Algebra 1
Curriculum

Board Approved: March 21, 2024

Course Information

Course Description:	Transfer Goals:
Algebra 1 is the foundation for all future high school math courses. This course fosters students' mathematical proficiency by encouraging problem-solving, reasoning, and communication skills, as well as promoting mathematical connections and applications to real-world situations. This course develops an understanding of algebraic concepts including but not limited to: linear, exponential, and quadratic functions, systems of equations and inequalities, and data and statistics.	• Problem-solving skills: Learn to understand and solve problems effectively. • Logical and numerical thinking: Apply reasoning and math skills to solve different situations. • Constructing arguments and critiquing: Build strong arguments and evaluate others' reasoning. • Using math in real-life situations: Apply mathematical concepts to solve practical problems. • Strategic thinking and attention to detail: Use the right tools and techniques with precision to solve problems efficiently.

Curriculum Standards: **Algebra 1 Missouri Learning Standards**

Curriculum Resource(s): *Reveal Algebra 1 © 2020 - McGraw Hill*

Unit 1: Number & Quantity

Timeframe: ***see current scope and sequence***

Unit Description: Extend and use properties of rational exponents. Use units to solve problems.	
Enduring Understandings: ● Rational exponents share the same properties as integer exponents. ● Conversion between rational exponent form and radical form yields equivalent expressions. ● Providing appropriate units to a number is essential to have an accurate answer. ● Conversation rates are needed when converting units. ● When using numbers in real-world contexts, it is important to be precise and use appropriate units.	**Essential Questions:** ● How do the properties compare of a rational exponent to an integer exponent? ● What are different ways in which you can write an equivalent version of a given expression involving rational exponents? ● Why is it important to have units when solving a problem? ● What do you need to know when converting units? ● How do numbers relate to real-world contexts and applications?

Unit 1 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.NQ.A.1	● I can explain the properties of exponents, including rational exponents.
A1.NQ.A.2	● I can rewrite expressions with rational exponents as equivalent radical expressions. ● I can rewrite radical expressions as equivalent expressions with rational exponents.
A1.NQ.B.3	● I can identify, label, and use appropriate units of measure within a problem. ● I can convert units and rates. ● I can use units within problems. ● I can choose and interpret the scale and origin in graphs and data displays.
A1.NQ.B.4	● I can define and use appropriate quantities for representing a given context or problem.
A1.NQ.B.5	● I can choose the right amount of detail based on what I am measuring.

Unit 2: Seeing Structure in Expressions

Timeframe: ***see current scope and sequence***

Unit Description: Interpret and use structure.

Enduring Understandings:	**Essential Questions:**
• Terms of a formula or expression have meaning based on the context of the problem. • Polynomial expressions can be written in many forms. (vertex, standard, factored) • Equivalent forms of polynomial expressions provide information to support the context of the situation. • Factored form provides the factors of the quadratic function and can be solved using the zero product property. • A quadratic function in vertex form provides the maximum or minimum value of the function.	• How do you interpret the contextual meaning of individual terms of a formula or expression? • What are the different forms to write a polynomial expression? • How can you analyze polynomial expressions to be able to rewrite in equivalent forms? • How does factored form provide the zeros of a quadratic function? • Why is completing the square of a quadratic function important?

Unit 2 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.SSE.A.1	• **I can determine the real-world context of the variables in an expression (For example, the coefficient for the number of dimes is 0.10 because the value of a dime is 10 cents.)** • **I can interpret the real-world context of each individual term or factor of an expression.** • **I can interpret the meaning of individual terms or factors from a given problem that utilizes formulas or expressions in terms of the context of the situation. (For example, I can compare how doubling the principal affects the final amount when using the compound interest formula.)**
A1.SSE.A.2	• **I can factor the GCF out of a polynomial expression.** • **I can factor a trinomial with a leading coefficient of 1.** • **I can factor a trinomial with a leading coefficient that is not 1.** • **I can factor special cases, such as a difference of two perfect squares and a perfect square trinomial.** • **I can write a polynomial expression in equivalent forms.** • **I can find the product of two polynomials.**

Priority standards indicated in **bold*

A1.SSE.A.3	• I can find the zeros of a quadratic function by rewriting it in factored form. • I can complete the square to find the maximum or minimum value.

