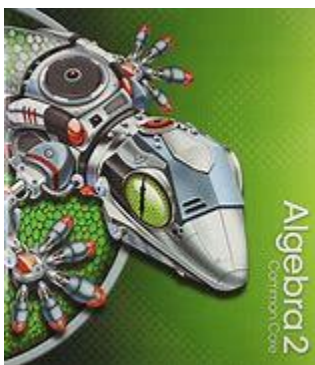


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Subject: ALGEBRA 2

Textbook: ALGEBRA 2 Common Core by Randall Charles, et. al.



Algebra 2: Overview

1. Extend the real number system to the complex number system, representing radicals with rational exponents.
2. Solve and interpret solutions to a variety of equations, inequalities, and systems of equations.
3. Demonstrate competency graphing and interpreting functions extending from linear, quadratic, and exponential with integer exponents to polynomial, radical, rational, exponential with real exponents, logarithmic, trigonometric functions, and piece-wise defined functions.
4. Extend simple and compound probability calculations to conditional probability.

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SUBJECT: ALGEBRA 2

GRADE: 11th – 12th Grade

TIMELINE: Semester 1- Quarter 1

Theme/Big Ideas for this Unit: RELATIONS and FUNCTIONS

Essential Questions for this Unit

1. When is a relation also a function?
2. How do you evaluate functions using function notation?
3. How do you identify the domain and range of a function or relation?
4. How can you analyze functions using real-world problems?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
F-IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	Relations and Functions	I can represent relation in four ways by mapping diagram, ordered pairs, table of values, and graph. I can define the following terms: domain, range, vertical line test, dependent and independent variable, input and output. I can identify functions and relations.	Lesson Check on page 64 Practice and Problem-solving exercises pp. 65-67	Textbook Chapter 2-1 page 60-67	Relation Function Domain Range Vertical Line Test (VLT) Function Rule Function notation Independent variable Dependent Variable

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
F-BF.A.1: Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine function types using arithmetic operations and function.	Function Operations and Compositions	I can add, subtract, multiply and divide functions I can evaluate composite functions.			Input Output Composite function
A2.F-BF.B.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	Families of Functions	I can analyze transformation of functions.	Lesson Check pg. 103 Problem-solving exercises pp. 104-106	Chapter 2-6 pp. 99-102	Parent function Transformation Translation Reflection Vertical stretch Vertical compression

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
F-BF.B.4a: Find inverse functions. a. Understand that an inverse function can be obtained by expressing the dependent variable of one function as the independent variable of another, recognizing that functions f and g are inverse functions if and only if $f(x) = y$ and $g(y) = x$ for all values of x in the domain of f and all values of y in the domain of g . b. Understand that if a function contains a point (a,b) , then the graph of the inverse relation of the function contains the point (b,a) . c. Interpret the meaning of and relationship between a function and its inverse utilizing real-world context.	Inverse Functions	I can explore the inverses of a function. I can find and verify inverses of non-linear functions.		ALGEBRA 2 Big Ideas – Textbook Chapter 5.6	Inverse One-to-one function Horizontal line test

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SUBJECT: ALGEBRA 2

GRADE: 11th – 12th Grade

TIMELINE: Semester 1 - Quarter 1

Theme/Big Ideas for this Unit: LINEAR FUNCTIONS and ABSOLUTE VALUE FUNCTIONS

Essential Questions for this Unit

1. How do you find the slope of a line?
2. How do you graph linear functions and identify their characteristics?
3. How do you write the equation of a line?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
F-IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Include problem-solving opportunities utilizing a real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	Linear Function and Slope-Intercept Form	I can graph linear equations. I can write the equation of a line.	Lesson check, practice and exercises on pp. 78-80	Textbook Chapter 2-3 pp.74-80	Slope Linear function Linear Equation y-intercept x-intercept slope-intercept form

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
F-IF.C.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	More About Linear Equations	I can write an equation of a line given its slope and a point on the line.	Lesson check page 86 Practice and exercises pp. 86-88	Textbook Chapter 2-4 pp. 81-88	point-slope form standard form of a linear equation parallel lines perpendicular lines
	Using Linear Models	I can describe the correlation of a set of data. I can use linear regression to approximate a line of best fit of a set of data. I can find the line of best fit by using technology.	Practice and problem solving exercises pp. 96-98	Chapter 2-5 pp.92-98	scatter plot correlation line of best fit correlation coefficient

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
F-BF.B.3: Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	Absolute Value Functions and Graphs	I can graph absolute value functions	Lesson Check pg 111 Practice and problem-solving exercises pp. 111-112	Chapter 2-7 pp. 107-112	absolute value function axis of symmetry vertex

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UBJECT: ALGEBRA 2

GRADE: 11th – 12th Grade

TIMELINE: Semester 1 - Quarter 2

Theme/Big Ideas for this Unit: QUADRATIC FUNCTIONS and EQUATIONS

Essential Questions for this Unit

1. How do you graph quadratic functions in vertex form? Standard form? Intercept form?
2. How is any quadratic function related to the parent function $y = x^2$?
3. How are the real solutions of a quadratic equation related to the graph of the related quadratic function?
4. How can you derive a formula for solving quadratic equation?
5. How can you complete the square for quadratic expressions?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
A2.F-BF.B.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. Also A-CED.A.1: F-	Quadratic Functions and Transformations	I can identify and graph quadratic functions.	Lesson check page 198 Practice and Problem-solving Exercises pp. 199-201	Lesson 4-1 pp. 194-199	Parabola Quadratic function Vertex form Axis of symmetry Vertex of the parabola Minimum value Maximum value

