Algebra II ACC Course Overview

Content Area: **Math**
Course(s): **ALGEBRA II**
Time Period:
Length: **Full Year**
Status: **Published**

Cover

EAST BRUNSWICK PUBLIC SCHOOLS

East Brunswick New Jersey

Superintendent of Schools

Dr. Victor P. Valeski

Mathematics

Agebra II Honors-Course Number: 1162

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Course Adoption: 4/21/1986

Curriculum Adoption:

Date of Last Revision Adoption: 9/5/19

Course Overview

COURSE DESCRIPTION:

Algebra is a symbolic language used to express mathematical relationships. Students need to understand how quantities are related to one another, and how algebra can be used to concisely express and analyze those relationships. Modern technology provides tools for supplementing the traditional focus on algebraic procedures, such as solving equations, with a more visual perspective, with graphs of equations displayed on a screen. Students can then focus on understanding the relationship between the equation and the graph, and on what the graph represents in a real-life situation. This course includes the study of patterns involving whole numbers, rational numbers, and integers using tables, rules, graphs and expressions. Appropriate algebraic methods used to solve linear and quadratic equations and linear inequalities will be studied. The focus of the course will center around the ability to graph functions and understand and describe the general behavior of functions. This is one of three courses in which students are enabled and expected to demonstrate mastery of some of the algebraic standards for mathematical content, the other course being Algerbra II and Algebra II Honors. The Standards for Mathematical Practices are embedded within the instructional strategies, and not delineated specifically by unit.

Modifications

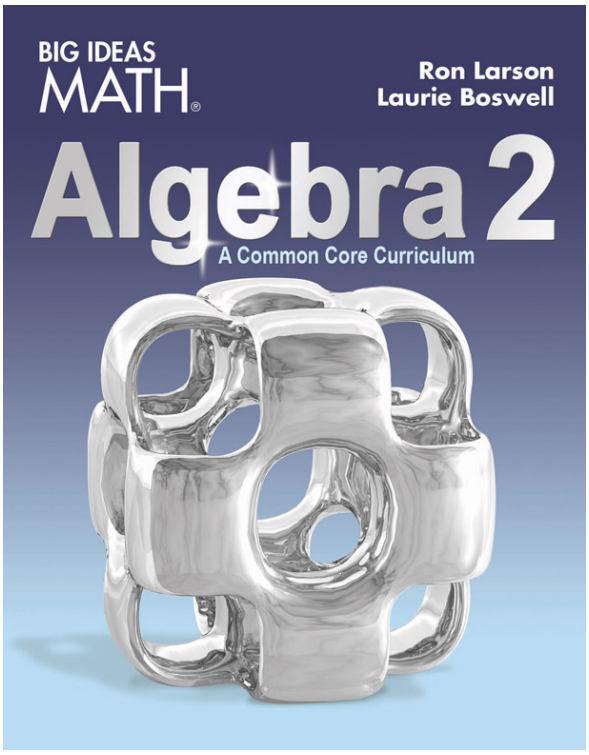
Newsela.com is available for differentiated reading assignments

The district has a license for Learning Ally. Learning Ally is an audio book resource for students who are unable to “eye read” grade level text but are able to comprehend when “ear reading" or listening.

Materials and Resources

Textbook: Big Ideas Algebra 2 A Common Core Curriculum

Ron Larson and Laurie Boswell 2019



- Teacher's Resource Package and online resources accompanying text
- TI – 84 graphing calculators
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Content Specific Standards

MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.N-RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MA.N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MA.S-ID.A.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.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.
MA.A-SSE.B.4	Derive and/or explain the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.
MA.F-IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MA.F-IF.C.7c	Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
MA.F-IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
MA.S-IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
MA.A-APR.B.2	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 $p(x)$.
MA.F-IF.C.8a	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.
MA.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.
MA.S-IC.A.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

MA.F-IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions.
MA.S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
MA.N-CN.C.7	Solve quadratic equations with real coefficients that have complex solutions.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.S-IC.B.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
MA.S-IC.B.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
MA.A-APR.C.5	Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.
MA.S-IC.B.5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
MA.N-CN.C.9	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
MA.S-IC.B.6	Evaluate reports based on data.
MA.A-APR.D.7	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
MA.F-BF.A.1b	Combine standard function types using arithmetic operations.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-CED.A.3	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.
MA.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.
MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
MA.F-BF.B.4a	Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse.
MA.A-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MA.F-LE.A.4	Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to ab to the ct power = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
MA.F-TF.A.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
MA.F-TF.C.8	Prove the Pythagorean identity $sin^2(\theta) + cos^2(\theta) = 1$ and use it to find $sin(\theta)$, $cos(\theta)$, or $tan(\theta)$ given $sin(\theta)$, $cos(\theta)$, or $tan(\theta)$ and the quadrant of the angle.

