

Virtual Learning Academy
Jefferson County Educational Service Center
Academic Content Standards
Algebra II

Algebra II Lesson 01 - Linear Equations

Math 11 Algebra II Lesson 01 - Linear Equations

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
C. Translate information from one representation (words, table, graph or equation) to another representation of a relation or function. (08-10)
02. Generalize patterns using functions or relationships (linear, quadratic and exponential), and freely translate among tabular, graphical and symbolic representations. (09)
E. Analyze and compare functions and their graphs using attributes, such as rates of change, intercepts and zeros. (08-10)
05. Describe and compare characteristics of the following families of functions: linear, quadratic and exponential functions; e.g., general shape, number of roots, domain, range, rate of change, maximum or minimum. (09)
F. Solve and graph linear equations and inequalities. (08-10)
06. Write and use equivalent forms of equations and inequalities in problem situations; e.g., changing a linear equation to the slope-intercept form. (09)
08. Find linear equations that represent lines that pass through a given set of ordered pairs, and find linear equations that represent lines parallel or perpendicular to a given line through a specific point. (09)
S05. Data Analysis and Probability
A. Create and analyze tabular and graphical displays of data using appropriate tools, including spreadsheets and graphing calculators. (11-12)
08. Analyze and interpret univariate and bivariate data to identify patterns, note trends, draw conclusions, and make predictions. (11)

Algebra II Lesson 02 - Parallel and Perpendicular Lines; Direct Variation; Solving Equations

Math 11 Algebra II Lesson 02 - Parallel and Perpendicular Lines; Direct Variation; Solving Equations

Standard Benchmark and Indicator
S01. Number, Number Sense and Operations
C. Apply properties of operations and the real number system, and justify when they hold for a set of numbers. (08-10)
01. Identify and justify whether properties (closure, identity, inverse, commutative and associative) hold for a given set and operations; e.g., even integers and multiplication. (09)
S04. Patterns, Functions and Algebra
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
06. Solve equations and inequalities having rational expressions as coefficients and solutions. (10)
I. Model and solve problem situations involving direct and inverse variation. (08-10)
13. Model and solve problems involving direct and inverse variation using proportional reasoning. (09)
J. Describe and interpret rates of change from graphical and numerical data. (08-10)

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09. Recognize and explain that the slopes of parallel lines are equal and the slopes of perpendicular lines are negative reciprocals. (10)
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Algebra II Lesson 03 - Inequalities and Absolute Value Equations

Math 11 Algebra II Lesson 03 - Inequalities and Absolute Value Equations

Standard Benchmark and Indicator
S01. Number, Number Sense and Operations
C. Apply factorials and exponents, including fractional exponents, to solve practical problems. (11-12)
08. Use fractional and negative exponents as optional ways of representing and finding solutions for problem situations; e.g., 27 (11)
S04. Patterns, Functions and Algebra
B. Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations. (08-10)
01. Define function formally and with f (10)
02. Describe and compare characteristics of the following families of functions: square root, cubic, absolute value and basic trigonometric functions; e.g., general shape, possible number of roots, domain and range. (10)
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
06. Solve equations and inequalities having rational expressions as coefficients and solutions. (10)

Algebra II Lesson 04 - Review of Lessons One Through Three

Algebra II Lesson 05 - Operations with Numbers, Exponents, and Functions

Math 11 Algebra II Lesson 05 - Operations with Numbers, Exponents, and Functions

Standard Benchmark and Indicator
S01. Number, Number Sense and Operations
C. Apply properties of operations and the real number system, and justify when they hold for a set of numbers. (08-10)
01. Identify and justify whether properties (closure, identity, inverse, commutative and associative) hold for a given set and operations; e.g., even integers and
C. Apply factorials and exponents, including fractional exponents, to solve practical problems. (11-12)
08. Use fractional and negative exponents as optional ways of representing and finding solutions for problem situations; e.g., 27 (11)
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
04. Demonstrate fluency in computations using real numbers. (09)
S04. Patterns, Functions and Algebra
B. Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations. (08-10)
01. Define function formally and with f (10)
02. Describe and compare characteristics of the following families of functions: square root, cubic, absolute value and basic trigonometric functions; e.g., general

