

2003/2010 ACOS MATHEMATICS CONTENT CORRELATION ALGEBRA I

2003 ACOS		2010 ACOS	
CURRENT ALABAMA CONTENT PLACEMENT		2010 ALGEBRA I CONTENT	
AI.1	Simplify numerical expressions using properties of real numbers and order of operations, including those involving square roots, radical form, or decimal approximations.	AI.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. [N-RN1] AI.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. [N-RN2]	
AI.1.B.1	Applying laws of exponents to simplify expressions, including those containing zero and negative integral exponents	AI.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. [N-RN1] AI.9d. Use the properties of exponents to transform expressions for exponential functions. [A-SSE3c] (Quadratic and Exponential Problems) AI.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. [N-RN2] AI.31b. Use the properties of exponents to interpret expressions for exponential functions. [F-IF8b]	
AI.2	Analyze linear functions from their equations, slopes, and intercepts.	AI.26. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. [F-IF3] AI.27. 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. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*</i> [F-IF4] (Linear, exponential and quadratic) AI.29. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.* [F-IF6] (Linear, exponential and quadratic) AI.37. Distinguish between situations that can be modeled with linear functions and with exponential functions. [F-LE1] AI.37a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. [F-LE1a] AI.37b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. [F-LE1b] AI.37c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. [F-LE1c] AI.46. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. [S-ID7]	
AI.2.B.1	Finding the slope of a line from its equation or by applying the slope formula	AI.29. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.* [F-IF6]	

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AI.2.B.2	Determining the equations of linear functions given two points, a point and the slope, tables of values, graphs, or ordered pairs	AI.33. Write a function that describes a relationship between two quantities.* [F-BF1] AI.38. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). [F-LE2]
AI.2.B.3	Graphing two-variable linear equations and inequalities on the Cartesian plane	AI.21. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [A-REI10] (Linear and exponential) AI.22. 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, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.* [A-REI11] AI.23. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. [A-REI12] (Linear and exponential)
AI.3	Determine characteristics of a relation, including its domain, range, and whether it is a function, when given graphs, tables of values, mappings, or sets of ordered pairs.	AI.24. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$. [F-IF1] (Focus on linear and exponential and on arithmetic and geometric sequences) AI.25. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. [F-IF2] (Focus on linear and exponential and on arithmetic and geometric sequences)
AI.3.B.1	Finding the range of a function when given its domain	AI.25. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. [F-IF2] (Focus on linear and exponential and on arithmetic and geometric sequences)
AI.4	Represent graphically common relations, including $x = \text{constant}$, $y = \text{constant}$, $y = x$, $y = \sqrt{x}$, $y = x^2$, and $y = x $.	AI.30. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*[F-IF7] (Linear, exponential, quadratic, absolute value, step, piece-wise defined) AI.30a. Graph linear and quadratic functions and show intercepts, maxima, and minima. [F-IF7a] (Linear, exponential, quadratic, absolute value, step, piece-wise defined) AI.30b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b] (Linear, exponential, quadratic, absolute value, step, piece-wise defined) AI.35. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, 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. [F-BF3] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)

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AI.4.B.1	Identifying situations that are modeled by common relations, including $x = \text{constant}$, $y = \text{constant}$, $y = x$, $y = \sqrt{x}$, $y = x^2$, and $y = x $	AI.30. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*[F-IF7]
AI.5	Perform operations of addition, subtraction, and multiplication on polynomial expressions.	AI.10. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. [A-APR1] (Linear and quadratic)
AI.5.B.1	Dividing by a monomial	CONTENT NO LONGER ADDRESSED IN ALGEBRA
AI.6	Factor binomials, trinomials, and other polynomials using GCF, difference of squares, perfect square trinomials, and grouping.	AI.8. Use the structure of an expression to identify ways to rewrite it. [A-SSE2] AI.9. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* [A-SSE3] (Quadratic and exponential)
AI.7	Solve multistep equations and inequalities including linear, radical, absolute value, and literal equations.	AI.14. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. [A-CED4] AI.15. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. [A-RE11] AI.16. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. [A-RE13] (Linear and quadratic)
AI.7.B.1	Writing the solution of an equation or inequality in set notation	AI.28. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5] (Linear, exponential, and quadratic)
AI.7.B.2	Graphing the solution of an equation or inequality	AI.21. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [A-RE10] (Linear and exponential) AI.22. 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, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational , absolute value, exponential, and logarithmic functions .* [A-RE11] AI.23. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. [A-RE12] (Linear and exponential)
AI.7.B.3	Modeling real-world problems by developing and solving equations and inequalities, including those involving direct and inverse variation	AI.5. Define appropriate quantities for the purpose of descriptive modeling. [N-Q2] AI.7. Interpret expressions that represent a quantity in terms of its context.* [A-SSE1] AI.11. Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i> [A-CED1] (Linear, quadratic, and exponential (integer inputs only)) AI.37. Distinguish between situations that can be modeled with linear functions and with exponential functions. [F-LE1] (Linear, quadratic, and exponential) AI.40. Interpret the parameters in a linear or exponential function in terms of a context. [F-LE5] <i>(Linear and exponential of form $f(x) = b^x + k$)</i>