Unit 3: Creating Equations

Timeframe: ***see current scope and sequence***

Unit Description: Create equations that describe linear, quadratic, and exponential relationships.	
Enduring Understandings: • A linear equation has a slope (rate of change), y-intercept (starting value), and ordered pairs. • A quadratic equation has a vertex, y-intercept, x-intercept/s, and ordered pairs, depending on what form it is in. • An exponential equation has a multiplier, initial value, and ordered pairs. • Writing a one-variable equation means the input or output is provided. Writing a two-variable equation means neither is provided. • To graph equations, they will need important characteristics (slope, x-intercepts, y-intercepts, vertex, points, etc.) of the graph. Students can also use graphing technology. • The equation or inequality will provide solutions to a problem but sometimes the solutions do not make sense based on the context of the problem. • To be able to solve for a variable in an equation they will use inverse operations.	**Essential Questions:** • What important information is needed when creating a linear equation? • What important information is needed when creating a quadratic equation? • What important information is needed when creating an exponential equation? • What is the difference between a one-variable equation and a two-variable equation? • How can I graph linear, quadratic, and exponential equations? • How can the solutions of equations and inequalities be interpreted in real-world contexts? • Why is it important to be able to solve an equation for a certain variable?

Unit 3 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.CED.A.1	• **I can create linear equations in one variable and use them to model and solve problems given a scenario.** • **I can create exponential equations in one variable and use them to model and solve problems given a scenario.** • **I can model exponential growth using a one variable model.** • **I can model exponential decay using a one-variable model** • **I can create quadratic equations in one variable and use them to model and solve problems given a scenario.**

Priority standards indicated in **bold*

	I can create linear inequalities in one variable and use them to model and solve problems given a scenario.
A1.CED.A.2	- I can create a linear equation with two variables given a scenario, graph, and table. - I can create a quadratic equation in standard form with two variables given a vertex. - I can create an exponential equation with two variables given a scenario, graph, and table. - I can graph a linear equation on the coordinate plane and create the labels and scales. - I can graph a quadratic equation on the coordinate plane and create the labels and scales. - I can graph an exponential equation on the coordinate plane and create the labels and scales.
A1.CED.A.3	- I can represent constraints with an equation or inequality within a modeling context. - I can represent constraints with a system of equations and/or inequalities within a modeling context. - I can interpret data points to determine if they are a solution or non-solution within a modeling context.
A1.CED.A.4	I can solve literal equations and formulas for a specified variable that highlights a quantity of interest.

Unit 4: Reasoning with Equations and Inequalities

Timeframe: ***see current scope and sequence***

Unit Description: Understand solving equations as a process, and solve equations and inequalities in one variable. Solve systems of equations. Represent and solve linear and exponential equations and inequalities graphically.

Enduring Understandings:	**Essential Questions:**
• Solving equations and inequalities can be done by using inverse properties. • The steps to the solving process produce equivalent representations of the equations or inequalities. • Completing the square on a quadratic equation creates an equivalent quadratic equation in vertex form. • There are multiple ways to solve a quadratic equation including: inspection, square root property, completing the square, quadratic formula, graphing, and factoring. • Mathematical fluency is about using an appropriate strategy and knowing multiple processes. • Systems of equations can be solved algebraically or graphically. • The solution to an equation with two variables is all of its solutions on the coordinate plane. • The solution to a system of linear inequalities is where the graphs share common order pairs. • Equations and inequalities can be used to solve real-world problems and support decision-making processes.	• What techniques can be utilized to solve equations and inequalities? • How are the equations related in each step of the solving process? • How can you rewrite a quadratic equation in vertex form? • What ways are there to solve a quadratic equation? • What is the most efficient method to solve a quadratic equation? • How can you find the solution to a system of equations? • What are the solutions to a two-variable equation? • How can you identify the solutions to a system of linear inequalities? • How can equations and inequalities be used to model mathematical relationships? • How can equations and inequalities be used to solve real-world problems to make informed decisions?

