SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Algebra 1B	**Length of Course:** 30 cycles
Grade Level(s): 9	**Periods Per Cycle:** 6
Units of Credit: 1	**Length of Period:** 43 minutes
Classification: Required	**Total Instructional Time:** 129 hours

Course Description

This course is the continuation of Algebra 1A which will complete the Algebra 1 curriculum. Algebra 1B will stress both the structure of the real number system and the methods of problem solving, including an in-depth analysis of the applications. This course is designed to help the students to do the following: understand the basic structure of algebra; perceive the role of deductive reasoning in algebra; appreciate the need for precision of language, and prepare students to take the Keystone Exam at the end of the course.
Prerequisite: Successful completion of Algebra 1A.

Instructional Strategies, Learning Practices, Activities, and Experiences

Anticipatory Sets	Flexible Groups	Projects
Assessments	Graphic Organizers	Teacher Demonstrations
Bell Ringers	Guided Practice	Technology Integration
Class Discussions	High-Level Questioning	Videos/DVD's
Closure	Homework	Wait Time
Critical Thinking	Posted Objectives	

Assessments

Assessments (Teacher-Created, Keystone)	Projects	Classwork
Higher-Level Questioning		Closures

Materials/Resources

Big Ideas Math: A Bridge to Success in Algebra 1 Larsen 1st Edition	Keystone Finish Line (Algebra 1), Continental Press, Inc.	Teacher-Created and Published Worksheets
		Internet Resources

Adopted: 5/21/18

Departmental Review: 2/18/2019

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Equations in One Variable	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Expressions, Equations, and Functions A. Expressions, Order of Operations, and Unit Rate (Review of Algebra 1A) • Evaluate algebraic expressions • Use the order of operations to simplify expressions • Read, write, and evaluate powers • Translate a verbal phrase into an algebraic expression • Find the unit rate for a given situation B. Equations (Review) and Inequalities (New) • Write equations and inequalities for a verbal sentence • Write and solve an equation or inequality for an application problem • Use formulas to solve an application problem • Check solutions to an equation or inequality C. Functions, Domain, and Range (Review) • Determine if a relation is a function • State the domain, range, independent, and dependent variables • Write a rule for a function given a table of input/ output values • Graph linear functions using a table of values	**CC.2.1.HS.F.2** ~ Apply properties of rational and irrational numbers to solve real world or mathematical problems. **CC.2.2.HS.D.1** ~ Interpret the structure of expressions to represent a quantity in terms of its context. **CC.2.2.HS.D.2** ~ Write expressions in equivalent forms to solve problems. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Equations in One Variable (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Properties of Real Numbers (Review of Algebra 1A) A. Order Real Numbers • Graph real numbers on a number line • Identify categories of real numbers and give examples of each • Find the opposite and absolute value of a real number B. Operations with Real Numbers • State the additive and multiplicative properties of real numbers • Add, subtract, multiply, and divide real numbers • Use the distributive property to simplify expressions • Find the mean • Solve real-life problems using operations with real numbers C. Find Square Roots and Compare Real Numbers • Approximate square roots • Evaluate expressions with square roots • Order and graph real numbers including square roots • Identify perfect squares • Solve real-life problems using square roots Properties of Real Numbers (New) D. Operations with Real Numbers • Perform matrix addition, subtraction, and scalar multiplication • Use matrices to model real life application problems	**CC.2.2.HS.D.2** ~ Write expressions in equivalent forms to solve problems. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.1.HS.F.1** ~ Apply and extend the properties of exponents to solve problems with rational exponents. **CC.2.1.HS.F.2** ~ Apply properties of rational and irrational numbers to solve real world or mathematical problems.

