ALGEBRA 2 AND HONORS ALGEBRA 2
Grades 9, 10, 11, 12

Unit of Credit: 1 Year

Prerequisite: Geometry

Course Overview:

Domains	**Seeing Structure in Expressions**	**Arithmetic with Polynomials and Rational Expressions**	**Creating Equations**	**Reasoning with Equations and Inequalities**
Clusters	• Interpret the structure of expressions • Write expressions in equivalent forms to solve problems	• Perform arithmetic operations on polynomials • Understand the relationship between zeros and factors of polynomials • Use polynomial identities to solve problems • Rewrite rational expressions	• Create equations that describe numbers or relationships	• Understand solving equations as a process of reasoning and explain the reasoning • Solve equations and inequalities in one variable • Solve systems of equations • Represent and solve equations and inequalities graphically
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.

Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, and radical functions. Students work closely with the expressions that define the functions, and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. 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 for this course, organized into four units, are as follows:

Critical Area 1: This unit develops the structural similarities between the system of polynomials and the system of integers. Students draw on analogies between polynomial arithmetic and baseten computation, focusing on properties of operations, particularly the distributive property. Students connect multiplication of polynomials with multiplication of multi-digit integers, and division of polynomials with long division of integers. Students identify zeros of polynomials, including complex zeros of quadratic polynomials, and make connections between zeros of polynomials and solutions of polynomial equations. The unit culminates with the fundamental theorem of algebra. A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers.

Critical Area 2: Building on their previous work with functions, and on their work with trigonometric ratios and circles in Geometry, students now use the coordinate plane to extend trigonometry to model periodic phenomena.

Critical Area 3: In this unit students synthesize and generalize what they have learned about a variety of function families. They extend their work with exponential functions to include solving exponential equations with logarithms. They explore the effects of transformations on graphs of diverse functions, including functions arising in an application, in order to abstract the general principle that transformations on a graph always have the same effect regardless of the type of the underlying function. They identify appropriate types of functions to model a situation, they adjust parameters to improve the model, and they compare models by analyzing appropriateness of fit and making judgments about the domain over which a model is a good fit. The description of modeling as "the process of choosing and using mathematics and statistics to analyze empirical situations, to understand them better, and to make decisions" is at the heart of this unit. The narrative discussion and diagram of the modeling cycle should be considered when knowledge of functions, statistics, and geometry is applied in a modeling context.

Critical Area 4: In this unit, students see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions. They identify different ways of collecting data—including sample surveys, experiments, and simulations—and the role that randomness and careful design play in the conclusions that can be drawn.

Common Core State Standards for Mathematics Appendix A, page 37.

Expressions.

An expression is a record of a computation with numbers, symbols that represent numbers, arithmetic operations, exponentiation, and, at more advanced levels, the operation of evaluating a function. Conventions about the use of parentheses and the order of operations assure that each expression is unambiguous. Creating an expression that describes a computation involving a general quantity requires the ability to express the computation in general terms, abstracting from specific instances. Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning. For example, $p + 0.05p$ can be interpreted as the addition of a 5% tax to a price p. Rewriting $p + 0.05p$ as $1.05p$ shows that adding a tax is the same as multiplying the price by a constant factor. Algebraic manipulations are governed by the properties of operations and exponents, and the conventions of algebraic notation. At times, an expression is the result of applying operations to simpler expressions. For example, $p + 0.05p$ is the sum of the simpler expressions p and $0.05p$. Viewing an expression as the result of operation on simpler expressions can sometimes clarify its underlying structure. A spreadsheet or a computer algebra system (CAS) can be used to experiment with algebraic expressions, perform complicated algebraic manipulations, and understand how algebraic manipulations behave.

Equations and inequalities

An equation is a statement of equality between two expressions, often viewed as a question asking for which values of the variables the expressions on either side are in fact equal. These values are the solutions to the equation. An identity, in contrast, is true for all values of the variables; identities are often developed by rewriting an expression in an equivalent form. The solutions of an equation in one variable form a set of numbers; the solutions of an equation in two variables form a set of ordered pairs of numbers, which can be plotted in the coordinate plane. Two or more equations and/or inequalities form a system. A solution for such a system must satisfy every equation and inequality in the system. An equation can often be solved by successively deducing from it one or more simpler equations. For example, one can add the same constant to both sides without changing the solutions, but squaring both sides might lead to extraneous solutions. Strategic competence in solving includes looking ahead for productive manipulations and anticipating the nature and number of solutions. Some equations have no solutions in a given number system, but have a solution in a larger system. For example, the solution of $x + 1 = 0$ is an integer, not a whole number; the solution of $2x + 1 = 0$ is a rational number, not an integer; the solutions of $x2 - 2 = 0$ are real numbers, not rational numbers; and the solutions of $x2 + 2 = 0$ are complex numbers, not real numbers. The same solution techniques used to solve equations can be used to rearrange formulas. For example, the formula for the area of a trapezoid, $A = ((b1+b2)/2)h$, can be solved for h using the same deductive process. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

Connections to Functions and Modeling

Expressions can define functions, and equivalent expressions define the same function. Asking when two functions have the same value for the same input leads to an equation; graphing the two functions allows for finding approximate solutions of the equation. Converting a verbal description to an equation, inequality, or system of these is an essential skill in modeling.

Honors Algebra 2

Students successfully completing the Honors Algebra 2 course designation will cover the same standards below with greater depth. In addition, there are community service, career exploration, and research project components required.

Algebra 2 Enhancement

The Algebra 2 Enhancement course is designed to lend effective support to students concurrently enrolled in Algebra 2. Using the Response to Intervention (RtI) model, the Enhancement course is a Tier 2 Intervention aimed at students who are at-risk in mathematics. It allows for rapid response to student difficulties and provides opportunities for: additional time spent on daily targets, intensity of instruction, explicitly teaching and moving from the concrete to the abstract, frequent response from students and feedback from teachers, as well as strategic teaching using data to direct instruction. Students are placed in the Enhancement course based on test scores, teacher/parent request, and academic achievement. These students are enrolled in Algebra 2.

Students receive elective credit for the Enhancement course.

Number and Quantity Content Standards

Domain: The Complex Number System N-CN

Cluster: Perform arithmetic operations with complex numbers.

1. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.
   - I can define and apply the properties of the imaginary number *i*.
   - I can write a complex number in the form of $a + bi$ where a and b are real numbers.

2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
   - I can add, subtract and multiply expressions involving complex numbers.
   - I can apply the commutative, associative and distributive properties to simplify expressions involving complex numbers.

Cluster: Use complex numbers in polynomial identities and equations.

7. Solve quadratic equations with real coefficients that have complex solutions.
   - I can solve quadratic equations that have complex solutions.

8. Extend polynomial identities to the complex numbers.
   - I can apply polynomial identities such as factoring to simplify expressions involving complex numbers.

9. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
   - I can apply the Fundamental Theorem of Algebra to polynomial functions.

Algebra Content Standards

Domain: Seeing Structure in Expressions A-SSE

Cluster: Interpret the structure of expressions.

1. Interpret expressions that represent a quantity in terms of its context.★
   a. Interpret parts of an expression, such as terms, factors, and coefficients.
   - I can distinguish parts of an expression, such as terms, factors, and coefficients.

   b. Interpret complicated expressions by viewing one or more of their parts as a single entity.
   - I can analyze complicated expressions by viewing one or more of their parts as a single entity.

2. Use the structure of an expression to identify ways to rewrite it.
   - I can use the structure of an expression to reconstruct it in different forms.

Cluster: Write expressions in equivalent forms to solve problems.

4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.
   - I can write a formula for the sum of a finite geometric series.
   - I can solve problems using a formula for the sum of a finite geometric series.

<u>Domain: Arithmetic with Polynomials and Rational Expressions A-APR</u>

Cluster: Perform arithmetic operations on polynomials.

1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
   - I can demonstrate that polynomials are closed under the operations of integers.

Cluster: Understand the relationship between zeros and factors of polynomials.

2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x – a$ is $p(a)$, so $p(a) = 0$ if and only if $(x – a)$ is a factor of $p(x)$.
   - I can divide polynomials and apply the Remainder Theorem using multiple strategies.

3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
   - I can identify zeros of a polynomial function and use them to graph the polynomial function.

Cluster: Use polynomial identities to solve problems.

4. Prove polynomial identities and use them to describe numerical relationships.
   - I can apply and prove polynomial identities and use them to describe numerical relationships.

5. Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal’s Triangle.
   - I can apply the Binomial Theorem.

Cluster: Rewrite rational expressions.

6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.
   - I can simplify and rewrite rational expressions in different forms.

7. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
   - I can simplify rational expressions using addition, subtraction, multiplication, and division by nonzero rational expressions.

Domain: Creating Equations A-CED

Cluster: Create equations that describe numbers or relationships.

1. Create equations and inequalities in one variable and use them to solve problems from a variety of contexts (e.g., science, history, and culture), including those of Montana American Indians..
   - I can compose and construct equations from a variety of contexts.

2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
   - I can create equations in two or more variables to represent relationships between quantities.
   - I can graph equations in two or more variables on the coordinate axes with labels and scales.

3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
   - I can write algebraic expressions and/or equations to represent constraints.
   - I can interpret solutions as viable or non-viable for a problem situation.

4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
   - I can solve an equation or formula for a variable.

Domain: Reasoning with Equations and Inequalities A-REI

Cluster: Understand solving equations as a process of reasoning and explain the reasoning.

2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
   - I can solve simple rational and radical equations in one variable.
   - I can distinguish between an actual solution and an extraneous solution.

Cluster: Represent and solve equations and inequalities graphically.

11. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.⋆
    - I can calculate and justify the solution(s) to a system of equations using multiple methods.

Domain: Interpreting Functions F-IF

Cluster: Interpret functions that arise in applications in terms of the context.

4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
   - I can sketch a function that models a relationship between two quantities given a verbal description of the relationship.
   - I can interpret key features of the graph or table of a function.

5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
   - I can state the domain of a given function.

6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.⋆
   a. I can calculate and interpret the average rate of change of a function from a graph or table.

Cluster: Analyze functions using different representations.

7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
   b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
   - I can graph square root, cube root and piecewise-defined functions.

   c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and describe end behavior.
   - I can graph polynomial functions, identify zeros and describe end behavior.

   e. Graph exponential and logarithmic functions, show intercepts and describe end behavior, and graph trigonometric functions, describing period, mid-line, and amplitude.
   - I can graph exponential and logarithmic functions and label intercepts and describe end behavior.
   - I can graph trigonometric functions and describe and label period, mid-line, and amplitude.

8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
   a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
   - I can factor a quadratic function to find zeros.
   - I can complete the square to find the zeros of a quadratic function.
   - I can relate the zeros of a quadratic function to identify extreme values, symmetry of the graph and interpret those in terms of a context.

   b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.
   - I can apply the properties of exponents to interpret expressions for exponential functions.
   - I can classify exponential expressions as exponential growth or decay.

9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions)..
   - I can compare the properties of two functions where each function is represented in a different way such as algebraically, graphically, numerically in tables or by verbal descriptions.

Domain: Building Functions F-BF

Cluster: Build a function that models a relationship between two quantities.

1. Write a function that describes a relationship between two quantities.
   b. Combine standard function types using arithmetic operations.
   - I can create an equation for a situation by combining multiple functions.

Cluster: Build new functions from existing functions.

3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
   - I can identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative).
   - I can identify the value of k given the graphs of the function.
   - I can recognize even and odd functions from their graphs and create algebraic expressions for them.

4. Find inverse functions.
   a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$.
   - I can determine if a function has an inverse.
   - I can write an expression or equation for the inverse of a function.

Domain: Linear, Quadratic, and Exponential Models F-LE

Cluster: Construct and compare linear, quadratic, and exponential models and solve problems.

4. For exponential models, use a logarithm to solve $A=cb^{kt}$
   - I can evaluate exponential models using logarithms to re-write the equation or use technology to calculate the logarithm.

Domain: Trigonometric Functions F-TF

Cluster: Extend the domain of trigonometric functions using the unit circle.

1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
   - I can convert angles from radian measure to degrees and back on the unit circle.
   - I can identify and label radian measures on the unit circle.

2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
   - I can use the coordinate plane to represent situations involving trigonometry.

Cluster: Model periodic phenomena with trigonometric functions.

5. Choose trigonometric functions to model periodic phenomena from a variety of contexts (e.g. science, history, and culture, including those of the Montana American Indian) with specified amplitude, frequency, and midline.
   - I can create a trigonometric function to model periodic phenomena from a variety of contexts with specified amplitude, frequency, and midline.

Cluster: Prove and apply trigonometric identities.

8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to calculate trigonometric ratios.
   - I can prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to calculate trigonometric ratios.

Modeling Content Standards

Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data.

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards.

