

Critical Algebra I

Expressions EX

Polynomials, Roots, & Exponent Laws: Students simplify algebraic and numerical expressions.

- 1 Add, subtract, and multiply polynomials; compare the system of polynomials to the system of integers when performing operations. A1.EX.1
- 2 Simplify and perform operations with radical expressions without variables; rationalizing denominators should not include conjugates. A1.EX.2
- 3 Simplify algebraic expressions using the laws of exponents. A1.EX.3
- 4 Interpret the parts of expressions such as terms, factors, and coefficients in terms of a real-world context. A1.EX.4

Functions FN

Domain & Range, Function Notation: Students understand the concept of a function, domain and range, and use function notation; students use function notation to solve problems.

- 1 Explain that a function assigns each element in the domain to exactly one element in the range. A1.FN.1
- 2 Use function notation to represent functions, understanding that if f is a function and x is an element of its domain, then $f(x)$ represents the output of f corresponding to the input x . A1.FN.2
- 3 Graph functions given in function notation, understanding that the graph contains the points $(x, f(x))$. A1.FN.3
- 4 Evaluate functions expressed in function notation for one or more elements in their domains (inputs); use function notation to describe a contextual situation. A1.FN.4

Construct & Compare: Students construct and compare linear, quadratic, and exponential models and solve problems.

- 5 Differentiate between real-world scenarios that can be modeled by exponential or linear functions by determining whether the relationship has a common difference or a common ratio. A1.FN.5
- 6 Compare the growth pattern of exponential to linear or quadratic functions using graphs and tables and recognize how exponential growth exceeds other functions. A1.FN.6

Linear Functions, Equations, & Inequalities LFE

Create & Solve: Students create and solve equations that model linear relationships.

- 1 Represent and solve real-world problems, using linear expressions, equations, and inequalities in one variable. [A1.LFE.1](#)
 - 2 Construct linear functions from arithmetic sequences with and without context. [A1.LFE.2](#)
 - 3 Solve linear formulas for a specified variable. [A1.LFE.3](#)
 - 4 Solve linear equations, linear inequalities, and absolute value equations in one variable, including those with rational number coefficients, and variables on both sides of the equal or inequality sign; solve them fluently, explaining the process used. [A1.LFE.4](#)
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Interpret Key Features: Students interpret key features of equations that model linear relationships.

- 5 Determine the domain and range of linear functions in mathematical problems. [A1.LFE.5](#)
 - 6 Determine reasonable domain and range values of linear functions representing real-world situations, both continuous and discrete; interpret the solution as reasonable or unreasonable in context. [A1.LFE.6](#)
 - 7 Interpret the key features of a linear and absolute value functions that models a relationship between two quantities in a given context. [A1.LFE.7](#)
 - 8 Flexibly use different representations of a linear function, including graphs, tables, and equations. [A1.LFE.8](#)
 - 9 Calculate and interpret the rate of change of a linear function represented in a table, graph, or as an equation in context of real-world and mathematical problems. [A1.LFE.9](#)
 - 10 Translate among equivalent forms of equations for linear functions, including standard, point-slope, and slope-intercept forms; recognize that each form reveals key features in a given context. [A1.LFE.10](#)
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Systems of Equations & Inequalities: Students solve systems of equations and inequalities.

- 11 Solve systems of linear equations by substitution, elimination, and graphing with and without a real-world context; understand that the solutions will be the same regardless of the method for solving. [A1.LFE.11](#)
 - 12 Solve a system of equations consisting of a linear equation and a quadratic equation in two variables graphically with the assistance of technology. [A1.LFE.12](#)
 - 13 Explain why a solution to the equation $f(x) = g(x)$ is the x-coordinate where the y-coordinate of $f(x)$ and $g(x)$ are the same using graphs, tables, or approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, quadratic, absolute value, and exponential. [A1.LFE.13](#)
 - 14 Solve linear inequalities and systems of linear inequalities in two variables by graphing. [A1.LFE.14](#)
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Graphing & Transformations: Students graph linear functions, equations, and inequalities.

- 15 Write linear equations that model the relationship between two quantities and produce a graph of the equation. [A1.LFE.15](#)
- 16 Graph linear functions expressed as an equation and show intercepts of the graph without technology. [A1.LFE.16](#)
- 17 Graph absolute value functions expressed as an equation with and without technology, showing intercepts and end behavior. [A1.LFE.17](#)
- 18 Graph and generalize the effect of transformations on linear and absolute value functions. [A1.LFE.18](#)
- 19 Given the graph of a linear function, explain the effects of the transformation from the parent function, $y = x$. [A1.LFE.19](#)

Statistical Relationships: Students explore linear statistical relationships.

