

### Correlation of the ALEKS course Algebra 1 to the Texas Essential Knowledge and Skills (TEKS) for Algebra 1

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#### Foundations for Functions:

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- = ALEKS course topic that addresses the standard
- TD = Teacher Directed

#### **A.1: The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways. The student is expected to:**

A.1.A: describe independent and dependent quantities in functional relationships;

- Independent and dependent variables

A.1.B: gather and record data and use data sets to determine functional relationships between quantities;

- Writing a function rule given a table of ordered pairs: One-step rules
- Writing a function rule given a table of ordered pairs: Two-step rules
- Identifying linear functions given ordered pairs

A.1.C: describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations;

- Writing a multi-step equation for a real-world situation
- Writing a multi-step inequality for a real-world situation
- Writing and evaluating a function that models a real-world situation
- Writing an equation and drawing its graph to model a real-world situation
- Writing an equation that models exponential growth or decay

A.1.D: represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities; and

- Translating a sentence into a one-step equation
- Translating a sentence into a multi-step equation
- Translating a sentence into a simple inequality
- Translating a sentence into a one-step inequality
- Translating a sentence into a multi-step inequality
- Writing a simple inequality for a real-world situation
- Writing a multi-step inequality for a real-world situation
- Graphing a linear inequality on the number line
- Writing an inequality given a graph on the number line
- Writing a compound inequality
- Graphing a compound linear inequality on the number line
- Writing a compound inequality given a graph on the number line
- Writing a function rule given a table of ordered pairs: One-step rules
- Writing a function rule given a table of ordered pairs: Two-step rules
- Writing and evaluating a function that models a real-world situation

A.1.E: interpret and make decisions, predictions, and critical judgments from functional relationships.

- Interpreting the parameters of a linear function that models a real-world situation
- Scatter plots and correlation
- Predictions from the line of best fit
- Interpreting the graphs of two functions

- Interpreting line graphs

**A.2: The student uses the properties and attributes of functions. The student is expected to:**

A.2.A: identify and sketch the general forms of linear ( $y = x$ ) and quadratic ( $y = x^2$ ) parent functions;

- Graphing a linear equation of the form  $y = mx$
- Graphing a line given its equation in slope-intercept form: Integer slope
- Graphing a line given its equation in slope-intercept form: Fractional slope
- Graphing a parabola of the form  $y = ax^2$

A.2.B: identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete;

- Domain and range from ordered pairs
- Graphing an integer function and finding its range for a given domain
- Domain and range of a linear function that models a real-world situation
- Domain and range from the graph of a parabola
- Range of a quadratic function

A.2.C: interpret situations in terms of given graphs or create situations that fit given graphs; and

- Choosing a graph to fit a narrative
- Scatter plots and correlation
- Interpreting the graphs of two functions
- Interpreting line graphs

A.2.D: collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations.

- Scatter plots and correlation
- Sketching the line of best fit
- Predictions from the line of best fit
- Approximating the equation of a line of best fit and making predictions
- Interpreting the graphs of two functions
- Interpreting bar graphs
- Interpreting line graphs

**A.3: The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations. The student is expected to:**

A.3.A: use symbols to represent unknowns and variables; and

- Writing a simple variable expression for a real-world situation
- Translating a sentence into a one-step expression
- Translating a sentence into a two-step expression
- Translating a sentence into a one-step equation
- Translating a sentence into a multi-step equation
- Translating a sentence into a one-step inequality
- Translating a sentence into a multi-step inequality
- Writing a simple inequality for a real-world situation
- Writing a multi-step inequality for a real-world situation
- Writing and evaluating a function that models a real-world situation

A.3.B: look for patterns and represent generalizations algebraically.