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
IF.B.4: F-IF.B.6. A2.F-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. A2.F-BF.A.1 Write a function that describes a relationship between two quantities. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. Include problem-solving opportunities utilizing real-world context. a. Determine an explicit	Standard Form of a Quadratic Functions Modeling with Quadratic Functions	I can graph quadratic functions written in standard form. I can solve and model data with quadratic functions.	Lesson check page 206 Practice and Problem-solving Exercises pp. 206-208 Lesson check page 212 Practice and Problem-solving Exercises pp. 212-213	Textbook Lesson 4-2 pp. 202-205 Textbook Lesson 4-3 pp. 209-211	Standard form

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
expression, a recursive process, or steps for calculation from a context.					
A2.A-SSE.A.2 Use structure to identify ways to rewrite polynomial and rational expressions. Focus on polynomial operations and factoring patterns.	Factoring Quadratic Expressions	I can factor special quadratic expressions I can find common and binomial factors of quadratic expressions.	Lesson check page 221 Practice and Problem-solving Exercises pp. 221-223	Lesson 4-4 pp. 216-223	Factoring Greatest common factor (GCF) of an expression Perfect square trinomial Difference of two squares
A-REI.B.4: Fluently solve quadratic equations in one variable. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic	Quadratic Equations	I can solve quadratic equations by factoring. I can solve quadratic equations by graphing	Lesson check page 229 Practice and Problem-solving Exercises pp. 229-230	Lesson 4-5 pp. 226-228	Zero of a function Zero-product property

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .	Completing the Square	I can solve quadratic equations by completing the square.	Lesson check page 237	Lesson 4-6 pp. 233-236	Completing the square
		I can rewrite functions by completing the square	Practice and Problem-solving Exercises pp. 237-239		
N-CN.C.7: Solve quadratic equations with real coefficients that have complex solutions	Quadratic Formula	I can solve quadratic equation using the quadratic formula.	Lesson check page 244	Lesson 4-7 pp. 240-244	Quadratic formula
		I can determine the number of solutions of a quadratic equation by using the discriminant.	Practice and Problem-solving Exercises pp. 245-247		Discriminant
A2.N-CN.A.1 Apply the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. Write complex numbers in the form $(a+bi)$ with a and b real.	Complex Numbers	I can identify, graph, and perform operations with complex numbers.	Lesson check page 253	Lesson 4-8 pp. 248-252	Imaginary unit
		I can find complex number solutions of quadratic equations.	Practice and Problem-solving Exercises pp. 253-255		Imaginary number
A2.N-CN.C.7 Solve					Complex number

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
quadratic equations with real coefficients that have complex solutions. A-REI.C.7: Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$. A-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 $f(x) = g(x)$; find the solutions approximately	Quadratic Systems	I can solve and graph systems of linear and quadratic equations. I can solve and graph systems of quadratic inequalities.	Lesson check page 261 Practice and Problem-solving Exercises pp. 262-263	Lesson 4-9 pp. 258-261	Pure imaginary number Absolute value of a complex number Complex conjugates

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
(e.g., using technology to graph the functions, make tables of values, or find successive approximations). Include problems in real-world context					

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GRADE: 11th – 12th Grade

TIMELINE: Semester 1- Quarter 2

Theme/Big Ideas for this Unit: POLYNOMIALS and POLYNOMIAL FUNCTIONS

Essential Questions for this Unit

1. What does the degree of a polynomial tell you about its related polynomial function?
2. For a polynomial function, how are factors, zeros, and x-intercepts are related?
3. For polynomial equation, how are factors and roots related?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
A2.F-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. A2.A-APR.B.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. Focus on quadratic, cubic, and quartic polynomials	Polynomial Functions	I can classify polynomials. I can graph polynomial functions and describe end behavior.	Lesson check page 285 Practice and Problem-solving Exercises pp. 285-287	Lesson 5-1 Textbook pp. 280-284	Monomial Degree of a monomial Polynomial Degree of a polynomial Polynomial function Standard form of a polynomial function Turning point End behavior

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately (e.g., using technology to graph the functions, make tables of values, or find successive approximations). Include problems in real-world context. Extend from linear, quadratic, and exponential functions to cases where $f(x)$ and/or $g(x)$ are polynomial, rational, exponential, and logarithmic functions. A2.A-APR.B.2 Know and apply the Remainder and Factor 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 $p(x)$.	Dividing Polynomials	I can divide polynomials using long division. I can divide polynomials using synthetic division.	Lesson check page 308 Practice and Problem-solving Exercises pp. 308-310	Lesson 5-4 Textbook pp. 303-307	Synthetic division Remainder theorem

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
A2.A-APR.B.2: Know and apply the Remainder and Factor 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 $p(x)$.	Theorems About Roots of Polynomials Equations	I can solve equations using the Rational Root Theorem. I can use Conjugate Root Theorem.	Lesson check page 315 Practice and Problem-solving Exercises pp. 316-317	Lesson 5-5 Textbook pp. 312-315	Rational Root Theorem Conjugate Root Theorem Descartes' Rule of Signs
A2.A-APR.B.3: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	The Fundamental Theorem of Algebra	I can use the Fundamental Theorem of Algebra to solve polynomial equations with complex solutions.	Lesson check page 322 Practice and Problem-solving Exercises pp. 322-324	Lesson 5-6 Textbook pp. 319-321	The Fundamental Theorem of Algebra

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Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary