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**Access**

**Algebra 1B**

**(#7912090)**

**Course Standards**

[MA.912.AR.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15555) Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.

**Clarifications:**
*Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables.

*Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.AR.1.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18279)  | Identify a part(s) of an equation or expression and explain the meaning within the context of a problem. |  |  |  |
| EssentialUnderstandings | * Understand the following concepts and vocabulary: equation, expression, add (+), subtract (-), multiply (x), divide ($÷$), equal (=), Greater than (>), Less than (<), unknown (x), variables, and real-world context
* Understand in a problem with real world context, the variables have meaning within the context of the problem

Ex. Distance Problem Distance Formula: d=rt (d = distance, r = rate, t = time)Ex. Interest ProblemInterest Formula: I = Prt (I = interest, P = principal, r = rate, t = time in years)Ex. Match items from a problem with variables (e.g., In the expression 6x + 7y, students explain that Bill had 6 times as many apples and 7 times as many oranges as Sam, with x representing the number of apples and y representing the number of oranges)  |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.1.1.docx) |  |  |  |

[MA.912.AR.1.2:](https://www.cpalms.org//PreviewStandard/Preview/15556) Rearrange equations or formulas to isolate a quantity of interest.

**Clarifications:**
*Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions.

*Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.1.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18280)  | Rearrange an equation or a formula for a specific variable. |  |  |  |
| EssentialUnderstandings | * Understand the following concepts and vocabulary: variable, symbol, equation, multivariate equation, add (+), subtract (-), multiply (x), divide (÷), equal (=), unknown, formulas
* Understand when rearranging an equation, isolate for variable of interest

Ex. d=rt (d = distance, r = rate, t = time)Solve for t* Understand algebraic rules (e.g., what you do to one side of the equation you must do to the other)

Ex. Distance Formula: d=rt (d = distance, r = rate, t = time)Solve for t$$d=rt$$Divide r on both sides$$\frac{d}{r}=\frac{rt}{r}$$$$\frac{d}{r}=t$$Ex. Interest Formula: I = Prt (I = interest, P = principal, r = rate, t = time in years) Solve for P$$I=Prt$$Divide rt on both sides$$\frac{I}{rt}=\frac{Prt}{rt}$$$$\frac{I}{rt}=P$$ |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.1.2.docx) |  |  |  |

[MA.912.AR.1.3:](https://www.cpalms.org//PreviewStandard/Preview/15557) Add, subtract and multiply polynomial expressions with rational number coefficients.

**Clarifications:**
*Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial.

*Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms. **Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.1.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18281) | Add, subtract and multiply polynomial expressions with integer coefficients |  |  |  |
| EssentialUnderstandings | * Understand the following vocabulary and symbols: polynomial, variable, exponent, constant, coefficient, and like terms
* Identify examples of polynomials (an expression consisting of variables and coefficients with non-negative exponents)
* Identify non-examples of polynomials
* Sort variables into like terms when adding and subtracting polynomials (e.g., sort all the x’s and y’s)

Ex. $$x^{2}+3y-2xy+4x-5x^{2}+10y-18xy+7x$$$$x^{2}-5x^{2}-2xy-18xy+7x+4x+3y+10y-4x^{2}-20xy+11x+13y$$* Understand that polynomials can be added, subtracted, and multiplied (multiplication should be limited to no more than two polynomials)
 |  |  |  |
| Resources:  | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.1.3.docx) |  |  |  |

[MA.912.AR.1.4:](https://www.cpalms.org//PreviewStandard/Preview/15558) Divide a polynomial expression by a monomial expression with rational number coefficients.

**Clarifications:**
*Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.1.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18282) | Divide a polynomial expression by a monomial expression with integer coefficients. |  |  |  |
| EssentialUnderstandings | * Understand the following vocabulary and symbols: polynomial expression, monomial expression, variable, exponent, constant, coefficient, numerator, denominator, simplify, and distributive property.
* Understand that the monomial in the numerator is divided by a monomial in the denominator

Ex. $\frac{4b}{2b}=2$* Understand that the denominator must be distributed to every term in the numerator.

Ex. $\frac{12x^{2}-10x+1}{2x}=\frac{12x^{2}}{2x}-\frac{10x}{2x}+\frac{1}{2x}$* Understand that the terms need to be simplified

Ex. $\frac{12x^{2}}{2x}-\frac{10x}{2x}+\frac{1}{2x}=6x-5+\frac{1}{2x}$ |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.1.4.docx) |  |  |  |

[MA.912.AR.1.7:](https://www.cpalms.org//PreviewStandard/Preview/15561) Rewrite a polynomial expression as a product of polynomials over the real number system.