- Writing a function rule given a table of ordered pairs: One-step rules
- Writing a function rule given a table of ordered pairs: Two-step rules

- Finding the next terms of an arithmetic sequence with whole numbers
- Finding the next terms of an arithmetic sequence with integers
- Identifying arithmetic sequences and finding the common difference
- Finding a specified term of an arithmetic sequence given the first terms
- Finding a specified term of an arithmetic sequence given the common difference and first term
- Writing an explicit rule for an arithmetic sequence
- Finding the next terms of a geometric sequence with whole numbers
- Finding the next terms of a geometric sequence with signed numbers

**A.4: The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to:**

A.4.A: find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations;

- Combining like terms: Whole number coefficients
- Combining like terms: Integer coefficients
- Combining like terms: Advanced
- Combining like terms in a quadratic expression
- Solving a simple equation with parentheses
- Introduction to solving a linear equation with several occurrences of the variable
- Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution
- Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution
- Solving a linear equation with several occurrences of the variable: Variables on both sides and two distributions
- Solving a linear equation with several occurrences of the variable: Variables on both sides and fractional coefficients
- Solving a linear equation with several occurrences of the variable: Fractional forms with binomial numerators
- Introduction to algebraic symbol manipulation
- Algebraic symbol manipulation: Problem type 1
- Algebraic symbol manipulation: Problem type 2
- Function tables
- Evaluating functions: Problem type 1
- Tables for linear functions
- Simplifying a sum or difference of two univariate polynomials
- Simplifying a sum or difference of three univariate polynomials
- Simplifying a sum or difference of multivariate polynomials
- Factoring out a monomial from a polynomial: Univariate
- Factoring out a monomial from a polynomial: Multivariate
- Factoring out a binomial from a polynomial
- Factoring a polynomial in one variable by grouping: Problem type 1
- Factoring a polynomial in one variable by grouping: Problem type 2
- Factoring a multivariate polynomial by grouping: Problem type 1
- Factoring a quadratic with leading coefficient 1
- Factoring a quadratic polynomial in two variables with leading coefficient 1
- Factoring out a constant before factoring a quadratic
- Factoring a quadratic with leading coefficient greater than 1: Problem type 1
- Factoring a quadratic with leading coefficient greater than 1: Problem type 2
- Factoring a quadratic with leading coefficient greater than 1: Problem type 3
- Factoring a quadratic by the ac-method
- Factoring a quadratic polynomial in two variables with leading coefficient greater than 1
- Factoring a quadratic with a negative leading coefficient

- Factoring a product of a quadratic trinomial and a monomial
- Factoring a perfect square trinomial with leading coefficient 1
- Factoring a perfect square trinomial with leading coefficient greater than 1
- Factoring a perfect square trinomial in two variables
- Factoring a difference of squares in one variable: Basic
- Factoring a difference of squares in one variable: Advanced
- Factoring a difference of squares in two variables
- Factoring a polynomial involving a GCF and a difference of squares: Univariate
- Solving equations written in factored form
- Finding the roots of a quadratic equation of the form  $ax^2 + bx = 0$
- Finding the roots of a quadratic equation with leading coefficient 1
- Finding the roots of a quadratic equation with leading coefficient greater than 1
- Solving a quadratic equation needing simplification
- Solving an equation of the form  $x^2 = a$  using the square root property
- Simplifying a ratio of polynomials: Problem type 1
- Simplifying a ratio of polynomials: Problem type 2
- Multiplying rational expressions: Problem type 2

A.4.B: use the commutative, associative, and distributive properties to simplify algebraic expressions; and

- Properties of addition
- Properties of real numbers
- Understanding the distributive property
- Distributive property: Whole number coefficients
- Distributive property: Integer coefficients
- Combining like terms: Advanced
- Multiplying a monomial and a polynomial: Univariate with positive leading coefficients
- Multiplying a monomial and a polynomial: Univariate with negative leading coefficients
- Multiplying binomials with leading coefficients of 1
- Multiplying binomials with leading coefficients greater than 1
- Multiplying binomials in two variables
- Multiplying conjugate binomials: Univariate
- Multiplying conjugate binomials: Multivariate
- Squaring a binomial: Univariate
- Squaring a binomial: Multivariate
- Multiplying binomials with negative coefficients
- Multiplication involving binomials and trinomials in one variable

A.4.C: connect equation notation with function notation, such as  $y = x + 1$  and  $f(x) = x + 1$ .

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## Linear Functions:

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**A.5: The student understands that linear functions can be represented in different ways and translates among their various representations. The student is expected to:**

A.5.A: determine whether or not given situations can be represented by linear functions;

- Identifying linear functions given ordered pairs

A.5.B: determine the domain and range for linear functions in given situations; and

- Graphing an integer function and finding its range for a given domain
- Domain and range of a linear function that models a real-world situation

A.5.C: use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear

functions.