Standards for Mathematical Practices

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Interdisciplinary Standards

ce ard	Explanation
1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageabl be solved through engineering.
L-2	Develop and use a model based on evidence to illustrate the relationships between systems or betwe system.
L-4	Use a model based on evidence to illustrate the relationships between systems or between componer

ard	Explanation
10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for or technical problem.
12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technica precise details for explanations or descriptions
12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., c video, multimedia) in order to address a question or solve a problem.
12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the da and corroborating or challenging conclusions with other sources of information.
12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent process, phenomenon, or concept, resolving conflicting information when possible.
-12.1	Write arguments focused on discipline-specific content
-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ technical processes.
-12.5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new app addressing what is most significant for a specific purpose and audience.
-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-gener solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the demonstrating understanding of the subject under investigation.

-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
.2.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, or development, and style are appropriate to task, purpose, and audience.
.2.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in p enhance understanding of findings, reasoning, and evidence and to add interest

NJSLS-Career Readiness, Life Literacies, and Key Skills

20 New Jersey Student Learning Standards – Career Readiness, Life L Key Skills 9.4 Life Literacies and Key Skills by the End of Grade 12	
Creativity and Innovation	
Core Ideas	**Performance Expectations**
et, failure is an important part of	• 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use cre (e.g., 1.1.12prof.CR3a).
Critical Thinking and Problem-solving	
Core Ideas	**Performance Expectations**
lividuals with diverse experiences can ving process, particularly for global olutions are needed.	• 9.4.12.CT.1: Identify problem-solving strategies used in the develo innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). • 9.4.12.CT.2: Explain the potential benefits of collaborating to enha and problem solving (e.g., 1.3E.12profCR3.a). • 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., comn experts in the field) to design a service learning activity that addres issue (e.g., environmental justice). • 9.4.12.CT.4: Participate in online strategy and planning sessions fo school-based, or other project and determine the strategies that con outcomes.
Global and Cultural Awareness	
Core Ideas	**Performance Expectations**
ems faced by a global society require lividuals with different points of view	• 9.4.12.GCA.1: Collaborate with individuals to analyze a variety of climate change effects and determine why some solutions (e.g., pol cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1- ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.I

Technology Literacy	
Core Ideas	**Performance Expectations**
features, capacities, and styles. ıt digital tools is helpful in selecting :n task.	• 9.4.12.TL.1: Assess digital tools based on features such as accessib capacities, and utility for accomplishing a specified task (e.g., W.1 • 9.4.12.TL.2: Generate data using formula-based calculations in a sp conclusions about the data.
ools can be used to access, record and)ints and to collect and tabulate the)ple.	• 9.4.12.TL.3: Analyze the effectiveness of the process and quality o environments. • 9.4.12.TL.4: Collaborate in online learning communities or social r worlds to analyze and propose a resolution to a real-world problem 7.1.AL.IPERS.6).

Pacing Guide

EARNING GOALS

earning Goal 1:

)lve algebraically and graphically a system of two linear equations.

earning Goal 2:

)lve algebraically a system of three linear equations.

earning Goal 1:

ransform quadratic functions expressed symbolically, and identify key features of the graph.

earning Goal 2:

raph quadratic functions expressed symbolically, and show key features of the graph (including intercepts and ext

earning Goal 3:

/rite equations of quadratic functions.

earning Goal 1:

)lve quadratic equations with real coefficients that have complex solutions by taking square roots, completing the
ıd factoring.

earning Goal 2:

dd, subtract, multiply, and divide complex numbers using the commutative, associative, and distributive propertie

earning Goal 3:

olve simple systems consisting of a linear and quadratic equation in two variables algebraically and graphically.

earning Goal 4:

olve quadratic inequalities.

earning Goal 1:

raph absolute value, greatest integer, cubic, piece-wise, and sine and cosine functions.

earning Goal 2:

lentify the effect on the graph of replacing f(x) by f(x)+k, kf(x), f(kx), and f(x+k), including absolute value, greate ubic, piece-wise, and sine and cosine functions.

earning Goal 3:

Graph trigonometric functions (sine and cosine specifically) expressed symbolically, showing key features of the g and in simple cases and using technology for more complicated.

earning Goal 1:

se an appropriate factoring technique to factor polynomials. Explain the relationship between zeros and factors o olynomials, and use the zeros to construct a rough graph of the function defined by the polynomial.

earning Goal 2:

pply the Remainder Theorem in order to determine the factors of a polynomial.

earning Goal 3:

raph polynomial functions from equations; identify zeros when suitable factorizations are available; show key fea nd behavior.

earning Goal 1:

se properties of integer exponents to explain and convert between expressions involving radicals and rational exp

earning Goal 2:

or radical functions, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showi atures given a verbal description of the relationship.

earning Goal 3:

olve radical equations and inequalities in one variable, use them to solve problems and show how extraneous solu ise.

earning Goal 4:

erform operations on functions, including addition, subtraction, multiplication, division, and composition; identify e resulting function.

earning Goal 5:

etermine the inverse function for a function.

earning Goal 1:

raph exponential functions expressed symbolically and show key features of the graph (including intercepts and e ehavior).

earning Goal 2:

se the properties of exponents to transform expressions for exponential functions, explain properties of the quanti the transformed expression or different properties of the function.