**Clarifications:**
*Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 4 or fewer terms with integer coefficients.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.1.AP.7:](https://www.cpalms.org/PreviewAccessPoint/Preview/18285) | Factor a quadratic expression. |  |  |  |
| EssentialUnderstandings | * Understand the following concepts and vocabulary: factor, coefficient, integer, terms, exponent, base, constant, variable, binomial, monomial, polynomial, multiplication, division, quadratic
* Understand how to multiply integers (using tools)
* Understand how to divide integers (using tools)
* List the factors of integers. (using tools)

Ex.24Factors: (2)(12); (3)(8); (4)(6); (1)(24) * Understand that factoring a quadratic expression will result in the product of monomials and/or binomials

Ex. Monomial and binomial: $4x^{2}+2x=2x\left(2x+1\right)$Two binomials: $x^{2}+5x+6=\left(x+2\right)\left(x+3\right)$* Use factoring tools/methods to factor quadratic equations (e.g., Algebra tiles, guess and check, quadratic formula, order the steps, etc.)
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.1.7.docx) |  |  |  |

[MA.912.AR.3.1:](https://www.cpalms.org//PreviewStandard/Preview/15573) Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system.

**Clarifications:**
*Clarification 1:* Within the Algebra 1 course, instruction includes the concept of non-real answers, without determining non-real solutions.

*Clarification 2:* Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.3.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18296)  | Given a one-variable quadratic equation from a mathematical or real-world context, select the solution to the equation over the real number system. |  |  |  |
| EssentialUnderstandings | * Understand the following related vocabulary: add (+), subtract (-), multiply (x), divide ($÷$), equal (=), one-variable, quadratic expression, quadratic equation, quadratic formula, real number system, factors, factored form, coefficient, exponent
* Understand the factors of real numbers
* Understand to determine the solutions to quadratic equations use factoring tools/methods (E.g., Algebra tiles, guess and check, quadratic formula, online tools, etc.)
* Understand the solution to a quadratic equation is what numerical value is substituted for the variable to make the equation equal to zero
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.3.1.docx) |  |  |  |

[MA.912.AR.3.4:](https://www.cpalms.org//PreviewStandard/Preview/15871) Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.

**Clarifications:**
*Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex.

*Clarification 2*: Instruction includes the use of standard form, factored form and vertex form.

*Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept. **Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.3.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18299) | Select a quadratic function to represent the relationship between two quantities from a graph. |  |  |  |
| EssentialUnderstandings | * Understand the following related vocabulary: two-variable, vertex, vertex form, quadratic function, graph, point on the graph, opens upward, opens downward, parabola, leading coefficient, positive, negative
* Understand that the graph of a quadratic function is a parabola.
* Understand where the vertex is located on the graph.

Ex: The highest point if the graph is open downward and the lowest point if the graph is open upward* Understand what the variables in the vertex form represent

Ex: $y=a(x-h)^{2}+k$Vertex = (*h*, *k*) (*h* is the *x*-value, *k* is the *y-*value)Leading coefficient = *a*Point on a graph = (*x, y*)* Understand when *a* is positive, the graph of the parabola opens upward
* Understand when *a* is negative, the graph of the parabola opens downward
* Understand that in the vertex form, *h* is replaced with the *x-*value of the vertex

Ex. Vertex = (3, -1)$y=a(x-3)^{2}+k$ * Understand that in the vertex form, *k* is replaced with the *y*-value of the vertex

Ex. Vertex = (3, -1) $y=a(x-3)^{2}-1$ * Understand that in the vertex form, we will replace *x* and *y* with a point on the graph to find the variable *a*

Ex. Point on a graph (1, 7) $$7=a(1-3)^{2}-1$$$$7=a(-2)^{2}-1$$$7=4a-1$ $8=4a$ $2=a$ $y=2(x-3)^{2}-1$ (quadratic in vertex form) |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.3.4.docx) |  |  |  |

[MA.912.AR.3.5:](https://www.cpalms.org//PreviewStandard/Preview/15576) Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.3.AP.5:](https://www.cpalms.org/PreviewAccessPoint/Preview/18300) | Given the 𝑥-intercepts and another point on the graph of a quadratic function, select the equation for the function. |  |  |  |
| EssentialUnderstandings | * Understand the following related vocabulary: quadratic function, graph, point on the graph, parabola, leading coefficient, x-intercepts, factored form, zeros, *x*-axis, *y*-axis
* Understand the factors of real numbers
* Understand that the *x*-intercepts are factors of the quadratic
* Understand that a quadratic in factored form is modeled by: $y=a(x-r\_{1})(x-r\_{2})$ (with zeros at $r\_{1}$ and $r\_{2}$)
* Understand that a point on the graph must be plugged in to solve for the leading coefficient which is *a*
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.3.5.docx) |  |  |  |

[MA.912.AR.3.6:](https://www.cpalms.org//PreviewStandard/Preview/15577) Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.3.AP.6:](https://www.cpalms.org/PreviewAccessPoint/Preview/18301) | Given an expression or equation representing a quadratic function in vertex form, determine the vertex and zeros. |  |  |  |
| EssentialUnderstandings | * Understand the following related vocabulary: vertex, vertex form, quadratic function, zeros, quadratic expression, quadratic equation
* Understand that the vertex form is $y=a(x-h)^{2}+k$
* Understand that the vertex is $(h,k)$
* Understand when the equation is in vertex form, set the equation equal to zero and solve for x to find the zeros
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.3.6.docx) |  |  |  |

[MA.912.AR.3.7:](https://www.cpalms.org//PreviewStandard/Preview/15578) Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.

