Seymour Public Schools Curriculum

Algebra II continues the study of functions.
Students learn operations with functions and graphing of different types of functions.
Students solve equations and perform operations with exponents, matrices and complex numbers.
Advanced features of the graphing calculator are incorporated into the curriculum as well as
real life problem solving and applications in the various fields of engineering and other sciences

Grade: 9-12	**Subject:** **Algebra II Data and Linear Representation** Linear relationships are explored- through graphing (line of best fit), slope, intercepts. Real life problems can be simplified by a linear equation. and the relationship between two variables made clear.
CSDE Standard	25.1 MATHEMATICS - ALG REASONING: PATTERNS & FUNCTS 25.2 MATHEMATICS - NUMERICAL & PROP REASONING 25.3 MATHEMATICS - GEOM & MEASUREMT 25.4 MATHEMATICS - WORKING WITH DATA
SHS Learning Expectations	1. Students will think critically. 2.Students will communicate effectively and creatively. 3. Students will access, evaluate, and use information for a variety of tasks and purposes.
Enduring Understanding	A line shows the relationship between two sets of data. A line of best fit is used to predict outcomes from data and real life situations.
Essential Questions	What is a linear relationship between two variables? What does a line of best fit represent in a given situation? Why is it important to use the order of operations when simplifying an expression?
Content Standard:	25.1.1.9.1 Students will identify, describe, create and generalize numeric, geometric, and statistical patterns with tables, graphs, words, and symbolic rules. 25.1.1.9.2 Students will make and justify predictions based on patterns. 25.1.2.9.3 Students will recognize and explain the meaning of the slope and x- and y-intercepts as they relate to a context, graph, table or equation. 25.1.2.9.4 Students will evaluate and interpret the graphs of linear, exponential, and polynomial functions. 25.1.2.9.6 Students will recognize the effect of changes in parameters on the graphs of functions or relations. 25.2.1.9.1 Students will compare, locate, label and order real numbers on number lines, scales, coordinate grids and

	measurement tools. 25.2.1.9.3 Students will use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information. recognize the limitations of estimation; and to judge the implications of the results. 25.3.2.9.5 Students will use Cartesian, navigational, polar, and spherical systems to represent, analyze, and solve geometric and measurement problems. 25.3.3.9.1 Students will select appropriate units, scales, degree of precision, and strategies to determine length, angle measure, perimeter, circumference, and area of plane geometric figures. 25.4.1.9.1 Students will collect real data and create meaningful graphical representations of the data. 25.4.1.9.2 Students will develop, use, and explain applications and limitations of linear and non-linear models and regression in a variety of contexts. 25.4.1.9.5 Students will recognize the limitations of mathematical models based on sample data as representations of real-world situations. 25.4.2.9.1 Students will estimate an unknown value between data points on a graph (interpolation) and make predictions by extending the graph (extrapolation).
Performance Expectations (Student outcomes)	Graph and identify linear equations a. Slopes and intercepts b. Tables c. Data Collection and interpretation Order of Operations Solve one variable equations Literal Equations Represent a real-world linear relationship in a table, graph, or equation. Identify linear equations and linear relationships between variables in a table. Graph a linear equation. Write a linear equation for a given line in the coordinate plane. Write a linear equation in two variables given sufficient information. Write an equation for a line that is parallel or perpendicular for a given line. Create a scatter plot and draw an informal inference about any correlation between the variables. Use a graphics calculator to find an equation for the least-squares line and use it to make predictions or estimates. Identify and use properties of real numbers Evaluate expressions by using the order of operations.

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	Write and solve a linear equation in one variable. Solve a literal equation for a specified variable.

Strategies/Modes (examples)	Materials/Resources (examples)	Assessments (examples)
Homework **Projects** **Guided Practice** **Worksheets** **Cooperative Learning Projects** **Math Labs** **Quizzes** **Tests**	Sections 1-1 1-2 1-3 1-5 1-6 Section 2-1	Notebook or homework Labs Quizzes, Alternative, and Tests