Unit 4 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
[A1.REI.A.1]()	• I can explain how each step taken when solving an equation in one variable creates an equivalent equation that has the same solution(s) as

	the original. ● I can explain how each step taken when solving an inequality in one variable creates an equivalent inequality that has the same solution(s) as the original.
A1.REI.A.2	● **I can solve a quadratic equation using the appropriate method(s):** ○ **Completing the Square** ○ **Factoring** ○ **Inspection** ○ **Square Root Property** ○ **Quadratic Formula**
A1.REI.B.3	● I can solve a system of linear equations graphically. ● I can solve a system of linear equations algebraically. (e.g., substitution, elimination)
A1.REI.B.4	● I can solve a system consisting of a linear equation and a quadratic equation graphically. ● I can solve a system consisting of a linear equation and a quadratic equation algebraically.
A1.REI.B.5	● I can justify that the technique of linear combination produces an equivalent system of equations.
A1.REI.C.6	● **I can explain why an ordered pair is a solution to a linear function.** ● **I can explain why an ordered pair is a solution to an exponential function.**
A1.REI.C.7	● I can graph the solution to a linear inequality in two variables.
A1.REI.C.8	● **I can explain the solution of a system of inequalities in the context of a real-world situation.** ● **I can solve a system of linear inequalities by graphing.** ● **I can explain if an ordered pair is a solution to a system of linear inequalities**

Unit 5: Arithmetic with Polynomials and Rational Expressions

Timeframe: ***see current scope and sequence***

Unit Description: Perform operations on polynomials.	
Enduring Understandings: ● Polynomials can be simplified by using addition, subtraction, or multiplication. ● The properties of polynomials are essential in making mathematical connections and recognizing equivalent forms.	**Essential Questions:** ● What operations can be used to simplify polynomials? ● How can polynomial operations be used to identify equivalent forms?

Unit 5 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.APR.A.1	● I can add polynomials. ● I can subtract polynomials. ● I can multiply polynomials.
A1.APR.A.2	● I can divide a polynomial by a monomial.

Unit 6: Interpreting Functions

Timeframe: ***see current scope and sequence***

Unit Description: Understand the concept of a function and use function notation. Interpret linear, quadratic and exponential functions in terms of the context. Analyze linear, quadratic and exponential functions using different representations.

Enduring Understandings:	**Essential Questions:**
• A function is a relation where each element of the domain corresponds to exactly one element of the range. • Functions can be represented using *f*, but also commonly used are *g* and *h*. • All of the ordered pairs on the graph of a function labeled *g* are solutions to *g(x)* such that *y = g(x)*. • Function notation is another way to name a specific type of equation, where the input is *x*. • The key characteristics of a function include: slope, x-intercept, y-intercept, intervals where the function is increasing, decreasing or constant, intervals where the function output is positive, negative or zero, relative maximum or minimum, and end behavior. • The domain and range are important when graphing a function. • The average rate of change is the slope between two points on a graph. (linear, exponential quadratic) • Graphing a function provides the characteristics of a given function. • Tables, graphs, equations, and verbal descriptions are all ways to represent functions.	• What is a function? • How can functions be represented and interpreted using different mathematical representations? • How can you evaluate a function in function notation? • What key characteristics can be included on a linear, exponential, or quadratic function? • How can you interpret the characteristics of a function? • Why is it important to identify the domain and range of a function? • How is the average rate of change related to the graph over a specific interval? • How do you find the key characteristics of a function when graphing? • What methods can be used to compare functions?

Unit 6 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.IF.A.1	• I can represent a function using function notation $f(x)$.

