Algebra I B Year At A Glance

Algebra I B Year-at-a-Glance (36 weeks)	
FIRST SEMESTER	SECOND SEMESTER
Unit 1 **Arithmetic with Polynomials**	**Unit 2** **Rational and Radical Functions**
18 weeks - Ends Dec 18	18 weeks - Ends May 17

Linear
• Slope
• Solving Equations
• Create equations of lines (include standard form)
• Function notation
 	
Exponents
• Exponent Rules
 	
Polynomials
• Polynomial Vocabulary
• Operations of Polynomials
  ○ Ordering Polynomials
  ○ Adding and Subtracting Polynomials
  ○ Multiplying Polynomials
 	
Geometry
• Geometric Vocabulary (practice using linear expressions)
  ○ Angle bisector (Solving Equations)
  ○ Segment bisector
  ○ Midsegment
  ○ Midpoint (of a segment)
  ○ Angle Addition Postulate
  ○ Segment Addition Postulate
  ○ Vertical angles
  ○ Parallel lines (including coordinate)
  ○ Perpendicular lines (including coordinate)
  ○ Parallel lines cut by transversals (angle relationships)
  ○ Supplementary angles
	Quadratics
	• Characteristics of Quadratic Graphs
	  ○ Max/Min/Vertex to sketch a graph
	  ○ Intercepts
	  ○ Intervals of increase/decrease/end behavior
	• Domain/Range (from mapping, ord.pairs, tables, graphs)
	• Solving Quadratics
	  ○ Identify solutions from graph
	  ○ Taking the Square Root
	  ○ Factoring (a=1)
	  ○ Zero product property
	  ○ Completing the Square
	  ○ Quadratic Formula
	  ○ Discriminant
	  ○ Identify types of solutions (real/non-real)
	  ○ Determine easiest method (factorable/not)
	
	Geometry
	• Geometric Vocabulary (practice using quadratic expressions)
	  ○ Angle bisector
	  ○ Segment bisector
	  ○ Midsegment
	  ○ Midpoint (of a segment)
	  ○ Angle Addition Postulate
	  ○ Segment Addition Postulate
	  ○ Vertical angles
	  ○ Parallel lines (including coordinate)
	  ○ Perpendicular lines (including coordinate)
	  ○ Parallel lines cut by transversals (angle relationships)

○ Complementary angles ○ Perimeter *(addition of linear expressions)* ○ Area *(multiplication of linear expressions)* ○ Volume *(multiplication of linear expressions)* ○ Measure of interior angles of polygons ○ Length of sides of regular polygons ○ Circumference ○ Proportions ○ Isosceles and equilateral triangles ○ Midpoint formula ● Solve Polynomials (zero product property) ○ Quadratics in factored form ○ Relate zeros of the graph to linear factors ● Characteristics of Polynomial Graphs ○ Max/Min/Vertex to sketch a graph ○ Intercepts ○ Intervals of increase/decrease/end behavior ● Domain/Range (from mapping, ord.pairs, tables, graphs) ○ Interval and inequality notations	○ Supplementary angles ○ Complementary angles ○ Perimeter ○ Measure of interior angles of polygons ○ Length of sides of regular polygons ○ Pythagorean Theorem ○ Circumference ○ Proportions ○ Isosceles and equilateral triangles ○ Distance and midpoint formulas ○ Area ○ Equation of a circle

COLOR KEY:

BLUE - Power Standard

BLACK - Additional Skills

RED - Closing the Achievement Gap

Green - Familiarity Only

Unit 1

Unit 2

Unit 3

Unit 4

Unit 5

Unit 1	Arithmetic with Polynomials	Grade Level	10	Approx length	18 weeks

CPSD Power Standards with Student Learning Objectives

HSA.REI.B.3.11 Solve linear equations, inequalities and absolute value equations in one variable, including equations with coefficients represented by letters

Student-Friendly Objectives:

- I can determine when it is appropriate to reverse an inequality symbol.
- I can solve an equation, inequality, and absolute value equation.
- I can solve an equation with many variables.
- I can represent my solution(s) graphically and using set notation when appropriate.
- I can check my solutions.

HSA.APR.A.1.5 Add, subtract, and multiply polynomials • Understand that polynomials, like the integers, are closed under addition, subtraction, and multiplication Note: If p and q are polynomials p + q, p – q, and pq are also polynomials

Student-Friendly Objectives:

- I can write a polynomial in descending order.
- I can classify polynomials based on its terms and degree.
- I can add and subtract polynomials.
- I can multiply polynomials.
- I can explain why polynomials are closed under addition, subtraction, and multiplication.