Equations in One Variable (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Solving Linear Equations (Review of Algebra 1A) A. Solve Linear Equations • Solve one-and two-step equations • Solve multi-step equations • Solve equations with variables on both sides • Set up and solve real-life application problems B. Rewrite Equations/ Formulas • Rewrite an equation in function form • Solve a formula for a given variable • Rewrite a formula and use to evaluate a real-life problem Solving Linear Equations (New) C. Ratios and Proportions • Write ratios and apply to real-life situations • Set up and solve a proportion • Use a proportion to solve real-life problems • Apply proportions to similar figures D. Percent Problems • Solve percent problems using proportions • Solve percent problems using an equation • Set up and solve real-life percent problems • Find the percent of change	**CC.2.1.HS.F.3** ~ Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays. **CC.2.1.HS.F.4** ~ Use units as a way to understand problems and to guide the solution of multi-step problems. **CC.2.1.HS.F.5** ~ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **CC.2.1.HS.F.6** ~ Extend the knowledge of arithmetic operations and apply to complex numbers. **CC.2.2.HS.D.2** ~ Write expressions in equivalent forms to solve problems. **CC.2.2.HS.D.7** ~ Create and graph equations or inequalities to describe numbers or relationships. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model. **CC.2.3.HS.A.12** ~ Explain volume formulas and use them to solve problems. **CC.2.3.HS.A.14** ~ Apply geometric concepts to model and solve real world problems.

Equations in Two Variables	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Graphing Linear Equations and Functions (Review of Algebra 1A) A. Graphing Linear Equations • Plot points in a coordinate plane • Perform and describe transformations in a coordinate plane • Graph a function with a given domain • Determine a continuous verses a discrete function • Graph a linear function using a table of values • Graph a linear function using x- and y-intercepts • Graph vertical and horizontal lines B. Find Slope and Graph Using Slope-Intercept Form • Find the slope of a line using two of its points • Interpret slope as a rate of change in a real-life situation • Find the slope and y-intercept of a given equation • Graph a line using slope-intercept form • Identify parallel lines C. Direct Variation • Identity direct variation equations • Graph direct variation models • Write a direct variation equation • Use a ratio to model direct variation	**CC.2.2.HS.D.8** ~ Apply inverse operations to solve equations or formulas for a given variable. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.2** ~ Graph and analyze functions and use their properties to make connections between the different representations. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model.

Equations in Two Variables (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Graphing Linear Equations and Functions (Continued) D. Graph Linear Functions • Use functions using function notation • Graph a function given in function notation • Determine the domain and range of a function • Graph transformations of the parent linear function • Compare linear functions with the parent linear function Writing Linear Equations (Review of Algebra 1A) A. Write the Equation of a Line in Slope-Intercept Form • Write the equation given the slope and intercept • Write the equation given the slope and one point • Write the equation given two points B. Write the Equation of a Line using Function Notation • Write the equation of a line that models a real-life situation • Write the equation of a line using function notation C. Scatterplots • Use a scatterplot to graph data • Determine correlation of a scatterplot • Use a line of best fit to model data • Determine the equation of a line of best fit • Apply a line of best fit for a real-life set of data to make a prediction	**CC.2.2.HS.D.6** ~ Extend the knowledge of rational functions to rewrite in equivalent forms. **CC.2.2.HS.D.7** ~ Create and graph equations or inequalities to describe numbers or relationships. **CC.2.2.HS.D.8** ~ Apply inverse operations to solve equations or formulas for a given variable. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.1** ~ Use the concept and notation of functions to interpret and apply them in terms of their context. **CC.2.2.HS.C.2** ~ Graph and analyze functions and use their properties to make connections between the different representations. **CC.2.2.HS.C.3** ~ Write functions or sequences that model relationships between two quantities. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model. **CC.2.4.HS.B.1** ~ Summarize, represent, and interpret data on a single count or measurement variable. **CC.2.4.HS.B.2** ~ Summarize, represent, and interpret data on two categorical and quantitative variables. **CC.2.4.HS.B.3** ~ Analyze linear models to make interpretations based on the data.