- 20 Write linear functions that provide a reasonable fit to data and use them to make predictions, with and without technology; interpret the slope and y-intercept in context. [A1.LFE.20](#)
- 21 Calculate, using technology, the correlation coefficient between two quantitative variables and interpret this quantity as a measure of the strength of the linear association. [A1.LFE.21](#)
- 22 Compare and contrast correlation and causation in real-world problems. [A1.LFE.22](#)

Quadratic Functions & Equations [QFE](#)

Create & Solve: Students create and solve equations that model quadratic relationships.

- 1 Represent and solve real-world problems using quadratic expressions and equations in one variable. [A1.QFE.1](#)
- 2 Write quadratic equations with real number solutions that model the relationship between two quantities and produce a graph of the equation. [A1.QFE.2](#)
- 3 Solve quadratic equations with real number solutions, containing one variable, including those with variables on both sides of the equal sign. Equations should be solved by:
 - 1 Graphing, [A1.QFE.3.1](#)
 - 2 Factoring (including perfect square trinomials and difference of squares binomials), [A1.QFE.3.2](#)
 - 3 Using the quadratic formula, [A1.QFE.3.3](#)
 - 4 Completing the square, or [A1.QFE.3.4](#)
 - 5 Taking the square root. [A1.QFE.3.5](#)

Interpret Key Features: Students interpret key features of equations that model quadratic relationships.

- 4 Determine the domain and range of quadratic functions in mathematical problems. [A1.QFE.4](#)

- 5 Determine reasonable domain and range values of quadratic functions representing real-world situations, both continuous and discrete; interpret the solution as reasonable or unreasonable in context. [A1.QFE.5](#)
- 6 Interpret the key features of a quadratic function that models a relationship between two quantities in a given context. [A1.QFE.6](#)
- 7 Flexibly use different representations of a quadratic function, including graphs, tables, and equations. [A1.QFE.7](#)
- 8 Explain how each form of a quadratic expression (standard, factored, and vertex form) identifies different key attributes, using the different forms to interpret quantities in context. [A1.QFE.8](#)
- 9 Use factoring and completing the square to create equivalent forms of quadratic functions to reveal key attributes. [A1.QFE.9](#)

Graphing & Transformations: Students graph quadratic functions and explore different transformations of $f(x) = x^2$.

- 10 Graph quadratic functions given as an equation or in function notation, labeling key attributes, without technology. [A1.QFE.10](#)
- 11 Graph and describe the effect of transformations on quadratic functions. [A1.QFE.11](#)
- 12 Given the graph of a quadratic function, explain the effects of the transformation from the parent function, $y = x^2$. [A1.QFE.12](#)

Statistical Relationships: Students explore quadratic statistical relationships.

- 13 Write quadratic functions that provide a reasonable fit to data and use them to make predictions with technology. [A1.QFE.13](#)

Exponential Functions & Equations [EFE](#)

Create & Solve: Students create and solve problems that model exponential relationships.

- 1 Represent and solve real-world problems, using exponential equations in one variable. [A1.EFE.1](#)
- 2 Represent real-world problems (growth, decay, and compound interest), using exponential equations. [A1.EFE.2](#)
- 3 Construct exponential equations from geometric sequences with and without context. [A1.EFE.3](#)

Interpret Key Features: Students interpret key features of equations that model exponential relationships.

- 4 Determine the domain and range of exponential functions in mathematical problems. [A1.EFE.4](#)
- 5 Determine reasonable domain and range values of exponential functions representing real-world situations, both continuous and discrete; interpret the solution as reasonable or unreasonable in context. [A1.EFE.5](#)
- 6 Interpret the key features of an exponential function that models a relationship between two quantities in a given context. [A1.EFE.6](#)

- 7 Flexibly use different representations of an exponential function, including graphs, tables, and equations. [A1.EFE.7](#)
 - 8 Interpret the quantities in an exponential equation in the context of a real-world problem, including growth, decay, and compound interest. [A1.EFE.8](#)
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Graphing: Students graph exponential functions.

- 9 Graph exponential functions that model real-world problems (growth, decay, and compound interest), showing key attributes. [A1.EFE.9](#)
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Statistical Relationships: Students explore exponential statistical relationships.

- 10 Write exponential functions that provide a reasonable fit to data and use them to make predictions with technology. [A1.EFE.10](#)
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**Statistics &
Probability** [SP](#)

Numerical Data: Students summarize and describe distributions.

- 1 Use box plots and histograms to determine the statistics appropriate to the shape of the data distribution; compare the center and spread of two or more data sets. [A1.SP.1](#)
 - 2 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points. [A1.SP.2](#)
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Bivariate Data: Students will investigate patterns of association in bivariate data.

- 3 Summarize data from two categorical variables in a frequency table; interpret relative frequencies in the context of the data, recognizing data trends and associations. [A1.SP.2](#)