HSA.APR.B.3.6 Identify zeros of polynomials **(linear, quadratic only**) when suitable factorizations are available • Use the zeros to construct a rough graph of the function defined by the polynomial

Student-Friendly Objectives:

- I can find the zeros of a quadratic given its factored form.
- I can determine if the vertex of a quadratic is the maximum or minimum value of the function.
- I can identify the zeros from a graph/equation.
- I can use the zeros and the vertex (min/max) to make a rough sketch of a graph.

HSA.CED.A.2.9 Create equations in two or more variables to represent relationships between quantities • Graph equations, in two variables, on a coordinate plane

Student-Friendly Objectives:

- I can graph (a line, a parabola, & an exponential curve) given various information.
- I can write an equation from a verbal description, a table, or a graph.

- I can interpret slope in the context of a problem.
- I can calculate the common ratio of a data set and interpret its meaning.
- I can identify the y-intercept in linear, exponential, or quadratic functions and interpret its meaning.
- I can determine if a point is a solution to an equation.
- I can describe the relationship between the domain and range using the variables.

HSF.IF.A.1.14 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range • Understand that if *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x* • Understand that the graph of *f* is the graph of the equation *y = f(x)*

Student-Friendly Objectives:

- I can determine if a relation is a function by looking at a set of ordered pairs, a table, a mapping, or a graph.
- I can relate the definition of a function to the use of the vertical line test.
- I can identify domain and range from graphs, mappings, sets of ordered pairs, or tables.

HSF.IF.A.2.14 In terms of a real-world context: • Use function notation • Evaluate functions for inputs in their domains • Interpret statements that use function notation

Student-Friendly Objectives:

- I can use function notation.
- I can find *f(x)* if given *x*.
- I can explain the elements of function notation when it represents a real world context.

HSF.IF.B.5.15 Relate the domain of a function to its graph • Relate the domain of a function to the quantitative relationship it describes. For example: If the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

Student-Friendly Objectives:

- I can describe the domain given a real-world problem.
- I can determine if the domain is appropriate for the real-world problem.
- I can identify the domain of linear, quadratic, and exponential functions.

HSF.IF.C.7.16 Graph functions expressed algebraically and show key features of the graph, with and *without technology (limited to parent functions only)* • Graph linear and quadratic functions and, when applicable, show intercepts, maxima, and minima • Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions • Graph exponential functions, showing intercepts and end behavior

Student-Friendly Objectives:

- I can name the key features of a graph and equation.
- I can graph the seven parent functions by hand.

- I can state the end behaviors from an equation and/or a graph.
- I can sketch the graph of an equation using the key features.

Learning Indicators of Power Standards

Students will know…

- The meaning of absolute value
- When (and why) the inequality symbol switches
- Which variable (among multiple letters) to isolate, i.e. $ax + b = 16$, solve for x in terms of a and b
- Solutions should be verified
- The definition of a polynomial
- Like terms can be added or subtracted
- Polynomials are closed under addition, subtraction, and multiplication
- Zeros are the x-intercepts and are also referred to as solutions and/or roots
- The impact of the Zero Product Property
- The vertex of a quadratic will be the maximum or minimum of the function
- The leading coefficient determines the direction of opening
- The formula for slope/rate of change
- Slope-intercept form of a linear equation
- All solutions to a two-variable equation are points on a graph
- Understand that a function can be represented graphically, algebraically, verbally, etc.
- Know what an initial value represents and its graphic representation
- Know how domain/range relate to the graph and its variables
- The definition of domain and range
- The definition of independent and dependent variables
- The independent variable is the input and the dependent variable is the output
- If x is an element of its domain, then $f(x)$ denotes the corresponding element of the range (y)
- The definition of function
- Various notations for domain and range
- The elements of function notation (i.e., if linear, then coefficient is a rate and constant term is often an initial value)
- The relationship between the domain and independent variable
- The appropriate domain could be the set or any subset of the real