**Clarifications:**
*Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry.

*Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex.

*Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.

*Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.3.AP.7:](https://www.cpalms.org/PreviewAccessPoint/Preview/18302)  | Given a table, equation or written description of a quadratic function, select the graph that represents the function. |  |  |  |
| EssentialUnderstandings | * Understand the following related vocabulary: vertex, vertex form, quadratic function, graph, point on the graph, opens upward, opens downward, parabola, table, positive number, negative number, maximum point, minimum point, *x*-axis, *y*-axis
* Understand that the graph of a quadratic function is a parabola
* Understand that the vertex form of a quadratic is $y=a(x-h)^{2}+k$
* Understand what makes the graph open upward or downward (parabola opens upward when a is positive and parabola opens downward when a is negative)
* Understand that the vertex is the minimum or maximum point on the graph of the parabola
* Understand when given an equation in vertex form, the vertex is $(h,k)$
* Understand that an additional point (*s*) will need to be found on the parabola to identify which graph represents the equation
* Understand when given a table of *x* and *y-*values, place the points on a coordinate graph and connect the points to create a parabola
* Understand that a written description can be given to describe the graph of a parabola
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.3.7.docx) |  |  |  |

[MA.912.AR.3.8:](https://www.cpalms.org//PreviewStandard/Preview/15579) Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.

**Clarifications:**
*Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry.

*Clarification 2*: Instruction includes the use of standard form, factored form and vertex form.

*Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.

*Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.3.AP.8:](https://www.cpalms.org/PreviewAccessPoint/Preview/18303)  | Given a mathematical and/or real-world problem that is modeled with quadratic functions, solve the mathematical problem, or select the graph using key features (in terms of context) that represents this model. |  |  |  |
| EssentialUnderstandings | * Understand the following related vocabulary: vertex, vertex form, standard form, quadratic function, graph, opens upward, opens downward, parabola, positive number, negative number, maximum point, minimum point, *x*-axis, *y*-axis, *x*-intercept, *y*-intercept, axis of symmetry
* Understand that the graph of a quadratic function is a parabola
* Understand that the vertex form of a quadratic is $y=a(x-h)^{2}+k$
* Understand that the standard form of a quadratic is $y=ax^{2}+bx+c$
* Understand what makes the graph open upward or downward. (parabola opens upward when a is positive and parabola opens downward when a is negative)
* Understand that the vertex is the minimum or maximum point on the graph of the parabola
* Understand in a real-world problem, the vertex represents maximum profit, maximum height, minimum cost for production, etc.
* Understand when given an equation in vertex form, the vertex is $(h,k)$
* Understand when given an equation in standard form, the vertex is found by $(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right))$
* Understand that key features may include vertex, axis of symmetry, *x*-intercept(s), and *y*-intercept(s)
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.3.8.docx) |  |  |  |

[MA.912.AR.5.3:](https://www.cpalms.org//PreviewStandard/Preview/15588) Given a mathematical or real-world context, classify an exponential function as representing growth or decay.

**Clarifications:**
*Clarification 1:*Within the Algebra 1 course, exponential functions are limited to the forms , where *b* is a whole number greater than 1 or a unit fraction, or , where .

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.5.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18311)  | Given a real-world context, identify an exponential function as representing growth or decay. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: *x*-axis, *y*-axis, increase, decrease, left, right, growth, decay, exponential function, exponential
* Understand that an exponential function that represents growth will quickly increase from left to right
* Understand that an exponential function that represents decay will quickly decrease from left to right
* Understand that growth can be represented by a pandemic, rabbits, mice, fleas, population, etc.
* Understand that decay can be represented by radioactive materials, population, something that cools (coffee, soup), etc.
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.5.3.docx) |  |  |  |

[MA.912.AR.5.4:](https://www.cpalms.org//PreviewStandard/Preview/15589) Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.

**Clarifications:**
*Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms , where *b* is a whole number greater than 1 or a unit fraction, or , where .

*Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.5.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18312) | Select an exponential function to represent two quantities from a graph or a table of values. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: *x*-axis, *y*-axis, *x*-value, *y*-value, left, right, increase, exponential function, exponential, table, graph, constant, common ratio, initial value, definable point, consecutive
* Understand when given a table of an exponential function the *x*-values will increase by a constant value and the *y*-values will increase by a common ratio
* Understand when given the exponential equation $y=ab^{x}$ the variable *a* represents the initial value and the variable *b* represents the ratio between the *y*-values ($a\ne 0,b\ne 1,and b>0)$
* Understand when a graph of the exponential function crosses the *y*-axis at a definable point the *y*-intercept is the initial value
* Understand when given a graph, to calculate the value for the variable b select two consecutive definable points and calculate the ratio between the *y*-values
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.5.4.docx) |  |  |  |

[MA.912.AR.5.6:](https://www.cpalms.org//PreviewStandard/Preview/15591) Given a table, equation or written description of an exponential function, graph that function and determine its key features.