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square root, cubic, absolute value and basic trigonometric functions; e.g., general shape, possible number of roots, domain and range. (10)

Algebra II Lesson 06 - Operations with Functions and Inverses of Functions

Math 11 Algebra II Lesson 06 - Operations with Functions and Inverses of Functions

Standard Benchmark and Indicator

S04. Patterns, Functions and Algebra

A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)

06. Represent the inverse of a function symbolically and graphically as a reflection about (11)

D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)

06. Solve equations and inequalities having rational expressions as coefficients and solutions. (10)

Algebra II Lesson 07 - Special Functions and Transformations

Math 11 Algebra II Lesson 07 - Special Functions and Transformations

Standard Benchmark and Indicator

S04. Patterns, Functions and Algebra

A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)

05. Identify families of functions with graphs that have rotation symmetry or reflection symmetry about the (11)

Algebra II Lesson 08 - Review of Lessons #5 Through #7

Algebra II Lesson 09 - Systems of Equations and Linear Inequalities

Math 11 Algebra II Lesson 09 - Systems of Equations and Linear Inequalities

Standard Benchmark and Indicator

09. Solve 3 by 3 systems of linear equations by elimination and using technology,

H. Solve systems of linear equations involving two variables graphically and

07. Solve systems of linear inequalities. (10)

09. Solve and interpret the meaning of 2 by 2 systems of linear equations

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graphically, by substitution and by elimination, with and without technology. (09)
11. Solve real-world problems that can be modeled, using systems of linear equations and inequalities. (10)

Algebra II Lesson 10 - Solving Systems of Linear Inequalities

Math 11 Algebra II Lesson 10 - Solving Systems of Linear Inequalities

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
H. Solve systems of linear equations involving two variables graphically and symbolically. (08-10)
07. Solve systems of linear inequalities. (10)
11. Solve real-world problems that can be modeled, using systems of linear equations and inequalities. (10)

Algebra II Lesson 11 - Systems of Equations and Linear Inequalities

Math 11 Algebra II Lesson 11 - Systems of Equations and Linear Inequalities

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
D. Apply algebraic methods to represent and generalize problem situations involving vectors and matrices. (11-12)
09. Solve 3 by 3 systems of linear equations by elimination and using technology, and interpret graphically what the solution means (a point, line, plane, or no solution). (11)
H. Solve systems of linear equations involving two variables graphically and symbolically. (08-10)
07. Solve systems of linear inequalities. (10)
09. Solve and interpret the meaning of 2 by 2 systems of linear equations graphically, by substitution and by elimination, with and without technology. (09)
11. Solve real-world problems that can be modeled, using systems of linear equations and inequalities. (10)

Algebra II Lesson 12 – Matrices

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e.g., use examples to show addition is commutative and when multiplication is not commutative. (11)
02. Determine what properties hold for vector addition and multiplication, and for scalar multiplication. (11)
B. Develop an understanding of properties of and representations for addition and multiplication of vectors and matrices. (11-12)
01. Determine what properties hold for matrix addition and matrix multiplication; e.g., use examples to show addition is commutative and when multiplication is not commutative. (11)
02. Determine what properties hold for vector addition and multiplication, and for scalar multiplication. (11)
D. Demonstrate fluency in operations with real numbers, vectors and matrices, using mental computation or paper and pencil calculations for simple cases and technology for more complicated cases. (11-12)
04. Use matrices to represent given information in a problem situation. (11)
06. Compute sums, differences and products of matrices using paper and pencil calculations for simple cases, and technology for more complicated cases. (11)
S04. Patterns, Functions and Algebra
D. Apply algebraic methods to represent and generalize problem situations involving vectors and matrices. (11-12)
07. Model and solve problems with matrices and vectors. (11)

Algebra II Lesson 13 - Solving Systems with Matrix Equations

Math 11 Algebra II Lesson 13 - Solving Systems with Matrix Equations

Standard Benchmark and Indicator
A. Demonstrate that vectors and matrices are systems having some of the same
01. Determine what properties hold for matrix addition and matrix multiplication;
02. Determine what properties hold for vector addition and multiplication, and for
B. Develop an understanding of properties of and representations for addition
01. Determine what properties hold for matrix addition and matrix multiplication;
02. Determine what properties hold for vector addition and multiplication, and for
D. Demonstrate fluency in operations with real numbers, vectors and matrices,
04. Use matrices to represent given information in a problem situation. (11)
06. Compute sums, differences and products of matrices using paper and pencil
S04. Patterns, Functions and Algebra
D. Apply algebraic methods to represent and generalize problem situations