Statistics and Probability

Domain: Interpreting Categorical and Quantitative Data S-ID

Cluster: Summarize, represent, and interpret data on a single count or measurement variable.

4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables, and Montana American Indian data sources to estimate areas under the normal curve.
   - I can calculate the mean and standard deviation of a data set to fit it to a normal distribution and estimate population percentages.
   - I can differentiate between data sets that fit in a normal distribution and data sets that do not.
   - I can estimate the areas under the normal curve.

Domain: Making Inferences and Justifying Conclusions S-IC

Cluster: Understand and evaluate random processes underlying statistical experiments.

1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
   - I can predict population parameters based on a random sample from that population using statistics.

2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.
   - I can assess if a specified model is consistent using simulation.

Cluster: Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
   - I can recognize the purposes of and differences among sample surveys, experiments and observational studies.
   - I can explain how randomization relates to sample surveys, experiments and observational studies.

4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
   - I can estimate a population mean or proportion using data from a sample survey.
   - I can develop a margin of error for an estimated population mean or proportion through the use of simulation models for random sampling.

5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
   - I can compare two treatments using data from a randomized experiment.
   - I can conclude if differences between parameters are significant by using simulations.

6. Evaluate reports based on data.
   - I can evaluate reports based on data.

Domain: Using Probability to Make Decisions S-MD

Cluster: Use probability to evaluate outcomes of decisions.

6. Use probabilities to make fair decisions.

7. Analyze decisions and strategies using probability concepts.

Standards	Explanations and Examples
Students are	**The Standards for Mathematical Practice describe ways in which students ought to engage with the**

expected to:	**subject matter as they grow in mathematical maturity and expertise.**
HS.MP.1. Make sense of problems and persevere in solving them.	High school students start to examine problems by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. By high school, students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. They check their answers to problems using different methods and continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
HS.MP.2. Reason abstractly and quantitatively.	High school students seek to make sense of quantities and their relationships in problem situations. They abstract a given situation and represent it symbolically, manipulate the representing symbols, and pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Students use quantitative reasoning to create coherent representations of the problem at hand; consider the units involved; attend to the meaning of quantities, not just how to compute them; and know and flexibly use different properties of operations and objects.
HS.MP.3. Construct viable arguments and critique the reasoning of others.	High school students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. High school students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. High school students learn to determine domains to which an argument applies, listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
HS.MP.4. Model with mathematics.	High school students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. High school students making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
HS.MP.5. Use appropriate tools strategically.	High school students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. High school students should be sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. They are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
HS.MP.6. Attend to precision.	High school students try to communicate precisely to others by using clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. By the time they reach high school they have learned to examine claims and make explicit use of

	definitions.
HS.MP.7. Look for and make use of structure.	By high school, students look closely to discern a pattern or structure. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. High school students use these patterns to create equivalent expressions, factor and solve equations, and compose functions, and transform figures.
HS.MP.8. Look for and express regularity in repeated reasoning.	High school students notice if calculations are repeated, and look both for general methods and for shortcuts. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x2 + x + 1)$, and $(x – 1)(x3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, derive formulas or make generalizations, high school students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Algebra 2 Montana Common Core Standards Vocabulary		
absolute value	function f(x)	quadratic formula
addition rule	geometric sequence	qualitative
algebraically	graphically	quantitative
amplitude	histogram	radian
annual rate	identities	radical
approximate	increasing (graph)	radius
arc	independent	range
arithmetic sequence	inequality	rate of decay
associative	infinite	rate of growth
box plot	integer	rational
causation	interest rate	rational expression
center	interpret	real number
center (data)	interquartile range	relative frequency
circle	intersection	recursive
coefficient	interval	relative minimum
commutative	inverse	remainder theorem
complement	irrational	roots
complete the square	linear	sample space
complex number	linear association	scatter plot
conditional probability	logarithmic	sequence
coordinate plane	maximum	series
correlation	mean	set
counterclockwise	median	shape (data)
decreasing (graph)	midline	spread (data)
degree	minimum	standard deviation
dependent	mode	statistic
distributive	normal distribution	subset
domain	odd function	subtended
dot plot	outliers	successive approximation
end behavior	parameter	symmetry
equations	period (graph)	table value
evaluate	polynomial	trigonometry
even function	probability	unit circle
exponential	proportion	zero (root)
expression	Pythagorean identity	
extreme value	Pythagorean theorem	
finite	Pythagorean triple	
frequency	quadratic	