- Function tables
- Writing a function rule given a table of ordered pairs: One-step rules
- Writing a function rule given a table of ordered pairs: Two-step rules
- Graphing a linear equation of the form  $y = mx$
- Graphing a line given its equation in slope-intercept form: Integer slope
- Graphing a line given its equation in slope-intercept form: Fractional slope
- Graphing a line given its equation in standard form
- Graphing a line given the x- and y-intercepts
- Graphing a line by first finding its x- and y-intercepts
- Graphing a line through a given point with a given slope
- Graphing a line by first finding its slope and y-intercept
- Graphing a line given its equation in point-slope form
- Graphing a vertical or horizontal line
- Writing an equation and graphing a line given its slope and y-intercept
- Writing an equation of a line given the y-intercept and another point
- Writing an equation in slope-intercept form given the slope and a point
- Writing an equation in point-slope form given the slope and a point
- Writing the equation of the line through two given points
- Writing the equations of vertical and horizontal lines through a given point
- Writing an equation and drawing its graph to model a real-world situation

**A.6: The student understands the meaning of the slope and intercepts of the graphs of linear functions and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.**

**The student is expected to:**

A.6.A: develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;

- Classifying slopes given graphs of lines
- Finding slope given the graph of a line on a grid
- Finding slope given two points on the line
- Finding the slope of horizontal and vertical lines
- Finding the slope and y-intercept of a line given its equation in the form  $y = mx + b$
- Finding the slope and y-intercept of a line given its equation in the form  $Ax + By = C$
- Comparing properties of linear functions given in different forms

A.6.B: interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;

- Writing an equation and drawing its graph to model a real-world situation
- Interpreting the parameters of a linear function that models a real-world situation
- Application problem with a linear function: Problem type 1
- Application problem with a linear function: Problem type 2

A.6.C: investigate, describe, and predict the effects of changes in  $m$  and  $b$  on the graph of  $y = mx + b$  ;

- Graphing a linear equation of the form  $y = mx$
- Graphing a line given its equation in slope-intercept form: Integer slope
- Graphing a line given its equation in slope-intercept form: Fractional slope

A.6.D: graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y -intercept;

- Graphing a linear equation of the form  $y = mx$
- Graphing a line given its equation in slope-intercept form: Integer slope
- Graphing a line given its equation in slope-intercept form: Fractional slope
- Graphing a line given its equation in standard form
- Graphing a line given the x- and y-intercepts

- Graphing a line by first finding its x- and y-intercepts
- Graphing a line through a given point with a given slope
- Graphing a line by first finding its slope and y-intercept
- Graphing a line given its equation in point-slope form
- Graphing a vertical or horizontal line
- Writing an equation and graphing a line given its slope and y-intercept
- Writing an equation of a line given the y-intercept and another point
- Writing an equation in slope-intercept form given the slope and a point
- Writing an equation in point-slope form given the slope and a point
- Writing the equation of the line through two given points
- Writing the equations of vertical and horizontal lines through a given point

A.6.E: determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;

- Finding x- and y-intercepts given the graph of a line on a grid
- Finding x- and y-intercepts of a line given the equation: Basic
- Finding x- and y-intercepts of a line given the equation: Advanced
- Comparing properties of linear functions given in different forms

A.6.F: interpret and predict the effects of changing slope and y-intercept in applied situations; and

- Interpreting the parameters of a linear function that models a real-world situation
- Combining functions to write a new function that models a real-world situation

A.6.G: relate direct variation to linear functions and solve problems involving proportional change.

- Solving a word problem involving rates and time conversion
- Simple word problem on proportions
- Word problem on proportions: Problem type 1
- Converting between metric and customary unit systems
- Interpreting direct variation from a graph
- Word problem on direct variation

**A.7: The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:**

A.7.A: analyze situations involving linear functions and formulate linear equations or inequalities to solve problems;

- Solving a fraction word problem using a linear equation of the form  $Ax = B$
- Solving a word problem with two unknowns using a linear equation
- Solving a decimal word problem using a linear equation of the form  $Ax + B = C$
- Solving a decimal word problem using a linear equation with the variable on both sides
- Solving a fraction word problem using a linear equation with the variable on both sides
- Solving a word problem involving consecutive integers
- Solving a value mixture problem using a linear equation
- Solving a simple word problem using the formula  $d = rt$
- Writing a multi-step inequality for a real-world situation
- Word problem with linear inequalities: Problem type 1
- Writing and evaluating a function that models a real-world situation