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07. Model and solve problems with matrices and vectors. (11)
G. Solve quadratic equations with real roots by graphing, formula and factoring. (08-10)
10. Solve real-world problems that can be modeled using linear, quadratic, exponential or square root functions. (10)

Algebra II Lesson 17 - Curve Fitting and Quadratic Inequalities

Math 11 Algebra II Lesson 17 - Curve Fitting and Quadratic Inequalities

Standard Benchmark and Indicator
S01. Number, Number Sense and Operations
E. Represent and compute with complex numbers. (11-12)
03. Represent complex numbers on the complex plane. (11)
07. Compute sums, differences, products and quotients of complex numbers. (11)

Algebra II Lesson 18 - Semester Exam

Algebra II Lesson 19 - Quadratic Functions

Math 11 Algebra II Lesson 19 - Quadratic Functions

Standard Benchmark and Indicator
S01. Number, Number Sense and Operations
E. Represent and compute with complex numbers. (11-12)
03. Represent complex numbers on the complex plane. (11)
07. Compute sums, differences, products and quotients of complex numbers. (11)
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
04. Identify the maximum and minimum points of polynomial, rational and trigonometric functions graphically and with technology. (11)
B. Use the quadratic formula to solve quadratic equations that have complex roots. (11-12)
08. Solve equations involving radical expressions and complex roots. (11)
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
11. Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only). (09)
F. Solve and graph linear equations and inequalities. (08-10)
10. Solve real-world problems that can be modeled using linear, quadratic, exponential or square root functions. (10)
G. Solve quadratic equations with real roots by graphing, formula and factoring.

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10. Solve quadratic equations with real roots by factoring, graphing, using the quadratic formula and with technology. (09)

Algebra II Lesson 20 - Exponential Growth and Decay

Math 11 Algebra II Lesson 20 - Exponential Growth and Decay

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
C. Use recursive functions to model and solve problems; e.g., home mortgages, annuities. (11-12)
01. Identify and describe problem situations involving an iterative process that can be represented as a recursive function; e.g., compound interest. (11)
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
07. Use formulas to solve problems involving exponential growth and decay. (09)

Algebra II Lesson 21 – Logarithms

Math 11 Algebra II Lesson 21 - Logarithms

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
F. Solve and graph linear equations and inequalities. (08-10)
10. Solve real-world problems that can be modeled using linear, quadratic, exponential or square root functions. (10)

Algebra II Lesson 22 - Natural Logarithms

Math 11 Algebra II Lesson 22 - Natural Logarithms

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
11. Describe how a change in the value of a constant in an exponential, logarithmic or radical equation affects the graph of the equation. (11)
C. Use recursive functions to model and solve problems; e.g., home mortgages, annuities. (11-12)
02. Translate a recursive function into a closed form expression or formula for the n th term to solve a problem situation involving an iterative process; e.g., find the value of an annuity after 7 years. (11)

Algebra II Lesson 23 - Exponential and Logarithmic Functions and Applications

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Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
C. Use recursive functions to model and solve problems; e.g., home mortgages, annuities. (11-12)
01. Identify and describe problem situations involving an iterative process that can be represented as a recursive function; e.g., compound interest. (11)
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
07. Use formulas to solve problems involving exponential growth and decay. (09)

Algebra II Lesson 24 – Polynomials

Math 11 Algebra II Lesson 24 - Polynomials

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
03. Describe and compare the characteristics of the following families of functions: quadratics with complex roots, polynomials of any degree, logarithms, and rational functions; e.g., general shape, number of roots, domain and range, asymptotic behavior. (11)
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
11. Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only). (09)

Algebra II Lesson 25 - Solving Polynomial Equations

Math 11 Algebra II Lesson 25 - Solving Polynomial Equations

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
03. Describe and compare the characteristics of the following families of functions: quadratics with complex roots, polynomials of any degree, logarithms, and rational functions; e.g., general shape, number of roots, domain and range, asymptotic behavior. (11)