And be able to…

- Isolate the variable of an equation, inequality, and absolute value (including with coefficients represented with letters -- literal equations)
- Set up and solve two equations based on an absolute value equation
- Represent a solution to a linear equation, inequality, or absolute value equation graphically or on a number line
- Represent the solution to an inequality using set notation
- Write a polynomial in descending order
- Classify a polynomial based on its terms and degree
- Add, subtract, and multiply polynomials
- Explain why polynomials are closed under addition, subtraction, and multiplication
- Use the Zero Product Property to find the zeros of quadratic given its factored form
- Determine if the vertex of a quadratic is a minimum or maximum
- Determine zeros of a function from a given graph
- Use the zeros and the vertex (min/max) to make a rough sketch of a graph given the equation of the function
- Solve for a specific variable in terms of the others
- Determine if a data set is linear, exponential, or neither
- Interpret slope or common ratio in the context of a graph, verbal description, or table
- Graph functions (linear, exponential, and quadratic)
- Write a description of the relationship between the variables (verbal or equation)
- Determine whether an exponential function is exponential growth or exponential decay.
- Translate between the tabular, algebraic, graphical, and verbal representations of equations
- Determine if a relation is a function when it's given as a set of ordered pairs, a table, a mapping, or a graph
- Graph an equation written in function notation
- Relate the vertical line test to the definition of a function

number system ● The key features of a graph ○ Intercepts ○ End behavior ○ Extrema ○ Increasing/decreasing intervals ○ Jump discontinuities on piecewise functions	● Identify the domain and range of a relation from graph (including piecewise graphs), mapping, set of ordered pairs, or a table ● Write an equation using function notation ● Evaluate functions ● Interpret equations written in function notation (i.e. *C(n)* = 2.79*n* means the cost of *n* gallons of gas is $2.79 times the number gallons and $2.79 is the price per gallon) ● Identify the domain given the graph ● Identify the domain given a problem in context ● Analyze the appropriateness of the identified domain ● Identify the domain of linear, quadratic, and exponential function both with and without a context ● Relate the domain of a function to the relationship it's describing (i.e. If *C(n)* = 2.79*n* gives the cost of *n* gallons of gas, *then an appropriate domain would be real numbers between 0 and the max the tank would hold*) ● Identify the type of function ● Graph the parent functions for those listed above without technology ● Graph a function using the key features ● Identify the end behaviors from the equation and the graph
Additional Arkansas State Standards	
None	

Unit 2	Quadratics	Grade Level	10	Approx Length	18 weeks

CPSD Power Standards with Student Learning Objectives

HSA.REI.B.4.11 Solve quadratic equations in one variable • Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Introduce this with a leading coefficient of 1 in Algebra I. • Solve quadratic equations (as appropriate to the initial form of the equation) by: • Inspection of a graph • Taking square roots • Completing the square • Using the quadratic formula • Factoring • Limitation: i) Tasks do not require students to write solutions for quadratic equations that have roots with nonzero imaginary parts. However, tasks can require the student to recognize cases in which a quadratic equation has no real solutions. Note: Solving a quadratic equation by factoring relies on the connection between zeros and factors of polynomials

Student-Friendly Objectives:

- I can solve a quadratic equation
  - By completing the square
  - Using the quadratic formula
  - By factoring (including using difference of squares)
  - By inspecting the graph or table
  - By taking the square root.
- I can determine the easiest method of solving a quadratic equation (depending on its given form).

HSA.APR.B.3.6 Identify zeros of polynomials **(linear, quadratic only**) when suitable factorizations are available • Use the zeros to construct a rough graph of the function defined by the polynomial

Student-Friendly Objectives:

- I can find the zeros of a quadratic given its factored form.
- I can determine if the vertex of a quadratic is the maximum or minimum value of the function.
- I can identify the zeros from a graph/equation.
- I can use the zeros and the vertex (min/max) to make a rough sketch of a graph.

HSA.CED.A.2.9 Create equations in two or more variables to represent relationships between quantities • Graph equations, in two variables, on a coordinate plane

Student-Friendly Objectives:

- I can graph (a line, a parabola, & an exponential curve) given various information.
- I can write an equation from a verbal description, a table, or a graph.
- I can interpret slope in the context of a problem.
- I can calculate the common ratio of a data set and interpret its meaning.

- I can identify the y-intercept in linear, exponential, or quadratic functions and interpret its meaning.
- I can determine if a point is a solution to an equation.
- I can describe the relationship between the domain and range using the variables.

HSF.IF.A.1.14 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range • Understand that if *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x* • Understand that the graph of *f* is the graph of the equation *y = f(x)*

Student-Friendly Objectives:
- I can determine if a relation is a function by looking at a set of ordered pairs, a table, a mapping, or a graph.
- I can relate the definition of a function to the use of the vertical line test.
- I can identify domain and range from graphs, mappings, sets of ordered pairs, or tables.