**Clarifications:**
*Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes.

*Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.

*Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.

*Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms , where *b* is a whole number greater than 1 or a unit fraction or , where .

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.5.AP.6:](https://www.cpalms.org/PreviewAccessPoint/Preview/18314) | Given a table, equation or written description of an exponential function, select the graph that represents the function. |  |  |  |
| EssentialUnderstandings | * Understand when given a table of an exponential function the *x*-values will increase by a constant value and the *y*-values will increase by a common ratio
* Understand when given the exponential equation $y=ab^{x}$ the variable *a* represents the initial value and the variable *b* represents the ratio between the *y*-values ($a\ne 0,b\ne 1,and b>0)$
* Understand when a graph of the exponential function crosses the *y*-axis at a definable point the *y*-intercept is the initial value variable *a*
* Understand when given a graph, to calculate the value for the variable b select two consecutive definable points and calculate the ratio between the *y*-values
* Understand that the standard form of an exponential function that represents growth is $y=a(1+r)^{x}$ where a is the initial value (a > 0), r is the rate of growth (r > 0), x is time
* Understand for exponential growth, as x increases, y grows exponentially
* Understand that the standard form of an exponential function that represents decay is $y=a(1-r)^{x}$ where a is the initial value (a > 0), r is the rate of decay (0 < r < 1), x is time
* Understand for exponential decay, as x increases, y decreases exponentially
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.5.6.docx) |  |  |  |

[MA.912.AR.9.6:](https://www.cpalms.org//PreviewStandard/Preview/15610) Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options.

**Clarifications:**
*Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
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| [MA.912.AR.9.AP.6:](https://www.cpalms.org/PreviewAccessPoint/Preview/18331) | Given a real-world context, as systems of linear equations or inequalities with identified constraints, select a solution as a viable or non-viable option. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: viable, non-viable, system, solution to the system, linear equation, inequality, inside shaded region, outside shaded region, Greater than (>), Less than (<), greater than or equal to (≥), less than or equal to (≤), variables
* Understand what makes a solution viable

Ex. If you are selling sodas and popcorn, the solution to the system cannot be a negative value nor can it be larger than the number of sodas and popcorn available to be viable. Understand what makes a solution non-viableEx. If you are selling sodas and popcorn, if the solution to the system is less than zero or greater than the number of sodas and popcorn available, then the solution is non-viable* Understand that for a system of inequalities the solution must fall in the shaded region to be viable and outside the shaded region to be non-viable
 |  |  |  |
| Resources: | [Element Card](https://www.accesstofls.org/core_curriculum_resources/Math/BEST/Element_Cards/HS/Algebra_1/MA.912.AR.9.6.docx) |  |  |  |

[MA.912.DP.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15744) Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate.

**Clarifications:**
*Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display.

*Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables.
*Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.DP.1.AP.1a:](https://www.cpalms.org/PreviewAccessPoint/Preview/18385)  | Given a set of data, select an appropriate table or graph to represent categorical data and whether it is univariate or bivariate. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: univariate data, bivariate data, categorical data, attribute, characteristics, bar graph, circle graph, frequency table, two-way table
* Understand that categorical data is data that is classified by attributes or characteristics (Ex. Favorite color, type of car, number on a sports jersey)
* Understand that univariate data has a single characteristic or attribute (Ex. Favorite color is a single attribute)
* Understand that bivariate data has two characteristics or attributes (Ex. Height and weight)
* Understand that categorical data can be represented by the following graphs: circle graph, bar graph (single bar graph, double bar graph, stacked bar graph)
* Understand that categorical data can be represented by the following tables: frequency table (univariate data), or two-way table (bivariate data)
 |  |  |  |
| Resources: |  |  |  |  |
| [MA.912.DP.1.AP.1b](file:///C%3A%5CPreviewAccessPoint%5CPreview%5C18386) | Given a set of data, select an appropriate table or graph to represent numerical data and whether it is univariate or bivariate. |  |  |  |
| EssentialUnderstandings | * Understand the following term and vocabulary: numerical data, univariate data, bivariate data, variable, dot plots, scatter plots, stem plots, frequency table, two-way table, value, measure
* Understand that numerical data is data that can be measured (Ex. The number of people who like the color green.)
* Understand that univariate data has a single variable (Ex. Variable is type of car and the data is how many people own each type of car)
* Understand that bivariate data is two numerical values paired with each other (Ex. Ordered pair (-2,3))
* Understand that numerical data can be represented by the following graphs: dot plots, scatter plots, or stem plots
* Understand that numerical data can be represented by the following tables: frequency table (univariate data), or two-way table (bivariate data)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.DP.1.2:](https://www.cpalms.org//PreviewStandard/Preview/15745) Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display.

