



SCHOOL DISTRICT OF MONROE

Preparing for the Future, One Child at a Time

Algebra 2

Course Description:

The curriculum from this course is developed from: [common-core-math-standards.pdf](#). This is a required course. The information in this course overview outlines what students should understand and be able to do by the end of the trimester/year.

Core Connections Algebra 2 is the third course in a five-year sequence of rigorous college preparatory mathematics courses that starts with Algebra I and continues through Calculus. It aims to apply and extend what students have learned in previous courses by focusing on finding connections between multiple representations of functions, transformations of different function families, finding zeros of polynomials and connecting them to graphs and equations of polynomials, modeling periodic phenomena with trigonometry, and understanding the role of randomness and the normal distribution in making statistical conclusions.

On a daily basis, students in *Core Connections Algebra 2* use problem-solving strategies, questioning, investigating, analyzing critically, gathering and constructing evidence, and communicating rigorous arguments justifying their thinking. Under teacher guidance, students learn in collaboration with others while sharing information, expertise, and ideas.

The course is well balanced between procedural fluency (algorithms and basic skills), deep conceptual understanding, strategic competence (problem solving), and adaptive reasoning (extension and transference). The lessons in the course meet all of the content standards, including the “plus” standards, of Appendix A of the *Common Core State Standards for Mathematics*. The course embeds the CCSS Standards for Mathematical Practice as an integral part of the lessons in the course.

Key concepts addressed in this course are:

- Visualize, express, interpret and describe, and graph functions (and their inverses, in many cases). Given a graph, students will be able to represent the function with an equation, and vice-versa, and transform the graph, including many function families.
- Use of variables and functions to represent relationships given in tables, graphs, situations, and geometric diagrams, and recognize the connections among these multiple representations.
- Application of multiple algebraic representations to model and solve problems presented as real world situations or simulations.
- Solving linear or quadratic equations in one variable, systems of equations in two variables, and linear systems of equations in three or more variables, including solving with graphical methods.
- Use of algebra to rewrite complicated algebraic expressions and equations in more useful forms.
- Rewriting rational expressions and arithmetic operations on polynomials.
- The relationship between zeros and factors of polynomials.
- Operations with complex numbers, and solving quadratic equations with complex solutions.
- Modeling periodic phenomena with trigonometric functions.
- Solving trigonometric equations and proving trigonometric identities.
- Calculating the sums of arithmetic and geometric series, including infinite geometric series.
- Concepts of randomness and bias in survey design and interpretation of the results.
- Use of a normal distribution to model outcomes and to make inferences as appropriate.
- Use of computers to simulate and determine complex probabilities.
- Use of margin of error and sample-to-sample variability to evaluate statistical decisions.
- Understand logarithms and their inverse relationship with exponentials.
- Use logarithms to solve exponential equations.

Mastery Standards:

Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. (CCSS.MATH.CONTENT.HSA.N-CN.9)

Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. (CCSS.MATH.CONTENT.HSA.A-APR.2)

Interpret parts of an expression, such as terms, factors, and coefficients. (CCSS.MATH.CONTENT.HSA.A-SSE.1a)

Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. (CCSS.MATH.CONTENT.HSA.A-CED.3)

Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. (CCSS.MATH.CONTENT.HSA.A-REI.2)

Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. (CCSS.MATH.CONTENT.HSF.F-IF.7b)

Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. (CCSS.MATH.CONTENT.HSF.F-IF.8a)

Write a function that describes a relationship between two quantities. (CCSS.MATH.CONTENT.HSF.F-BF.1)

Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. (CCSS.MATH.CONTENT.HSF.F-TF.2)

Unit	Description of Unit and Learning Targets
Unit 1: Investigations and Functions <u>Essential Questions:</u> <ul style="list-style-type: none">As you investigate functions, why is it important to analyze the function thoroughly and clearly communicate your reasons to others?	Students will..... <u>Learning Targets:</u> <ul style="list-style-type: none">I can identify key parts of a graphI can find intersections of functionsI can simplify radical expressions
Unit 2: Transformations of Parent Graphs <u>Essential Questions:</u> <ul style="list-style-type: none">Why is it important to model everyday situations with mathematics?	Students will... <u>Learning Targets:</u> <ul style="list-style-type: none">I can write quadratic equations from given informationI can graph parent functions using transformationsI can write equations from transformed parent functionsI can write equations of circlesI can solve quadratic equations in context
Unit 3: Equivalent Forms <u>Essential Questions:</u> <ul style="list-style-type: none">Why do we want to show forms equivalent?	Students will... <u>Learning Targets:</u> <ul style="list-style-type: none">I can factor and multiply polynomialsI can simplify rational expressionsI can add and subtract rational expressions

<p>Unit 4: Solving and Intersections</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> Why is it beneficial to have multiple tools for solving problems and verifying solutions? 	<p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> I can solve inequalities graphically I can solving systems of inequalities I can solve inequalities algebraically I can solve equations graphically I can solve linear programming situations
<p>Unit 5: Inverses and Logarithms</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> Why is it important to know that I can use the reflective nature of inverse graphs to find the equations for inverses? 	<p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> I can find the inverse of a function I can graph inverse of a function given the original function I can evaluate composite functions I can graph logarithmic functions
<p>Unit 6: 3-D Graphing and Logarithms</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> Why is it important to know now you can apply what you learned about graphs and equations in two dimensions to three dimensional situations? 	<p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> I can solve system of equations with 3 variables I can solve exponential and logarithmic equations
<p>Unit 7: Trigonometric Functions</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> Why can I use what I know about right triangle trigonometry to describe functions determined by rotations about a circle? 	<p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> I can identify exact values of special angles using the unit circle I can convert radians to degrees (and vice versa) I can simplify trig. expressions in degree and radians I can graph sine and cosine functions
<p>Unit 8: Polynomials</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> How does the degree of a polynomial help me determine the nature of its graph or a possible equation? 	<p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> I can sketch graphs of polynomial equations. I can write polynomial equations given the roots I can write solutions using complex numbers I can write polynomial equations given complex roots I can divide polynomials to find roots
<p>Unit 10: Series</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> Why would you want to extend patterns? 	<p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> I can find arithmetic sequence and sums I can find geometric sequence and sums