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Grade: 9-12	**Subject:** **Algebra II Functions** This section will cover the characteristics of linear, quadratic, and exponential functions, and how those functions apply to real world situations.
CSDE Standard	25.1 MATHEMATICS - ALG REASONING: PATTERNS & FUNCTS
SHS Learning Expectations	1. Students will think critically. 2.Students will communicate effectively and creatively. 3. Students will access, evaluate, and use information for a variety of tasks and purposes.
Enduring Understanding	The characteristics of functions are used to model a variety of situations.
Essential Questions	How are functions used in the real world?
Content Standard:	25.1.1.9.1 Students will identify, describe, create and generalize numeric, geometric, and statistical patterns with tables, graphs, words, and symbolic rules. 25.1.1.9.2 Students will make and justify predictions based on patterns. 25.1.1.9.3 Students will identify the characteristics of functions and relations including domain and range. 25.1.1.9.4 Students will describe and compare properties and classes of linear, quadratic, and exponential functions. 25.1.1.9.6 Students will analyze essential relations in a problem to determine possible functions that could model the situation. 25.1.2.9.1 Students will represent functions and relations on the coordinate plane. 25.1.2.9.2 Students will identify an appropriate symbolic representation for a function or relation displayed graphically or verbally. 25.1.2.9.3 Students will recognize and explain the meaning of the slope and x- and y-intercepts as they relate to a context, graph, table or equation. 25.1.2.9.4 Students will evaluate and interpret the graphs of linear, exponential, and polynomial functions. 25.1.2.9.5 Students will relate the graphical representation of a function to its function family and find equations,

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	intercepts, maximum or minimum values, asymptotes and line of symmetry for that function. 25.1.2.9.6 Students will recognize the effect of changes in parameters on the graphs of functions or relations. 25.1.3.9.2 Students will determine equivalent representations of an algebraic equation or inequality to simplify and solve problems.
Performance Expectations (Student outcomes)	Functions a. Operations b. Graph c. Inverse Graph a relation, state its domain and range, and tell whether it is a function. Write a function in function notation and evaluate it. Perform operations with functions to write new functions. Find the composite of two functions. Find the inverse of a relation or function. Determine whether the inverse of a function is a function.

Strategies/Modes (examples)	Materials/Resources (examples)	Assessments (examples)
Homework **Projects** **Guided Practice** **Worksheets** **Cooperative Learning Projects** **Math Labs** **Quizzes** **Tests**	Sections 2-3 2-4 2-5	Notebook or Homework Labs Quizzes, Alternative, Tests

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Grade: 9-12	**Subject:** **Algebra II Matrices** This section will cover matrices, operations with matrices, and how to represent and manage data with matrices.
CSDE Standard	25.1 MATHEMATICS - ALG REASONING: PATTERNS & FUNCTS
SHS Learning Expectations	1. Students will think critically. 2.Students will communicate effectively and creatively. 3. Students will access, evaluate, and use information for a variety of tasks and purposes.
Enduring Understanding	A matrix is a way to manage data.
Essential Questions	How and why do you create a matrix to represent data?
Content Standard:	25.1.1.9.1 Students will identify, describe, create and generalize numeric, geometric, and statistical patterns with tables, graphs, words, and symbolic rules. 25.1.1.9.2 Students will make and justify predictions based on patterns. 25.1.3.9.6 Students will use logarithms, vectors and matrices to solve problems.
Performance Expectations (Student outcomes)	Matrices a. Operations i. Addition/subtraction ii. Scalar multiplication iii. Matrix multiplication b. Identify/find the inverse of a matrix c. Solving equations with 2,3, and 4 variables i. Substitution ii. Determinate iii. Cramer's rule Represent mathematical and real-world data in a matrix. Find sums and differences of matrices and the scalar product of a number and a matrix. Multiply two matrices and solve mathematical and real-world problems. Find and use the inverse of a matrix, if it exists. Find and use the determinant of a matrix. Use matrices to solve systems of linear equations in mathematical situations. Represent a system of equations as an augmented matrix.

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	Solve a system of linear equations by using elementary row operations.

Strategies/Modes (examples)	Materials/Resources (examples)	Assessments (examples)
Homework **Projects** **Guided Practice** **Worksheets** **Cooperative Learning Projects** **Math Labs** **Quizzes** **Tests**	Holt, Rinehart and Winston Text Sections 4-1 4-2 4-3 4-4 4-5	Notebook or Homework Lab Quizzes, Alternative, and Tests

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Grade: 9-12	**Subject:** **Algebra II Polynomial Functions** This section will cover polynomial expressions and how to classify and simplify polynomials. Some operations using polynomials will also be covered.
CSDE Standard	25.1 MATHEMATICS - ALG REASONING: PATTERNS & FUNCTS
SHS Learning Expectations	1. Students will think critically. 2.Students will communicate effectively and creatively. 3. Students will access, evaluate, and use information for a variety of tasks and purposes.
Enduring Understanding	Simplification of polynomial expressions is based on their degree or classification.
Essential Questions	How do you simplify a polynomial? Why are polynomials classified?
Content Standard:	25.1.1.9.3 Students will identify the characteristics of functions and relations including domain and range. 25.1.1.9.4 Students will describe and compare properties and classes of linear, quadratic, and exponential functions. 25.1.1.9.5 Students will describe and compare properties and classes of functions including exponential, polynomial, rational, logarithmic and trigonometric. 25.1.2.9.4 Students will evaluate and interpret the graphs of linear, exponential, and polynomial functions.
Performance Expectations (Student outcomes)	Polynomials a. Operations b. Foil c. Simplifying radicals d. Factoring Identify, evaluate, add, and subtract polynomials. Classify polynomials and describe the shapes of their graphs. Identify and describe the important features of the graph of a polynomial function. Multiply polynomials, including special products. Add, Subtract, Multiply and Divide radical expressions. Write radical expressions in simplest form. Factor a polynomial with terms containing common factors.