**Clarifications:**
*Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.DP.1.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18387) | Given a univariate or bivariate data distribution (numerical or categorical), identify the different components and quantities in the display. |  |  |  |
| EssentialUnderstandings | * Understand the following term and vocabulary: univariate distribution, bivariate distribution, attributes, numerical data, categorical data, characteristics, frequency table, two-way table joint frequency, marginal frequency, margins, measure
* Understand that categorical data is data that is classified by attributes or characteristics (Ex. Favorite color, type of car, number on a sports jersey)
* Understand that numerical data is data that can be measured (Ex. The number of people who like the color green.)
* Understand that a bivariate distribution can be represented by a two-way table
* Understand that a univariate distribution can be represented by a frequency table
* Understand that a two-way table has two types of frequencies: joint frequencies (numbers inside the two-way table) and marginal frequencies (totals in the margins or edge of table)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.DP.1.4:](https://www.cpalms.org//PreviewStandard/Preview/15747) Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation.

**Clarifications:**
*Clarification 1:* Within the Algebra 1 course, the margin of error will be given.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.DP.1.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18389)  | Given the mean or percentage and the margin of error from a sample survey, identify a population total. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: margin of error, level accuracy, experiment, range, trustworthiness, results, mean, percentage, interval, accuracy, population
* Understand that the margin of error describes the level of accuracy of an experiment. The margin of error describes a range that helps determine the trustworthiness of results (Ex: An election results poll has a +/– 3% margin of error.)
* Understand that a combination of a mean or percentage with the margin of error gives us an interval that the population mean, or percentage may fall. (Ex. Mean = 10; margin of error = +/- 2; Interval = (8, 12) so the population mean may fall between 8 and 12)
* Understand that a smaller margin of error indicates trustworthy results, and a larger margin of error means the results are not considered as accurate
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.DP.3.1:](https://www.cpalms.org//PreviewStandard/Preview/15757) Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.DP.3.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18394) | When given a two-way frequency table summarizing bivariate categorical data, identify joint and marginal frequencies. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: two-way frequency table, bivariate categorical data, marginal frequencies, joint frequencies, attributes, characteristics, classify
* Understand that a two-way table has two types of frequencies: joint frequencies (numbers inside the two-way table) and marginal frequencies (totals in the margins or edge of table)
* Understand that categorical data is data that is classified by attributes or characteristics (Ex. Favorite color, type of car, number on a sports jersey)
* Understand that bivariate data has two characteristics or attributes. (Ex. Height and weight)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.F.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15621) Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.

**Clarifications:**
*Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential.

*Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions:  and .

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.F.1.AP.1a:](https://www.cpalms.org/PreviewAccessPoint/Preview/18333) | Given an equation or graph that defines a function, identify the function type as either linear, quadratic, or exponential. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: linear function, quadratic function, exponential function, graph, x-axis, y-axis, rapidly increase, rapidly decrease, y-intercept, variable, slope, ratio, constant, parabola, line, curve
* Understand that a linear function is in the form of $y=mx+b$ where m is the slope and b is the y-intercept
* Understand that a quadratic function is in the form of $y=ax^{2}+bx+c$ where the variable $a\ne 0, $ and the variable *c* is the constant
* Understand that an exponential function in is the form $y=ab^{x}$ where the variable *a* represents the initial value and the variable *b* represents the ratio between the *y*-values ($a\ne 0,b\ne 1,and b>0)$
* Understand that the graph of a quadratic function is a parabola
* Understand that the graph of a linear function is a line
* Understand that the graph of an exponential function is a curve that increases rapidly from left to right or decreases rapidly from left to right
 |  |  |  |
| Resources: |  |  |  |  |
| [MA.912.F.1.AP.1b:](https://www.cpalms.org/PreviewAccessPoint/Preview/18334) | Given an input-output table with an accompanying graph, determine a function type, either linear, quadratic, or exponential that could represent it. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: graph, input-output table, linear function, x-values, y-values, common ratio, constant value, table, quadratic function, exponential function, 1st difference, 2nd difference, parabola, rapidly increase, rapidly decrease, line, curve
* Understand to determine that a given table is an exponential function, the *x*-values will increase by a constant value and the *y*-values will increase by a common ratio
* Understand to determine that a given table is a linear function, the x-values will increase by a constant value and the y-values will increase by a constant value
* Understand to determine that a given table is a quadratic function, the 1st difference when subtracting the y-values will be different numbers, then when subtracting the new differences, the 2nd difference will be the same number

Diagram showing quadratic function the 1st difference when subtracting the y-values and 2nd difference will be the same* Understand that the graph of a quadratic function is a parabola
* Understand that the graph of a linear function is a line
* Understand that the graph of an exponential function is a curve that increases rapidly from left to right or decreases rapidly from left to right
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.F.1.2:](https://www.cpalms.org//PreviewStandard/Preview/15622) Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output.