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AI.8	Solve systems of linear equations and inequalities in two variables graphically or algebraically.	AI.12. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2] (Linear, quadratic, and exponential (integer inputs only)) AI.18. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. [A-REI5] (Linear-linear and linear-quadratic) AI.19. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. [A-REI6] (Linear, quadratic, and exponential (integer inputs only)) AI.20. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. [A-REI7] (Linear, quadratic, and exponential (integer inputs only))
AI.8.B.1	Modeling real-world problems by developing and solving systems of linear equations and inequalities	AI.13. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. [A-CED3]
AI.9	Solve quadratic equations using the zero product property.	AI.4. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. [N-Q1] AI.9a. Factor a quadratic expression to reveal the zeros of the function it defines. [A-SSE3a] AI.17. Solve quadratic equations in one variable. [A-REI4] (Limited to use of zero-product property)
AI.9.B.1	Approximating solutions graphically and numerically	AI.4. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. [N-Q1] AI.6. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities [N-Q3] AI.9a. Factor a quadratic expression to reveal the zeros of the function it defines. [A-SSE3a] AI.19. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. [A-REI6] (Linear-linear and linear-quadratic)
AI.10	Calculate length, midpoint, and slope of a line segment when given coordinates of its endpoints on the Cartesian plane.	CONTENT NOW ADDRESSED IN GRADE 8: 8.7. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. [8-EE5] 8.23. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. [8-G8]
AI.10.B.1	Deriving the distance, midpoint, and slope formulas	
AI.11	Solve problems algebraically that involve area and perimeter of a polygon, area and circumference of a circle, and volume and surface area of right circular cylinders or right rectangular prisms.	CONTENT NOW ADDRESSED IN GRADE 7: 7.14. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. [7-G4] 7.16. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. [7-G6] CONTENT NOW ADDRESSED IN GRADE 8: 8.24. Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. [8-G9]
AI.11.B.1	Applying formulas to solve word problems	

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AI.12	Compare various methods of data reporting, including scatterplots, stem-and-leaf plots, histograms, box-and-whisker plots, and line graphs, to make inferences or predictions.	AI.41. Represent data with plots on the real number line (dot plots, histograms, and box plots). [S-ID1] AI.42. 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. [S-ID2] AI.43. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). [S-ID3]
AI.12.B.1	Determining effects of linear transformations of data	CONTENT NO LONGER ADDRESSED IN ALGEBRA
AI.12.B.2	Determining effects of outliers	AI.43. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). [S-ID3]
AI.12.B.3	Evaluating the appropriateness of the design of a survey	CONTENT NO LONGER ADDRESSED IN ALGEBRA
AI.13	Identify characteristics of a data set, including measurement or categorical and univariate or bivariate.	AI.44. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. [S-ID5]
AI.14	Use a scatterplot and its line of best fit or a specific line graph to determine the relationship existing between two sets of data, including positive, negative, or no relationship.	AI.45. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. [S-ID6] a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. <i>Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.</i> [S-ID6a] b. Informally assess the fit of a function by plotting and analyzing residuals. [S-ID6b] c. Fit a linear function for a scatter plot that suggest a linear association. [S-ID6c] AI.47. Compute (using technology) and interpret the correlation coefficient of a linear fit. [S-ID8]
AI.15	Estimate probabilities given data in lists or graphs.	CONTENT NOW ADDRESSED IN GRADE 7: 7.22. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. [7-SP6] 7.23. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. [7-SP7]
AI.15.B.1	Comparing theoretical and experimental probabilities	
CONTENT MOVED TO ALGEBRA I IN 2010 ACOS		
	Foundational Knowledge - GLOSSARY	AI.7a. Interpret parts of an expression, such as terms, factors, and coefficients. [A-SSE1a]
7.3.B.2	Determining the reasonableness of results	AI.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. [N-RN3]
7.13.B.1	Representing outcomes as a list, chart, picture, or tree diagram	AI.49. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). [S-CP1]
8.1.B.4	Using vocabulary associated with sets, including <i>union</i> and <i>intersection</i>	AI.49. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). [S-CP1]
8.14.B.3	Computing the probability of two independent events and two dependent events.	AI.50. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. [S-CP2]