Priority standards indicated in* ***bold*

	• I understand that a function is a relation in which every input has exactly one output.
A1.IF.A.2	• I can evaluate functions in function notation. • I can interpret statements that use function notation in terms of a context.

A1.IF.B.3	• **I can interpret key features of a linear function using tables, graphs, and verbal descriptions.**
	  ○ **Slope/Rate of Change**
	  ○ **x-intercept & y-intercept**
	• **I can interpret key features of an exponential function using tables, graphs, and verbal descriptions.**
	  ○ **x-intercepts & y-intercepts**
	  ○ **increasing/decreasing**
	  ○ **Multiplier**
	• **I can interpret key features of a quadratic function using tables, graphs, and verbal descriptions.**
	  ○ **x-intercepts & y-intercepts**
	  ○ **increasing/decreasing**
	  ○ **Vertex**
	  ○ **Axis of symmetry**
	  ○ **Maximum/minimum**

A1.IF.B.4	• I can relate the domain and range of a function to its graph. • I can describe how the domain and range within the context of a situation affect the characteristics of the graph of the function.
A1.IF.B.5	• I can determine the average rate of change of a function over a specified interval. • I can interpret the meaning of the average rate of change over a specified interval in a given context.
A1.IF.B.6	• I can interpret the parameters of a linear and exponential function in terms of the context.

A1.IF.C.7	• **I can graph, identify, and interpret key features of a linear equation.**
	  ○ **Slope/Rate of Change**
	  ○ **x-intercept & y-intercept**
	• **I can graph, identify, and interpret key features of an exponential equation.**
	  ○ **x-intercepts & y-intercepts**
	  ○ **increasing/decreasing**
	  ○ **Multiplier**
	• **I can graph, identify, and interpret key features of a quadratic equation.**
	  ○ **x-intercepts & y-intercepts**
	  ○ **increasing/decreasing intervals**
	  ○ **Vertex**

	○ **Axis of symmetry** ○ **Maximum/minimum**
A1.IF.C.8	● I can translate between different but equivalent forms of a function to reveal and explain different properties of the function and interpret these in terms of a context.
A1.IF.C.9	● I can compare two functions given a table, graph, equation, or verbal description.

Unit 7: Building Functions

Timeframe: ***see current scope and sequence***

Unit Description: Build new functions from existing functions (linear, quadratic and exponential).	
Enduring Understandings: ● The transformations of a function include vertical and horizontal translations, vertical dilations (stretch, compress), and reflections. ● The transformed function can be rewritten by applying the transformations to the original function. ● Mathematical reasoning and critical thinking are essential in constructing and analyzing translated functions.	**Essential Questions:** ● How can you analyze the effect of translations and scale changes on functions? ● How can you identify the new function given the transformations to the original function? ● How do mathematical reasoning and critical thinking play a role in constructing and analyzing functions?

Unit 7 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.BF.A.1	● **I can analyze the effect of translations and scale changes on functions.** ● **I can create a quadratic equation in vertex form from a verbal description of translations from the parent function.** ● **I can state how a quadratic given in vertex form is different from the parent function.** ● **I can look at the graph of a parabola and use its differences from the parent function to write an equation in vertex form.**

Unit 8: Linear, Quadratic, and Exponential Models

Timeframe: ***see current scope and sequence***

Unit Description: Construct and compare linear, quadratic and exponential models and solve problems. Use arithmetic and geometric sequences.	
Enduring Understandings: *Students will understand that:* ● Key features of linear, quadratic, and exponential functions provide valuable insights into their behavior and applications. ● Different problem-solving strategies and techniques can be used to analyze and solve problems involving linear, quadratic, and exponential models. ● Connections between linear, quadratic, and exponential models and their real-world applications can be made.	**Essential Questions:** ● How can we model and analyze real-world situations using linear, quadratic, and exponential functions? ● How can we analyze and solve problems involving linear, quadratic, and exponential functions? ● How can we make connections between linear, quadratic, and exponential models and their real-world applications?