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	Factor a perfect square trinomial, a difference of two squares, and a sum or difference of two cubes.

Strategies/Modes (examples)	Materials/Resources (examples)	Assessments (examples)
Homework **Projects** **Guided Practice** **Worksheets** **Cooperative Learning Projects** **Math Labs** **Quizzes** **Tests**	Holt, Rinehart and Winston Text Sections 7-1 7-2 7-3 Prentice Hall Text 8-1 8-2 8-3	Notebook or Homework Lab Quizzes, Alternative, and Tests

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Grade: 9-12	**Subject:** **Algebra II Proportions, Inequalities and Exponents** This section will cover ratios, rates, proportions, direct variation, indirect variation, and operations with exponents.
CSDE Standard	25.1 MATHEMATICS - ALG REASONING: PATTERNS & FUNCTS 25.2 MATHEMATICS - NUMERICAL & PROP REASONING 25.2 MATHEMATICS - NUMERICAL & PROP REASONING
SHS Learning Expectations	1. Students will think critically. 2.Students will communicate effectively and creatively. 3. Students will access, evaluate, and use information for a variety of tasks and purposes.
Enduring Understanding	Ratios, rate, proportions, direct and indirect variation, and exponents are used to solve real life problems.
Essential Questions	How do you use ratios and rates to write proportions? How do you use proportions to represent direct and indirect variation? How do you handle exponents with different mathematical operations?
Content Standard:	25.1.1.9.2 Students will make and justify predictions based on patterns. 25.1.1.9.9 Students will solve problems involving direct and inverse variation. 25.1.3.9.1 Students will model and solve problems with linear, quadratic, and absolute value equations; and linear inequalities. 25.1.3.9.2 Students will determine equivalent representations of an algebraic equation or inequality to simplify and solve problems. 25.1.3.9.4 Students will determine equivalent representations of an algebraic equation or inequality to simplify and solve problems. 25.2.1.9.5 Students will select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational, complex) to solve practical problems involving order, magnitude, measures, labels, locations and scales. 25.2.1.9.7 Students will judge the effects of computations with powers and roots on the magnitude of results. 25.2.2.9.2 Students will solve problems involving scientific notation and absolute value. 25.2.2.9.3 Students will develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results. 25.2.2.9.4 Students will use dimensional analysis to determine equivalent rates.

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	25.2.2.9.5 Students will solve problems using direct and inverse variation. 25.3.2.9.3 Students will apply transformations to plane figures to determine congruence, similarity, symmetry, and
Performance Expectations (Student outcomes)	Ratio and proportions Direct and inverse variation One variable absolute value equations and inequalities Exponents a. Rules b. Operations Write and apply direct variation equations. Write and solve proportions. Indentify inverse, joint, and combined variations, find the constant of variation, and write an equation for the variation. Solve real-world problems involving inverse, joint, or combined variation. Write, solve, and graph linear inequalities in one variable. Solve and graph compound linear inequalities in one variable. Write, solve, and graph absolute-value equations and inequalities in mathematical and real-world situations. Evaluate expressions involving exponents. Simplify expressions involving exponents.

Strategies/Modes (examples)	**Materials/Resources (examples)**	**Assessments (examples)**
Homework **Projects** **Guided Practice** **Worksheets** **Cooperative Learning Projects** **Math Labs** **Quizzes** **Tests**	Sections 1-4 8-1 1-7 1-8 2-2	Notebook or Homework Lab Quizzes, Alternative, and Tests