HSF.IF.A.2.14 In terms of a real-world context: • Use function notation • Evaluate functions for inputs in their domains • Interpret statements that use function notation

Student-Friendly Objectives:
- I can use function notation.
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- I can explain the elements of function notation when it represents a real world context.

HSF.IF.B.5.15 Relate the domain of a function to its graph • Relate the domain of a function to the quantitative relationship it describes. For example: If the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

Student-Friendly Objectives:
- I can describe the domain given a real-world problem.
- I can determine if the domain is appropriate for the real-world problem.
- I can identify the domain of linear, quadratic, and exponential functions.

HSF.IF.C.7.16 Graph functions expressed algebraically and show key features of the graph, with and *without technology (limited to parent functions only)* • Graph linear and quadratic functions and, when applicable, show intercepts, maxima, and minima • Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions • Graph exponential functions, showing intercepts and end behavior

Student-Friendly Objectives:
- I can name the key features of a graph and equation.
- I can graph the seven parent functions by hand.

Learning Indicators of Power Standards

Students will know…	And be able to…
● Zeros are the x-intercepts and are also referred to as solutions and/or roots ● The impact of the Zero Product Property ● The vertex of a quadratic will be the maximum or minimum of the function ● The leading coefficient determines the direction of opening ● The formula for slope/rate of change ● Slope-intercept form of a linear equation ● All solutions to a two-variable equation are points on a graph ● Understand that a function can be represented graphically, algebraically, verbally, etc. ● What an initial value represents and its graphic representation ● How domain/range relate to the graph and its variables ● Solutions of quadratic equations are the x-intercepts of the graph and the zeros on the table ● The quadratic formula ● Not all quadratics are factorable ● The process of completing the square (how the new "*c*" coefficient is formed) ● The definition of domain and range ● The definition of independent and dependent variables ● The independent variable is the input and the dependent variable is the output ● If *x* is an element of its domain, then *f(x)* denotes the corresponding element of the range (*y*) ● The definition of function ● Various notations for domain and range ● The elements of function notation (i.e., if linear, then coefficient is a rate and constant term is often an initial value) ● The relationship between the domain and independent variable ● The appropriate domain could be the set or any subset of the real number system ● The key features of a graph ○ Intercepts ○ End behavior ○ Extrema ○ Increasing/decreasing intervals ○ Jump discontinuities on piecewise functions	● Use the Zero Product Property to find the zeros of quadratic given its factored form ● Determine if the vertex of a quadratic is a minimum or maximum ● Determine zeros of a function from a given graph ● Use the zeros and the vertex (min/max) to make a rough sketch of a graph given the equation of the function ● Solve for a specific variable in terms of the others ● Determine if a data set is linear, exponential, or neither ● Interpret slope or common ratio in the context of a graph, verbal description, or table ● Graph functions (linear, exponential, and quadratic) ● Write a description of the relationship between the variables (verbal or equation) ● Determine whether an exponential function is exponential growth or exponential decay. ● Translate between the tabular, algebraic, graphical, and verbal representations of equations ● Locate solutions of quadratic equations on a graph or table, if real solutions exist ● Solve a quadratic equation by factoring (including using difference squares) ● Complete the square algebraically (associate meaning of new "*c*" coefficient) ● Convert a quadratic equation from standard form to vertex form ● Solve a quadratic equation by completing the square ● Solve a quadratic equation by taking the square root ● Recognize an unfactorable quadratic equation, and use another appropriate method to solve ● Solve a quadratic equation by graphing (use technology for irrational roots) ● Determine if a relation is a function when it's given as a set of ordered pairs, a table, a mapping, or a graph ● Graph an equation written in function notation ● Relate the vertical line test to the definition of a function ● Identify the domain and range of a relation from graph (including piecewise graphs), mapping, set of ordered pairs, or a table ● Write an equation using function notation ● Evaluate functions

	● Interpret equations written in function notation (i.e. *C(n)* = 2.79*n* means the cost of *n* gallons of gas is $2.79 times the number gallons and $2.79 is the price per gallon) ● Identify the domain given the graph ● Identify the domain given a problem in context ● Analyze the appropriateness of the identified domain ● Identify the domain of linear, quadratic, and exponential function both with and without a context ● Relate the domain of a function to the relationship it's describing (i.e. If *C(n)* = 2.79*n* gives the cost of *n* gallons of gas, *then an appropriate domain would be real numbers between 0 and the max the tank would hold*) ● Identify the type of function ● Graph the parent functions for those listed above without technology ● Graph a function using the key features ● Identify the end behaviors from the equation and the graph
Additional Arkansas State Standards	
None	