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A2T.3	<p>A2T.3 Analyze families of functions, including shifts, reflections, and dilations of</p> <p>$y = \frac{k}{x}$ (inverse variation), $y = kx$ (direct variation/linear), $y = [x]$ (greatest integer), $y = x^2$ (quadratic), $y = a^x$ (exponential), and $y = \log_a x$ (logarithmic).</p>	<p>Al.32. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [F-IF9] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)</p> <p>Al.35. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, 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. [F-BF3] (Linear, exponential, quadratic, and absolute value)</p>
A2T.3.B.1	<p>Identifying the domain and range of a relation given its graph, a table of values, or its equation, including those with restricted domains</p>	
A2T.4	<p>Determine approximate real zeros of functions graphically and numerically and exact real zeros of polynomial functions.</p>	<p>Al.17. Solve quadratic equations in one variable. [A-RE14]</p> <p>Al.17a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. [A-RE14a]</p> <p>Al.17b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic 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. [A-RE14b]</p>
A2T.4.B.1	<p>Using the zero product property, completing the square, and the quadratic formula</p>	<p>Al.9b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. [A-SSE3b] (Quadratic and exponential)</p> <p>Al.17. Solve quadratic equations in one variable. [A-RE14]</p> <p>Al.17a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. [A-RE14a]</p> <p>Al.17b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic 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. [A-RE14b]</p> <p>Al.31a. 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. [F-IF8a] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)</p>
A2T.5.B.1	<p>Generating an equation when given its roots or graph</p>	<p>Al.9c. Determine a quadratic equation when given its graph or roots. [AL]</p>
A2T.5.B.3	<p>Determining the maximum or minimum values of quadratic functions both graphically and algebraically</p>	<p>Al.9b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. [A-SSE3b] (Quadratic and exponential)</p> <p>Al.30. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. [F-IF7] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)</p> <p>Al.30a. Graph linear and quadratic functions and show intercepts, maxima, and minima. [F-IF7a] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)</p> <p>Al.31a. 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. [F-IF8a] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)</p>

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A2T.5.B.4	Applying functions to real-world problems	Al.33a. Determine an explicit expression, a recursive process, or steps for calculation from a context. [F-BF1a]
A2T.6	Perform operations on functions, including addition, subtraction, multiplication, division, and composition.	Al.31. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8] (Linear, exponential, quadratic, absolute value, step, piece-wise defined) Al.33b. Combine standard function types using arithmetic operations. [F-BF1b] (Linear, exponential, and quadratic)
A2T.6.B.1	Determining the inverse of a function or a relation	Al.36. Find inverse functions. [F-BF4] Al.36a. 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. [F-BF4a]
A2T.7	Solve equations, inequalities, and applied problems involving absolute values, radicals, and quadratics over the complex numbers, as well as simple trigonometric, exponential, and logarithmic functions.	Al.16. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. [A-REI3] (Linear and quadratic) Al.17. Solve quadratic equations in one variable. [A-REI4] Al.21. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [A-REI10] (Linear and exponential) Al.22. 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, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.* [A-REI11] (Linear and exponential) Al.23. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. [A-REI12] (Linear and exponential) Al.28. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5] (Linear, exponential, and quadratic) Al.30b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b] (Linear, exponential, quadratic, absolute value, step, piece-wise defined) Al.30c. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. [F-IF7e] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)
A2T.7.B.2	Expressing the solution of an equation, inequality, or applied problem as a graph on a number line or by using set or interval notation	
A2T.9.B.1	Determining period and amplitude of sine, cosine, and tangent functions from graphs or basic equations	Al.30c. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. [F-IF7e] (Linear, exponential, quadratic, absolute value, step, piece-wise defined)
NEW ALGEBRA CONTENT IN 2010 ACOS		
		Al.7b. Interpret complicated expressions by viewing one or more of their parts as a single entity. (Linear, exponential, quadratic)
		Al.34. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.* [F-BF2]
		Al.39. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. [F-LE3]
		Al.48. Distinguish between correlation and causation. [S-ID9]