Equations in Two Variables (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Writing Linear Equations (New) D. Write the Equation of a Line in Point-Slope Form • Write the equation given one point and the slope • Write the equation given two points • Graph the equation in point-slope form E. Write the Equation of a Line in Standard Form F. Write and Graph Equations of Parallel and Perpendicular Lines • Write the equations of parallel and perpendicular lines • Graph parallel and perpendicular lines	

Equations in Two Variables (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Solving and Graphing Linear Inequalities (New) A. Solving Simple Inequalities • Solve inequalities using addition and subtraction • Solve inequalities using multiplication • Graph linear inequalities on a number line • Solve multi-step inequalities, including variables on both sides • Set up and solve real-life problems using inequalities B. Solve Compound Inequalities • Solve both “and” and “or” inequalities • Graph both “and” and “or” inequalities • Set up and solve application problems that involve compound inequalities C. Solve Absolute Value Equations and Inequalities • Solve an absolute value equation • Solve an absolute value inequality D. Graph Linear Inequalities in Two Variables • Check if a given point is a solution of a linear inequality • Graph a linear inequality on a coordinate plane • Set up and determine solutions of a real-life problem using linear inequalities	**CC.2.2.HS.D.7** ~ Create and graph equations or inequalities to describe numbers or relationships. **CC.2.2.HS.D.8** ~ Apply inverse operations to solve equations or formulas for a given variable. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.4** ~ Interpret the effects transformations have on functions and find the inverses of functions. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model.

Equations in Two Variables (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Systems of Equations (Review of Algebra 1A) A. Solve a Linear System by Graphing • Determine if an ordered pair is a solution of a system of equations • Find the solution to a system of linear equations by graphing B. Solve a Linear System by Substitution • Solve an equation for a given variable • Solve a linear system using substitution • Check solutions to a system C. Solve a Linear System by Elimination • Solve when no multiplication is required • Solve a system when multiplication is required first D. Solve Application Problems using a System of Equations E. Solve Special Types of Linear Systems • Determine when a system in inconsistent • Determine when a system is a consistent dependent system Systems of Inequalities (New) F. Solve a System of Linear Inequalities	**CC.2.2.HS.D.8** ~ Apply inverse operations to solve equations or formulas for a given variable. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model. **CC.2.4.HS.B.2** ~ Summarize, represent, and interpret data on two categorical and quantitative variables.

Probability and Data Analysis	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Probability and Data Analysis (New) A. Probability and Odds • Find the probability of an event occurring • Find the odds in favor and odds against an event occurring • Use the formula for the number of permutations or combinations • Find the probabilities using permutations and combinations • Find the probabilities of compound events B. Data Analysis • Determine bias in a sample • Find the mean, median, and mode of a set of data • Find the range of a set of data • Construct and interpret a stem-and-leaf plot • Construct and interpret a histogram • Construct and interpret a box-and-whisker plot	**CC.2.1.HS.F.3** ~ Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays. **CC.2.1.HS.F.4** ~ Use units as a way to understand problems and to guide the solution of multi-step problems. **CC.2.1.HS.F.5** ~ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **CC.2.4.HS.B.1** ~ Summarize, represent, and interpret data on a single count or measurement variable. **CC.2.4.HS.B.2** ~ Summarize, represent, and interpret data on two categorical and quantitative variables. **CC.2.4.HS.B.4** ~ Recognize and evaluate random processes underlying statistical experiments. **CC.2.4.HS.B.5** ~ Make inferences and justify conclusions based on sample surveys, experiments, and observational studies. **CC.2.4.HS.B.6** ~ Use the concepts of independence and conditional probability to interpret data. **CC.2.4.HS.B.7** ~ Apply the rules of probability to compute probabilities of compound events in a uniform probability model.

Exponential and Quadratic Functions	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Exponents and Exponential Functions (Review of Algebra 1A) A. Properties of Exponents • Apply the exponent properties involving products to simplify expressions • Apply the exponent properties involving quotients to simplify expressions • Use zero and negative exponent properties to simplify expressions B. Scientific Notation • Write numbers in both decimal form and scientific notation • Multiply, divide, and find powers of numbers in scientific notation • Use scientific notation to solve real-life application problems Exponents and Exponential Functions (New) C. Exponential Growth and Decay • Graph exponential growth and decay functions • Write and solve exponential growth and decay functions • Apply exponential growth and decay to real-life situations	**CC.2.1.HS.F.1** ~ Apply and extend the properties of exponents to solve problems with rational exponents. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model. **CC.2.2.HS.D.1** ~ Interpret the structure of expressions to represent a quantity in terms of its context.