**Clarifications:**
*Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y.

*Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.F.1.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18335)  | Given a function represented in function notation, evaluate the function for an input in its domain. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: function, function notation, input, domain, x-values, evaluate
* Understand that in function notation the $f\left(x\right)=y$
* Understand that the inputs are the set of *x-*values
* Understand that the domain is the set of *x*-values
* Understand that evaluating a function means to plug the x-values into the function
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.F.1.3:](https://www.cpalms.org//PreviewStandard/Preview/15623) Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval.

**Clarifications:**
*Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.F.1.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18336)  | Given a real-world situation represented graphically or algebraically, identify the rate of change as positive, negative, zero or undefined. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: rate of change, y-intercept (b), slope (m), slope intercept form, linear, negative slope, positive slope, coefficient, vertical, horizontal, *x*-axis, *y*-axis, variable, zero slope, undefined slope, increasing, decreasing
* Understand that slope is rise over the run
* Understand that slope is the rate of change
* Understand when identifying a rate of change, the rate of change is positive when the *y*-values increase as the *x*-values increase (the line is sloping upward from left to right)
* Understand when identifying a rate of change, the rate of change is negative when the *y*-values decrease as the *x*-values increase (the line is sloping downward from left to right)
* Understand when identifying a rate of change, the rate of change is zero when the *y*-values remain the same as the *x*-values increase (the line is horizontal)
* Understand the rate of change is undefined when the *y*-values are different values, but the *x*-value remains the same (the line is vertical)
* Understand that the slope intercept form is $y=mx+b$

Understand the y-intercept is where the line crosses the y-axis (variable b)* Understand that in a linear equation the coefficient of the *x*-value is the slope (variable m)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.F.1.6:](https://www.cpalms.org//PreviewStandard/Preview/15885) Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions.

**Clarifications:**
*Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes.

*Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically.

*Clarification 3*: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.F.1.AP.6:](https://www.cpalms.org/PreviewAccessPoint/Preview/18338) | Identify key features of linear, quadratic or exponential functions each represented in a different way algebraically or graphically (key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior). |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: linear function, quadratic function, exponential function, graph, x-axis, y-axis, x-intercept, y-intercept, interval, increasing, decreasing, positive, negative, domain, range, positive infinity, negative infinity, upward, downward, slope, set, growth, decay, exponentially
* Understand a graph is read from left to right
* Understand the *y*-intercept is where the function crosses the *y*-axis
* Understand the *x*-intercept is where the function crosses the *x*-axis
* Understand that an interval always refers to the x-values
* Understand the function is increasing in the interval when the *x*-values increase, and the *y*-values increase
* Understand the function is decreasing in the interval when the *x*-values increase, and the *y*-values decrease
* Understand that the domain is the set of all the *x*-values
* Understand that the range is the set of all the *y*-values
* Understand in a quadratic function that is opening upward, as the *x*-values decrease the *y*-values increase to positive infinity
* Understand in a quadratic function that is opening upward, as the *x*-values increase, the *y*-values increase to positive infinity

Understand in a quadratic function that is opening downward, as the *x*-values decrease, the *y*-values decrease to negative infinityUnderstand in a quadratic function that is opening downward, as the *x*-values increase the *y*-values decrease to negative infinityUnderstand in a linear function, if the slope is positive the function will go upward from left to rightUnderstand in a linear function, if the slope is negative the function will go downward from left to rightUnderstand for exponential growth, as x increases, y grows exponentially (to positive infinity)* Understand for exponential decay, as x increases, y decreases exponentially (to negative infinity)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.F.1.8:](https://www.cpalms.org//PreviewStandard/Preview/15626) Determine whether a linear, quadratic or exponential function best models a given real-world situation.

**Clarifications:**
*Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval.

*Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.F.1.AP.8:](https://www.cpalms.org/PreviewAccessPoint/Preview/18340) | Select whether a linear or quadratic function best models a given real-world situation. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: linear function, quadratic function, rate of change, parabola, line
* Understand that a linear function models behavior that forms a line (ex. any problem that involves a rate of change)
* Understand that a quadratic function models behavior that forms a parabola (ex: throwing a ball upward, water coming out of a fountain, etc.)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.F.2.1:](https://www.cpalms.org//PreviewStandard/Preview/15629) Identify the effect on the graph or table of a given function after replacing *f(x)* by *f(x)*+*k*,*kf(x)*, *f(kx)* and *f(x+k)* for specific values of *k*.