A.7.B: investigate methods for solving linear equations and inequalities using concrete models, graphs, and the properties of equality, select a method, and solve the equations and inequalities; and

- Additive property of equality with whole numbers
- Additive property of equality with fractions and mixed numbers
- Additive property of equality with decimals
- Additive property of equality with integers
- Additive property of equality with a negative coefficient
- Additive property of equality with signed fractions

- Multiplicative property of equality with whole numbers
- Multiplicative property of equality with fractions
- Multiplicative property of equality with decimals
- Multiplicative property of equality with integers
- Multiplicative property of equality with signed fractions
- Identifying solutions to a linear equation in one variable: Two-step equations
- Using two steps to solve an equation with whole numbers
- Solving a two-step equation with integers
- Solving a multi-step equation given in fractional form
- Solving a two-step equation with signed fractions
- Using two steps to solve an equation with signed decimals
- Solving a simple equation with parentheses
- Introduction to solving a linear equation with several occurrences of the variable
- Solving a linear equation with several occurrences of the variable: Variables on the same side
- Solving a linear equation with several occurrences of the variable: Variables on both sides
- Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution
- Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution
- Solving a linear equation with several occurrences of the variable: Variables on both sides and two distributions
- Solving a linear equation with several occurrences of the variable: Variables on both sides and fractional coefficients
- Solving a linear equation with several occurrences of the variable: Fractional forms with binomial numerators
- Solving equations with zero, one, or infinitely many solutions
- Solving a fraction word problem using a linear equation of the form  $Ax = B$
- Identifying solutions to a linear inequality in one variable
- Additive property of inequality with whole numbers
- Additive property of inequality with integers
- Additive property of inequality with signed fractions
- Additive property of inequality with signed decimals
- Multiplicative property of inequality with integers
- Solving a two-step linear inequality: Problem type 1
- Solving a two-step linear inequality: Problem type 2
- Solving a two-step linear inequality with a fractional coefficient
- Solving a linear inequality with multiple occurrences of the variable: Problem type 1
- Solving a linear inequality with multiple occurrences of the variable: Problem type 2
- Solving a linear inequality with multiple occurrences of the variable: Problem type 3
- Solving a compound linear inequality: Problem type 1

A.7.C: interpret and determine the reasonableness of solutions to linear equations and inequalities.

- Identifying solutions to a linear equation in one variable: Two-step equations
- Solving a fraction word problem using a linear equation of the form  $Ax = B$
- Solving a word problem with two unknowns using a linear equation
- Solving a decimal word problem using a linear equation of the form  $Ax + B = C$
- Solving a decimal word problem using a linear equation with the variable on both sides
- Solving a word problem involving consecutive integers
- Solving a value mixture problem using a linear equation
- Solving a simple word problem using the formula  $d = rt$
- Finding a side length given the perimeter and side lengths with variables
- Finding the side length of a rectangle given its perimeter or area
- Finding the value for a new score that will yield a given mean
- Identifying solutions to a linear inequality in one variable
- Word problem with linear inequalities: Problem type 1

**A.8: The student formulates systems of linear equations from problem situations, uses**

**a variety of methods to solve them, and analyzes the solutions in terms of the situation.**

**The student is expected to:**

A.8.A: analyze situations and formulate systems of linear equations in two unknowns to solve problems;

- Solving a word problem involving a sum and another simple relationship using a system of linear equations
- Solving a word problem using a system of linear equations of the form  $Ax + By = C$
- Solving a word problem using a system of linear equations of the form  $y = mx + b$
- Solving a value mixture problem using a system of linear equations
- Solving a distance, rate, time problem using a system of linear equations
- Solving a percent mixture problem using a system of linear equations
- Solving a tax rate or interest rate problem using a system of linear equations

A.8.B: solve systems of linear equations using concrete models, graphs, tables, and algebraic methods; and

- Graphically solving a system of linear equations
- Solving a simple system using substitution
- Solving a system of linear equations using elimination with addition
- Solving a system of linear equations using elimination with multiplication and addition
- Solving a system of linear equations with fractional coefficients
- Solving a system of linear equations with decimal coefficients

A.8.C: interpret and determine the reasonableness of solutions to systems of linear equations.