Unit 8 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.LQE.A.1	● I can show that the slope of a linear function is constant between any two points. ● I can recognize situations in which one quantity changes at a constant rate per unit interval relative to another. ● I can recognize exponential situations in which a quantity grows or decays by a constant percent rate per unit interval. ● I can show that exponential functions change by equal factors over equal intervals.
A1.LQE.A.2	● I can describe using tables and graphs that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
A1.LQE.A.3	● **I can construct a linear equation given a graph, verbal description and a table.** ● **I can construct an exponential equation given a graph, verbal description, and a table.** ● **I can construct a quadratic equation with a leading coefficient of 1 given rational x-intercepts given a graph, verbal description, and a table.**

**Priority standards indicated in bold*

A1.LQE.B.4	• **I can write an arithmetic sequence in recursive and explicit form given graphs, verbal descriptions, or tables.** • **I can write a geometric sequence in recursive and explicit form given graphs, verbal descriptions, or tables.** • **I can translate between explicit and recursive forms of arithmetic and geometric sequences.**
A1.LQE.B.5	• I can write arithmetic sequences in recursive and explicit forms given graphs, verbal descriptions, or tables. • I can connect arithmetic sequences to linear functions. • I can model situations with arithmetic sequences. • I can write geometric sequences in recursive and explicit forms given graphs, verbal descriptions, or tables. • I can connect geometric sequences to exponential functions. • I can model situations with geometric sequences.
A1.LQE.B.6	• I can find the term of a general sequence given an explicit or recursive formula.

Unit 9: Data and Statistical Analysis

Timeframe: ***see current scope and sequence***

Unit Description: Summarize, represent, and interpret data.	
Enduring Understandings: *Students will understand that:* ● Data can be collected, organized, and analyzed to find patterns and make informed conclusions. ● Statistical measures and techniques can be used to summarize and interpret data. ● Analyzing statistics allows us to draw conclusions and make generalizations based on data.	**Essential Questions:** ● How can data be collected, organized, and analyzed to reveal patterns and trends? ● What statistical measures and techniques can be used to summarize and interpret data? ● How does analyzing statistics allow us to draw conclusions and make generalizations based on data?

Unit 9 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
A1.DS.A.1	● **I can analyze and interpret graphical displays of data (including dot plot, histogram, and box and whisker plot).** ● **I can determine the shape of data by looking at a dot plot, histogram, and box plot.** ● **I can describe how an outlier changes or does not change the measures of the center.** ● **I can determine the best measure of center based on having or not having outliers in a data set.**
A1.DS.A.2	● I can use statistics appropriate to the shape of the data distribution to compare the center (median, mean, mode) of two or more different data sets. ● I can use statistics appropriate to the shape of the data distribution to compare spread (interquartile range) of two or more different data sets. ● I can calculate and use statistics appropriate to the shape of the data distribution to compare spread (standard deviation) of two or more different data sets.
A1.DS.A.3	● I can interpret differences in shape, center and spread in the context of the data sets, accounting for possible effects of outliers.
A1.DS.A.4	● I can interpret relative frequencies in the context of the data. ● I can recognize possible associations and trends in the data.

Priority standards indicated in* ***bold*

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A1.DS.A.5	• I can construct a scatter plot of bivariate quantitative data and determine the type of function that models the relationship. • I can construct a linear function to model the bivariate data on a scatter plot that minimizes residuals (distance from the mean) using calculation and/or technology. • I can construct a scatter plot of bivariate quantitative data and determine the type of function that models the relationship. • I can construct an exponential function to model the bivariate data on a scatter plot that minimizes residuals using calculation and/or technology.
A1.DS.A.6	• I can interpret the slope (rate of change) and y-intercept (constant term) of a linear model in the context of the data.
A1.DS.A.7	• I can use technology to determine the correlation coefficient of a data set with a linear association. • I can describe the strengths and weaknesses of a correlation coefficient of a data set with a linear association.
A1.DS.A.8	• I can distinguish between correlation and causation.