**Clarifications:**
*Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value.

*Clarification 2*: Instruction focuses on including positive and negative values for *k*.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.F.2.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18342) | Select the effect (up, down, left, or right) on the graph of a given function after replacing 𝑓(𝑥) by 𝑓(𝑥) + 𝑘 and 𝑓(𝑥 + 𝑘) for specific values of 𝑘. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: transforming, shifting, graph, x-axis, y-axis, left, right, upward, downward, positive, negative, function, addition (+), subtraction (-), integer
* Understand how to add and subtract integers
* Understand when transforming $f\left(x\right)+k$, adding a positive value for *k*, shifts the entire graph upward (ex. $x^{2}+3$, the function $x^{2}$ is shifted up 3 places)
* Understand when transforming $f\left(x\right)+k$, adding a negative value (or subtracting a value) for k*,* shifts the entire graph downward (ex. $x^{2}-3$, the function $x^{2}$ is shifted down 3 places)
* Understand when transforming $f\left(x+k\right)$, adding a positive value for *k*, shifts the entire graph to the left (ex. $(x+3)^{2}$, the function $x^{2}$ is shifted over 3 places to the left)
* Understand when transforming $f\left(x+k\right)$, adding a negative value (or subtracting a value) for *k*, shifts the entire graph to the right (ex. $(x-3)^{2}$, the function $x^{2}$ is shifted over 3 places to the right)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.FL.3.2:](https://www.cpalms.org//PreviewStandard/Preview/15651) Solve real-world problems involving simple, compound and continuously compounded interest.

**Clarifications:**
*Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.FL.3.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18351)  | Solve real-world problems involving simple and compound interest. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: rate, interest, principal, time, number of times compounded, percentages, decimals, real numbers, multiplication (x), compound interest, simple interest, variables, formulas, final amount
* Understand how to convert percentages to decimals
* Understand how to multiply real numbers with a calculator
* Understand in equations when variables are side by side with no sign between them it is implied that the values are multiplied (ex. $Prt$ means $(P)(r)(t)$ or P times r times t)
* Understand that rate $(r)$ is always in decimal form (ex. 6% will be expressed in the formula as 0.06.)
* Understand that simple interest is interest paid on the principal only over a period of time (ex. Car loans, most bank loans)
* Understand to calculate simple interest use the formula $I=Prt$ (where I = interest, P = principal, r = rate, t = time)
* Understand that in a simple or a compound interest problem, time(t) is in terms of years (ex. 3 months: $\frac{3}{12}=t$)
* Understand that compound interest is interest paid on the initial principal plus interest on the interest charged previously (ex. Credit cards, savings account)
* Understand to calculate compound interest use the formula $A=P(1+\frac{r}{n})^{nt}$ (where A = final amount, P = principal, r = rate, t = time, n = number of times compounded)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.FL.3.4:](https://www.cpalms.org//PreviewStandard/Preview/15653) Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth.

**Clarifications:**
*Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.FL.3.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18352) | Identify the relationship between simple interest and linear growth. Identify the relationship between compound interest and exponential growth. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: linear growth, exponential growth, simple interest, compound interest, percentage, constant proportion, value
* Understand that linear growth is a slow and steady growth and exponential growth is a rapid and steep growth
* Understand that simple interest problems show linear growth
* Understand that linear growth is growing by the same amount over a period of time
* Understand that simple interest problems grow by the same percentage each year (linear growth)
* Understand that exponential growth is growth that increases quickly over time
* Understand that compound interest problems show exponential growth
* Understand that exponential growth is growing in increasing value (constant proportion) over time
* Understand that compound interest problems grow by a constant proportion over time (exponential growth)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.NSO.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15529) Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents.

**Clarifications:**
*Clarification 1:* Instruction includes the use of technology when appropriate.

*Clarification 2:* Refer to the [K-12 Formulas (Appendix E)](https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/best/ma/appendixe.pdf) for the Laws of Exponents.

*Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals.

*Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.NSO.1.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18270) | Evaluate numerical expressions involving rational exponents. |  |  |  |
| EssentialUnderstandings | * Understand the following concepts, symbols, and/or vocabulary for: numerator, denominator, expression, exponent, negative exponent, radical expression, raising to a power
* Understand the parts of a fractions.
* Understand that a rational number can be represented by a fraction
* Identify expressions with exponents
* Create a model with objects to show that the exponent of a number says how many times to multiply the number by itself

e.g., substitute two chips for each “2”Exp. 23 = 2 × 2 × 2 = 8* Understand that a negative exponent will result in a fraction with a numerator of 1 (e.g., 5-2 = $\frac{1}{5^{2}}=\frac{1}{25}$)
* Understand that a fractional exponent is another way to write a radical expression (e.g., $16^{\frac{1}{2}}=\sqrt{16}=4$; $27^{\frac{1}{3}}=\sqrt[3]{27}=3$)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.NSO.1.2:](https://www.cpalms.org//PreviewStandard/Preview/15530) Generate equivalent algebraic expressions using the properties of exponents.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.NSO.1.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18271) | Identify equivalent algebraic expressions using properties of exponents. |  |  |  |
| EssentialUnderstandings | * Understand the following vocabulary: algebraic expression, exponents, simplest form, variable, base number, integers
* Understand addition, subtraction, multiplication, and division of integers
* Identify the parts of an algebraic expression

e.g., x7 where x is the base number and 7 is the exponentCreate a model with objects to represent an algebraic expressione.g., substitute manipulatives or algebra tiles for each “a” e.g., a7 = a × a × a × a × a × a × a = aaaaaaa* Identify expressions with exponents

e.g., (x⁴)(x³)* Understand the properties of exponents
* Use the properties of exponents to simplify algebraic expressions
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.NSO.1.4:](https://www.cpalms.org//PreviewStandard/Preview/15532) Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals.