earning Goal 3:

xpress as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is a real number; evalua garithm using properties of logarithms and technology.

earning Goal 4:

raph logarithmic functions expressed symbolically and show key features of the graph (including intercepts and e ehavior).

earning Goal 5:

se properties of logarithms.

earning Goal 6:

olve exponential and logarithmic equations and inequalities using properties of exponents and logarithms.

earning Goal 1:

lassify and write direct and inverse variation equations.

earning Goal 2:

or rational functions, interpret key features of graphs, including intercepts and asymptotes, and sketch graphs sho atures given a verbal description of the relationship.

earning Goal 3:

erform operations on rational expressions, including addition, subtraction, multiplication, and division.

earning Goal 4:

olve rational equations and inequalities in one variable, use them to solve problems and show how extraneous sol ise. create simple rational equations and inequalities in one variable and use them to solve problems.

earning Goal 1:

efine and use sequences and series.

earning Goal 2:

nalyze arithmetic sequences and series.

earning Goal 3:

nalyze geometric sequences and series.

earning Goal 1:

lentify sample spaces and find theoretical and experimental probabilities.

earning Goal 2:

nalyze independent and dependent events.

earning Goal 3:

se two-way tables to calculate probabilities.

earning Goal 4:

se the mean and standard deviation of a data set to fit it to a normal distribution, estimate population percentages
ılculators, spreadsheets, and tables to estimate areas under the normal curve).

earning Goal 5:

xplore populations, samples, collecting data, and analyzing hypotheses.

.earning Goal 1:

erive the equation of a parabola given a focus and directrix; graph a parabola, identifying the vertex, focus, and di

earning Goal 2:

erive the equation of a circle given features of the graph; graph a circle, identifying the radius and center.

earning Goal 3:

erive the equation of an ellipse given features of the graph; graph an ellipse, identifying the vertices, co-vertices,
:nter.

earning Goal 4:

erive the equation of a hyperbola given features of the graph; graph a hyperbola, identifying vertices, co-vertices,
:nter.

Formative and Summative Assessments

Mathematics Department incorporates a variety of methods for assessment including:					
Common Unit Test and Quizzes	**Minor Assessments & Classwork**	**Projects**	**Homework**	**Midterm Exam**	**Fin**
Student assessments based on specific or general content knowledge	Any cooperative work primarily completed in class, Entrance / Exit cards, Performance assessments etc.	Some of the courses may utilize content specific projects.	Work assigned to be completed outside of classroom	Common Comprehensive Assessment given after semester 1.	Cor Ass con aca

Grading Procedures and Evaluation

GRADING GUIDELINES:

As per Math Department Policy, grades will be determined by a variety of assessment strategies, including Major Assessments, Minor Assessments, and Performance Assessments. In addition to tests and quizzes, students will be evaluated on a combination of performance assessment instruments, including homework completions, cooperative group participation, note-taking, open ended question responses, lab reports and/or supplemental projects.

GRADING PROCEDURES:

Grading procedures must be described in sufficient detail so that a pupil will understand, the minimal to advanced proficiency, expected of him/her as the outcome of each unit, for the marking period and for the course as a whole. Benchmark level assessments associated with the course also need to be identified. While assessments of proficiency levels must be valid and reliable they do not need be the same for all students. Other criteria to be considered in grading must be identified and the degree to which such criteria will be considered in a grade. Each pupil must receive a copy of the grading procedures, proficiencies and criteria for each unit and/or marking period.

COURSE EVALUATION:

Course achievement will be evaluated as the percent of all pupils who achieve the minimum level of proficiency (final average grade) in the course. Student achievement levels above minimum proficiency will also be reported. Final grades, and where relevant mid-term and final exams, will be analyzed by staff for the total cohort and for sub-groups of students to determine course areas requiring greater support or modification.

In terms of proficiency the East Brunswick grades are as follows:

A	**Excellent**	**Advanced Proficient**
B	**Good**	**Above Average Proficient**
C	**Fair**	**Proficient**
D	**Poor**	**Minimally Proficient**
F	**Failing**	**Partially Proficient**

In this course the goal is that a minimum of 95% of the pupil's will meet at least the minimum proficiency level (D or better) set for the course. The department will analyze the achievement of students on Unit Assessments, Mid-term and Final Exams and Final Course Grades, and for Final Course Grades the achievement of sub-groups identified by the state to determine if modifications in the curriculum and instructional methods are needed.

Course evaluation requires the answering of the following questions:
1. Are course content, instruction and assessments aligned with the required NJSLS? 2. Is instruction sufficient for students to achieve the Standards? 3. Do all students achieve the set proficiencies/benchmarks set for the course?

Other Information

SCED

02056 Algebra II Accelerated

Algebra II course topics typically include field properties and theorems; set theory; operations with rational and irrational expressions; factoring of rational expressions; in-depth study of linear equations and inequalities; quadratic equations; solving systems of linear and quadratic equations; graphing of constant, linear, and quadratic equations; properties of higher degree equations; and operations with rational and

irrational exponents.