations or inequalities.
7.MP.7. Look for and make use of structure.	Students routinely seek patterns or structures to model and solve problems. For instance, students recognize patterns that exist in ratio tables making connections between the constant of proportionality in a table with the slope of a graph. Students apply properties to generate equivalent expressions (i.e. $6 + 2x = 2(3 + x)$ by distributive property) and solve equations (i.e. $2c + 3 = 15$, $2c = 12$ by subtraction property of equality; c=6 by division property of equality). Students compose and decompose two- and three-dimensional figures to solve real world problems involving scale drawings, surface area, and volume. Students examine tree diagrams or systematic lists to determine the sample space for compound events and verify that they have listed all possibilities.
7.MP.8. Look for and express regularity in repeated reasoning.	In grade 7, students use repeated reasoning to understand algorithms and make generalizations about patterns. During multiple opportunities to solve and model problems, they may notice that $a/b \div c/d = ad/bc$ and construct other examples and models that confirm their generalization. They extend their thinking to include complex fractions and rational numbers. Students formally begin to make connections between covariance, rates, and representations showing the relationships between quantities. They create, explain, evaluate, and modify probability models to describe simple and compound events.

Standard	Grade 7 Accelerated Montana Common Core Standards Vocabulary
7.RP.1	ratio, rate, unit rate
7.RP.2	proportional relationship, constant of proportionality, unit rate, equivalent ratios, origin
7.RP.3	proportional relationship, ratio, percent
7.NS.1	Positive, negative, opposite, additive inverse, absolute value, integer, rational number
7.NS.2	integer, rational number, terminating decimal, repeating decimal
7.NS.3	rational number, complex fraction
7.EE.1	linear expression, coefficient, like terms
7.EE.2	none
7.EE.3	rational number
7.EE.4	none
7.G.1	scale drawing
7.G.2	none
7.G.3	right rectangular prism, right rectangular pyramid
7.G.4	radius, diameter, circumference, area, pi
7.G.5	supplementary angles, complementary angles, vertical angles, adjacent angles
7.G.6	length, width, base, height, altitude, area, surface area, volume
7.SP.1	sample, population, random sample, representative sample
7.SP.2	population, sample, random sample
7.SP.3	centers (also, measures of center), variabilities (also, measures of variability), mean, median, mean absolute deviation, interquartile range
7.SP.4	measures of variability, measures of center, mean, median, mean, absolute deviation, interquartile range, population, random sample
7.SP.5	likely, unlikely
7.SP.6	theoretical probability, experimental probability, relative frequency
7.SP.7	probability model, uniform probability model, frequency, relative frequency, theoretical probability, experimental probability
7.SP.8	compound events, sample space, tree diagram, outcomes, favorable outcomes, simulation