Algebra A Year at a Glance
2018-2019

Algebra A Year-at-a-Glance			
FIRST SEMESTER		SECOND SEMESTER	
Unit 1 **Equations, Inequalities, and Functions**	**Unit 2** **Linear Equations and Graphing**	**Unit 3** **Exponential Functions**	**Unit 4** **Polynomial Operations and Radicals**
10 weeks	12 weeks	7 weeks	7 weeks

• Multi-Step Equations
  ○ Two-Step
  ○ Distributive Prop.
  ○ LikeTerms
  ○ Variables on Both Sides
  ○ Proportions
  ○ Absolute Value
• Inequalities
  ○ Multi-Step
  ○ Compound
• Functions
  ○ Domain/Range
  ○ Vertical Line Test
  ○ Function Notation
	• Slope
	• Writing Linear Equations from:
	  ○ Graphs
	  ○ Context
	  ○ Slope and a Point
	  ○ Two Points
	  ○ Tables
	  ○ X and Y Intercepts
	• Graphing
	  ○ Slope-Intercept Form
	  ○ Standard Form
	  ○ Intervals
	  ○ Piecewise
	• Systems of Equations
	  ○ Graphing
	  ○ Substitution
	  ○ Elimination
	• Graphing Linear Inequalities
	• Graphing Systems of Inequalities
		• Sequences
		  ○ Arithmetic (linear)
		  ○ Geometric (exponential)
		• Exponential Functions
		  ○ Evaluating
		  ○ Graphing
		  ○ Analyzing
		  ○ Writing from:
		  ➢ Tables
		  ➢ Points
		  ➢ Graphs
		• Growth and Decay in Context
		• Compound Interest
			• Exponent Rules
			• Polynomials
			  ○ Add/Subtract
			  ○ Multiply
			  ➢ Monomials
			  ➢ Binomials
			  ➢ Trinomials
			• Radicals
			  ○ Simplifying
			  ○ Multiplying

BLUE - Power Standard

BLACK - Additional Skills

RED - Closing the Achievement Gap

Green - Familiarity Only

Unit 1	Equations, Inequalities, and Functions	Grade Level	Algebra A	Approx length	10 weeks

CPSD Power Standards with Student Learning Objectives

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 write an equation from a verbal description, a table, or a graph.
- I can describe the relationship between the domain and range using the variables.

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.

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 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.

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 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
- 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

And be able to…

- Solve for a specific variable in terms of the others
- Write a description of the relationship between the variables (verbal or equation)
- 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
- 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, mapping, set of ordered pairs, or a table
- Write an equation using function notation
- Evaluate functions
- Interpret equations written in function notation (i.e. $C(n) = 2.79n$ 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*)
Additional Arkansas State Standards	
● HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems. Choose and interpret units consistently in formulas. Choose and interpret the scale and the origin in graphs and data displays. ● HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling (i.e., use units appropriate to the problem being solved) ● HSA.SSE.A.1 Interpret expressions that represent a quantity in terms of its context ● HSA.CED.A.3 Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context ● HSA.CED.A.4 Rearrange literal equations using the properties of equality	

Unit 2	Linear Equations and Graphing	Grade Level	Algebra A	Approx Length	12 weeks

CPSD Power Standards with Student Learning Objectives

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 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.REI.C.6.12 Solve systems of equations algebraically and graphically Limitation: i) Tasks have a real-world context. ii) Tasks have hallmarks of modeling as a mathematical practice (less defined tasks, more of the modeling cycle).

Student Friendly Objectives:

- I can solve a system of equations by substitution, elimination or graphing.
- I can determine if a point is a solution.
- I can write a system of equations for a real-world situation.
- I can solve and interpret the solution of a system of equations in a real world context.

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 functions

Student Friendly Objectives:

- I can name the key features of a graph and equation.
- I can sketch the graph of an equation using the key features.

Learning Indicators of Power Standards

Students will know...	And be able to...
• 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	• Solve for a specific variable in terms of the others • Interpret slope or common ratio in the context of a graph, verbal description, or table

• 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 a systems of equations
• That a solution to a system of equations is the point(s) that makes both equations true
• Whether a system of equations has one solution, no solutions, or infinite solutions
• 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 systems of equations
• That a solution to a system of equations is the point(s) that makes both equations true
• Whether a system of equations has one solution, no solutions, or infinite solutions
• The key features of a graph
  ○ Intercepts
  ○ End behavior
  ○ Extrema
  ○ Increasing/decreasing intervals
  ○ Jump discontinuities in piecewise functions
	• Graph functions
	• Write a description of the relationship between the variables (verbal or equation)
	• Determine whether a point is the solution to a system of equations
	• Solve a system of equations algebraically using substitution or elimination
	• Use graphs to solve a system of equations
	• Create, solve, and interpret the solution of a system of equations from context
	• Graph a function using the key features

Additional Arkansas State Standards	
• HSA.REI.C.5 Solve systems of equations in two variables using substitution and elimination. Understand that the solution to a system of equations will be the same when using substitution and elimination. • HSA.REI.D.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane • HSA.REI.D.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 $f(x)=g(x)$ • HSA.REI.D.12 Solve linear inequalities and systems of linear inequalities in two variables by graphing • HSF.IF.B.6 Calculate and interpret the average rate of change of a function over a specified interval. Estimate the rate of change from a graph • HSF.BF.B.3 Experiment with multiple transformations and illustrate an explanation of the effects on the graph with or without technology • HSS.ID.C.7 Interpret the slope (rate of change) and interpret the intercept (constant term) of a linear model in the context of the data	

Unit 3	Exponential Functions	Grade Level	Algebra A	Approx Length	7 weeks

CPSD Power Standards with Student Learning Objectives

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 exponential functions, showing intercepts and end behavior

Student-Friendly Objectives:

- I can name the key features of a graph and equation.
- I can sketch the graph of an equation using the key features.

Learning Indicators of Power Standards

Students will know…	And be able to…
● The key features of a graph ○ Intercepts ○ End behavior ○ Increasing/decreasing intervals	● Graph a function using the key features ● Identify the end behaviors from the equation and the graph

Additional Arkansas State Standards

- HSF.IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers
- HSF.IF.C.9 Compare properties of two functions each represented in a different way(algebraically, graphically, numberically in tables, or by verbal descriptions)
- HSF.LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions
  - Show that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals
  - Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another
- HSF.LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly
- HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems. Choose and interpret units consistently in formulas. Choose and interpret the scale and the origin in graphs and data displays.
- HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling (i.e., use units appropriate to the problem being solved)

Unit 4	Polynomial Operations and Radicals	Grade Level	Algebra A	Approx Length	7 weeks

CPSD Power Standards with Student Learning Objectives

SA.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.

Learning Indicators of Power Standards

Students will know…	And be able to…
• The definition of a polynomial • Like terms can be added or subtracted • Polynomials are closed under addition, subtraction, and multiplication	• 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

Additional Arkansas State Standards

- HSN.RN.B.4 Simplify radical expressions, perform operations with radical expressions, and rationalize denominators and/or numberators
- HSA.APR.D.7 Add, subtract, multiply, and divide by nonzero rational expressions. Understand that rational expressions, like the integers are closed under addition, subtraction, and multiplication
- HSA.SSE.A.1 Interpret expressions that represent a quantity in terms of its context
    - Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients
    - Interpret complicated expressions by viewing one or more of their parts as a single entity
- HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it
- HSA.SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression
- Factor a quadratic expression to reveal the zeros of the function it defines