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Grade: 9-12	**Subject:** **Algebra II Quadratic Equations** This section will cover systems of equations, how to solve quadratic equations using various methods, and how to use systems of equations to solve real life problems.
CSDE Standard	25.1 MATHEMATICS - ALG REASONING: PATTERNS & FUNCTS
SHS Learning Expectations	1. Students will think critically. 2.Students will communicate effectively and creatively. 3. Students will access, evaluate, and use information for a variety of tasks and purposes.
Enduring Understanding	Solving systems of equations and inequalities allows us to visualize solutions to real life problems.
Essential Questions	How and why do choose a certain method to solve a system of equations?
Content Standard:	25.1.1.9.2 Students will make and justify predictions based on patterns. 25.1.1.9.3 Students will identify the characteristics of functions and relations including domain and range. 25.1.1.9.4 Students will describe and compare properties and classes of linear, quadratic, and exponential functions. 25.1.1.9.6 Students will analyze essential relations in a problem to determine possible functions that could model the situation. 25.1.1.9.9 Students will solve problems involving direct and inverse variation. 25.1.2.9.1 Students will represent functions and relations on the coordinate plane.
Performance Expectations (Student outcomes)	Solve quadratic equations a. Factoring b. Completing the square c. Quadratic formula i. Discriminant ii. Complex numbers d. Graphing i. minimums and maximums Define, identify and graph quadratic functions. Multiply linear binomials to produce a quadratic expression. Solve quadratic equations by taking square roots. Use the Pythagorean theorem to solve problems involving right triangles. Factor a quadratic expression.

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	Use factoring to solve a quadratic equation and find the zeros of a quadratic function. Use completing the square to solve a quadratic equation. Use the vertex form of a quadratic function to locate the axis of symmetry of its graph. Use the quadratic formula to find real roots of quadratic equations. Classify and find all roots of a quadratic equation. Find a quadratic function that exactly fits three data points. Find a quadratic model to represent a data set. Find maximum/minimum values of quadratic models.

Strategies/Modes (examples)	Materials/Resources (examples)	Assessments (examples)
Homework **Projects** **Guided Practice** **Worksheets** **Cooperative Learning Projects** **Math Labs** **Quizzes** **Tests**	Holt, Rinehart and Winston Text Sections 5-1 5-2 5-3 5-4 5-5 5-6	Notebook or Homework Lab Quizzes, Alternative, and Tests

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Grade: 9-12	**Subject:** **Algebra II Systems of Equations and Inequalities** This section will cover systems of equations and inequalities, how to graph systems of equations and systems of inequalities, and how to use linear programming to solve real life problems.
CSDE Standard	25.1 MATHEMATICS - ALG REASONING: PATTERNS & FUNCTS 25.4 MATHEMATICS - WORKING WITH DATA
SHS Learning Expectations	1. Students will think critically. 2.Students will communicate effectively and creatively. 3. Students will access, evaluate, and use information for a variety of tasks and purposes.
Enduring Understanding	Systems of equations have many applications in real life.
Essential Questions	How are systems of equations and inequalities solved? How are systems of equations and inequalities used in real life?
Content Standard:	25.1.1.9.2 Students will make and justify predictions based on patterns. 25.1.1.9.3 Students will identify the characteristics of functions and relations including domain and range. 25.1.1.9.4 Students will describe and compare properties and classes of linear, quadratic, and exponential functions. 25.1.1.9.6 Students will analyze essential relations in a problem to determine possible functions that could model the situation . 25.1.1.9.9 Students will solve problems involving direct and inverse variation. 25.1.2.9.1 Students will represent functions and relations on the coordinate plane. 25.4.1.9.1 Students will collect real data and create meaningful graphical representations of the data. 25.4.1.9.2 Students will develop, use, and explain applications and limitations of linear and non-linear models and regression in a variety of contexts. 25.4.1.9.3 Students will investigate and solve relevant problems, through designing statistical experiments and collecting, organizing, displaying, and analyzing data in tabular, graphical, and symbolic forms.
Performance Expectations (Student outcomes)	Solving systems of equations a. Graphing b. Substitution c. Elimination

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	Solving systems of inequalities a. Graphing b. Linear Programming Solve a system of linear equations in two variables by graphing. Solve a system of linear equations by substitution. Solve a system in two variables by elimination. Solve and graph a linear inequality in two variables. Use a linear inequality in two variables to solve real-world problems. Write and graph a system of linear inequalities in two variables. Write a system of linear inequalities in two variables for a given solution region. Write and graph a set of constraints for a linear-programming problem. Use linear programming to find the maximum or minimum value of an objective function.

Strategies/Modes (examples)	Materials/Resources (examples)	Assessments (examples)
Homework **Projects** **Guided Practice** **Worksheets** **Cooperative Learning Projects** **Math Labs** **Quizzes** **Tests**	Holt, Rinehart and Winston Text Sections 3-1 3-2 3-3 3-4 3-5 Prentice Hall Text Section 4-6	Notebook or Homework Lab Quizzes, Alternative, and Tests