- Identifying solutions to a system of linear equations
- Interpreting the graphs of two functions
- Solving a word problem involving a sum and another simple relationship using a system of linear equations
- Solving a word problem using a system of linear equations of the form  $Ax + By = C$
- Solving a word problem using a system of linear equations of the form  $y = mx + b$
- Solving a value mixture problem using a system of linear equations
- Solving a distance, rate, time problem using a system of linear equations

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## Quadratic and other nonlinear functions

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- = ALEKS course topic that addresses the standard

**A.9: The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions. The student is expected to:**

A.9.A: determine the domain and range for quadratic functions in given situations;

- Domain and range from the graph of a parabola
- Range of a quadratic function

A.9.B: investigate, describe, and predict the effects of changes in  $a$  on the graph of  $y = ax^2 + c$  ;

- Graphing a parabola of the form  $y = ax^2 + c$
- How the leading coefficient affects the shape of a parabola

A.9.C: investigate, describe, and predict the effects of changes in  $c$  on the graph of  $y = ax^2 + c$  ; and

- Graphing a parabola of the form  $y = ax^2 + c$
- Translating the graph of a parabola: One step
- Writing an equation for a function after a vertical translation

A.9.D: analyze graphs of quadratic functions and draw conclusions.



- Finding the vertex, x-intercepts, and axis of symmetry from the graph of a parabola
- Finding the x-intercept(s) and the vertex of a parabola
- Comparing properties of quadratic functions given in different forms

**A.10: The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods. The student is expected to:**

A.10.A: solve quadratic equations using concrete models, tables, graphs, and algebraic methods; and

- Solving equations written in factored form
- Finding the roots of a quadratic equation of the form  $ax^2 + bx = 0$
- Finding the roots of a quadratic equation with leading coefficient 1
- Finding the roots of a quadratic equation with leading coefficient greater than 1
- Solving a quadratic equation needing simplification
- Solving a quadratic equation by graphing
- Solving an equation of the form  $x^2 = a$  using the square root property
- Solving a quadratic equation using the square root property: Problem type 1
- Solving a quadratic equation using the square root property: Problem type 2
- Solving a quadratic equation by completing the square
- Applying the quadratic formula: Decimal answers
- Applying the quadratic formula: Exact answers

A.10.B: make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x -intercepts) of the graph of the function.

- Finding the x-intercept(s) and the vertex of a parabola
- Solving a quadratic equation by graphing

**A.11: The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations. The student is expected to:**

A.11.A: use patterns to generate the laws of exponents and apply them in problem-solving situations;

- Evaluating expressions with exponents of zero
- Writing a positive number without a negative exponent
- Writing a negative number without a negative exponent
- Writing a simple algebraic expression without negative exponents
- Understanding the product rule of exponents
- Introduction to the product rule of exponents
- Product rule with positive exponents
- Introduction to the product rule with negative exponents
- Product rule with negative exponents
- Introduction to the quotient rule of exponents
- Quotients of expressions involving exponents
- Quotient rule with negative exponents: Problem type 1
- Quotient rule with negative exponents: Problem type 2
- Understanding the power rule of exponents
- Introduction to the power rule of exponents
- Power rule with positive exponents
- Power rule with negative exponents: Problem type 1
- Power rule with negative exponents: Problem type 2
- Using the power and product rules to simplify expressions with positive exponents
- Using the power and quotient rules to simplify expressions with positive exponents
- Using the power and quotient rules to simplify expressions with negative exponents: Problem type 1
- Using the power and quotient rules to simplify expressions with negative exponents: Problem type 2
- Multiplying and dividing numbers written in scientific notation

A.11.B: analyze data and represent situations involving inverse variation using concrete models, tables, graphs, or algebraic methods; and

- Identifying direct and inverse variation from ordered pairs
- Identifying direct and inverse variation equations
- Writing an inverse variation equation
- Word problem on inverse variation

A.11.C: analyze data and represent situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods.

- Evaluating an exponential function that models a real-world situation
- Finding the initial amount and rate of change given an exponential function
- Writing an equation that models exponential growth or decay
- Writing an exponential function rule given a table of ordered pairs
- Solving a word problem using an exponential equation: Problem type 1
- Graphing an exponential function: Problem type 1
- Graphing an exponential function: Problem type 2