Exponential and Quadratic Functions (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Polynomials and Factoring (New) A. Classify Polynomials • Classify polynomials by type • Classify polynomials by degree • Rewrite a polynomial in standard form B. Perform Operations with Polynomials • Add and subtract polynomials • Multiply polynomials using the distributive property • Multiply two binomials using the first, outer, inner, last (FOIL) method • Find the special products using the square of a binomial and the sum and difference pattern C. Factor Polynomials • Factor out the greatest common factor (GCF) of a polynomial • Factor by grouping • Factor a difference of two squares • Factor a trinomial w/a leading coefficient of 1 • Factor a trinomial w/a leading coefficient other than 1 • Factor a perfect square trinomial D. Solve a Polynomial Equation in Factored Form • Use the zero product property to solve equations • Use factoring to solve geometry volume and area application problems • Use the vertical motion model for falling objects to set up and solve real-life problems	**CC.2.2.HS.D.3** ~ Extend the knowledge of arithmetic operations and apply to polynomials. **CC.2.2.HS.D.4** ~ Understand the relationship between zeroes and factors of polynomials to make generalizations about functions and their graphs. **CC.2.2.HS.D.5** ~ Use polynomial identities to solve problems. **CC.2.2.HS.D.8** ~ Apply inverse operations to solve equations or formulas for a given variable. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model.

Exponential and Quadratic Functions (Continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Polynomials and Factoring (Continued) E. Simplify Rational Expressions (12.4) • Simplify a rational expression by factoring and canceling common factors • Determine the excluded value of a rational expression	**CC.2.2.HS.D.1** ~ Interpret the structure of expressions to represent a quantity in terms of its context. **CC.2.1.HS.F.1** ~ Apply and extend the properties of exponents to solve problems with rational exponents.
Quadratic Equations and Functions (New) A. Graph a Quadratic Function • Graph the parent quadratic function and transformations of the parent function • Graph quadratic functions by finding the vertex and making a table of values • Finding the minimum and maximum value of a quadratic equation B. Solve a Quadratic Equation • Solve a quadratic equation by graphing • Solve a quadratic equation by finding square roots • Solve a quadratic equation by factoring • Solve a quadratic equation using the quadratic formula • Solve real-life quadratic problems • Use the discriminant to determine the number of real solutions of a quadratic equation • Solve a quadratic formula with an imaginary solutions	**CC.2.1.HS.F.7** ~ Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. **CC.2.2.HS.D.3** ~ Extend the knowledge of arithmetic operations and apply to polynomials. **CC.2.2.HS.D.4** ~ Understand the relationship between zeroes and factors of polynomials to make generalizations about functions and their graphs. **CC.2.2.HS.D.5** ~ Use polynomial identities to solve problems. **CC.2.2.HS.D.8** ~ Apply inverse operations to solve equations or formulas for a given variable. **CC.2.2.HS.D.9** ~ Use reasoning to solve equations and justify the solution method. **CC.2.2.HS.D.10** ~ Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **CC.2.2.HS.C.4** ~ Interpret the effects transformations have on functions and find the inverses of functions. **CC.2.2.HS.C.5** ~ Construct and compare linear, quadratic, and exponential models to solve problems. **CC.2.2.HS.C.6** ~ Interpret functions in terms of the situations they model. **CC.2.3.HS.A.14** ~ Apply geometric concepts to model and solve real world problems.

Radicals and Rational Functions	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Radicals (New) A. Simplify Radical Expressions B. Rationalize the Denominator • Rationalize the denominator with a single term • Rationalize the denominator with two terms C. Perform Operations with Radicals	**CC.2.2.HS.D.1** ~ Interpret the structure of expressions to represent a quantity in terms of its context. **CC.2.1.HS.F.1** ~ Apply and extend the properties of exponents to solve problems with rational exponents.