Algebra II Lesson 26 - Remainder and Factor Theorems

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S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
03. Describe and compare the characteristics of the following families of functions: quadratics with complex roots, polynomials of any degree, logarithms, and rational functions; e.g., general shape, number of roots, domain and range, asymptotic behavior. (11)
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
11. Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only). (09)

Algebra II Lesson 27 - Rational Functions: Inverse, Joint, and Combined Variation

Math 11 Algebra II Lesson 27 - Rational Functions: Inverse, Joint, and Combined Variation

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
03. Describe and compare the characteristics of the following families of functions: quadratics with complex roots, polynomials of any degree, logarithms, and rational functions; e.g., general shape, number of roots, domain and range, asymptotic behavior. (11)
B. Use the quadratic formula to solve quadratic equations that have complex roots. (11-12)
08. Solve equations involving radical expressions and complex roots. (11)

Algebra II Lesson 28 - Rational Expression, Equations, and Inequalities

Math 11 Algebra II Lesson 28 - Rational Expression, Equations, and Inequalities

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
05. Solve simple linear and nonlinear equations and inequalities having square roots as coefficients and solutions. (10)
06. Solve equations and inequalities having rational expressions as coefficients and solutions. (10)

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Algebra II Lesson 29 - Radical Expressions, Functions, Equations, and Inequalities

Math 11 Algebra II Lesson 29 - Radical Expressions, Functions, Equations, and Inequalities

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
05. Solve simple linear and nonlinear equations and inequalities having square roots as coefficients and solutions. (10)
06. Solve equations and inequalities having rational expressions as coefficients and solutions. (10)
F. Solve and graph linear equations and inequalities. (08-10)
10. Solve real-world problems that can be modeled using linear, quadratic, exponential or square root functions. (10)

Algebra II Lesson 30 - Distance Formula, Conic Sections, Parabolas

Math 11 Algebra II Lesson 30 - Distance Formula, Conic Sections, Parabolas

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
10. Describe the characteristics of the graphs of conic sections. (11)

Algebra II Lesson 31 - Circles and Ellipses

Math 11 Algebra II Lesson 31 - Circles and Ellipses

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
10. Describe the characteristics of the graphs of conic sections. (11)

Algebra II Lesson 32 - Hyperbolas and Solving Quadratic Systems

Math 11 Algebra II Lesson 32 - Hyperbolas and Solving Quadratic Systems

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)

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10. Describe the characteristics of the graphs of conic sections. (11)
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Algebra II Lesson 33 - Review of Conic Sections

Math 11 Algebra II Lesson 33 - Review of Conic Sections

Standard Benchmark and Indicator
S04. Patterns, Functions and Algebra
A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior. (11-12)
10. Describe the characteristics of the graphs of conic sections. (11)

Algebra II Lesson 34 - Probability: Fundamental Counting Principle, Permutations, Combinations

Math 11 Algebra II Lesson 34 - Probability: Fundamental Counting Principle, Permutations, Combinations

Standard Benchmark and Indicator
S05. Data Analysis and Probability
H. Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes. (08-10)
07. Use counting techniques and the Fundamental Counting principle to determine the total number of possible outcomes for mathematical situations. (09)
K. Make predictions based on theoretical probabilities and experimental results. (08-10)
08. Differentiate and explain the relationship between the probability of an event and the odds of an event, and compute one given the other. (10)

Algebra II Lesson 35 - Independent and Dependent Events; Conditional Probability

Math 11 Algebra II Lesson 35 - Independent and Dependent Events; Conditional Probability

Standard Benchmark and Indicator
S05. Data Analysis and Probability
D. Connect statistical techniques to applications in workplace and consumer situations. (11-12)
11. Examine statements and decisions involving risk; e.g., insurance rates and medical decisions. (11)
K. Make predictions based on theoretical probabilities and experimental results. (08-10)
10. Use theoretical and experimental probability, including simulations or random numbers, to estimate probabilities and to solve problems dealing with uncertainty; e.g., compound events, independent events, simple dependent events. (09)

Algebra II Lesson 36 - Final Exam

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