**Clarifications:**
*Clarification 1:* Within the Algebra 1 course, expressions are limited to a single arithmetic operation involving two square roots or two cube roots.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.NSO.1.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18273) | Apply previous understanding of operations with rational numbers to add and subtract numerical radicals that are in radical form. |  |  |  |
| EssentialUnderstandings | * Understand vocabulary: addition, subtraction, expression, rational numbers, irrational numbers, radical numbers
* Add and subtract integers (e.g., use manipulatives, a number line or calculator to add 2 + -5)
* Add and Subtract fractions
* Recognize the difference between rational numbers and irrational numbers
* Recognize the difference between a rational number in radical form and a rational number not in radical form
* Understand adding and subtracting rational numbers in radical form follows the same rules as adding and subtracting variables
 |  |  |  |
| Resources: |  |  |  |  |

[MA.K12.MTR.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15875) Actively participate in effortful learning both individually and collectively. Mathematicians who participate in effortful learning both individually and with others:

* Analyze the problem in a way that makes sense given the task.
* Ask questions that will help with solving the task.
* Build perseverance by modifying methods as needed while solving a challenging task.
* Stay engaged and maintain a positive mindset when working to solve tasks.
* Help and support each other when attempting a new method or approach.

**Clarifications:**
Teachers who encourage students to participate actively in effortful learning both individually and with others:

* Cultivate a community of growth mindset learners.
* Foster perseverance in students by choosing tasks that are challenging.
* Develop students’ ability to analyze and problem solve.
* Recognize students’ effort when solving challenging problems.

[MA.K12.MTR.2.1:](https://www.cpalms.org//PreviewStandard/Preview/15876)Demonstrate understanding by representing problems in multiple ways.

Mathematicians who demonstrate understanding by representing problems in multiple ways:

* Build understanding through modeling and using manipulatives.
* Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
* Progress from modeling problems with objects and drawings to using algorithms and equations.
* Express connections between concepts and representations.
* Choose a representation based on the given context or purpose.

**Clarifications:**
Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:

* Help students make connections between concepts and representations.
* Provide opportunities for students to use manipulatives when investigating concepts.
* Guide students from concrete to pictorial to abstract representations as understanding progresses.
* Show students that various representations can have different purposes and can be useful in different situations.

[MA.K12.MTR.3.1:](https://www.cpalms.org//PreviewStandard/Preview/15877) Complete tasks with mathematical fluency.

Mathematicians who complete tasks with mathematical fluency:

* Select efficient and appropriate methods for solving problems within the given context.
* Maintain flexibility and accuracy while performing procedures and mental calculations.
* Complete tasks accurately and with confidence.
* Adapt procedures to apply them to a new context.
* Use feedback to improve efficiency when performing calculations.

**Clarifications:**
Teachers who encourage students to complete tasks with mathematical fluency:

* Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
* Offer multiple opportunities for students to practice efficient and generalizable methods.
* Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

[MA.K12.MTR.4.1:](https://www.cpalms.org//PreviewStandard/Preview/15878) Engage in discussions that reflect on the mathematical thinking of self and others.

Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

* Communicate mathematical ideas, vocabulary and methods effectively.
* Analyze the mathematical thinking of others.
* Compare the efficiency of a method to those expressed by others.
* Recognize errors and suggest how to correctly solve the task.
* Justify results by explaining methods and processes.
* Construct possible arguments based on evidence.

**Clarifications:**
Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:

* Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
* Create opportunities for students to discuss their thinking with peers.
* Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
* Develop students’ ability to justify methods and compare their responses to the responses of their peers.

[MA.K12.MTR.5.1:](https://www.cpalms.org//PreviewStandard/Preview/15879) Use patterns and structure to help understand and connect mathematical concepts.

Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

* Focus on relevant details within a problem.
* Create plans and procedures to logically order events, steps or ideas to solve problems.
* Decompose a complex problem into manageable parts.
* Relate previously learned concepts to new concepts.
* Look for similarities among problems.
* Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**
Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

* Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
* Support students to develop generalizations based on the similarities found among problems.
* Provide opportunities for students to create plans and procedures to solve problems.
* Develop students’ ability to construct relationships between their current understanding and more sophisticated ways of thinking.

[MA.K12.MTR.6.1:](https://www.cpalms.org//PreviewStandard/Preview/15880) Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:

* Estimate to discover possible solutions.
* Use benchmark quantities to determine if a solution makes sense.
* Check calculations when solving problems.
* Verify possible solutions by explaining the methods used.
* Evaluate results based on the given context.

**Clarifications:**
Teachers who encourage students to assess the reasonableness of solutions:

* Have students estimate or predict solutions prior to solving.
* Prompt students to continually ask, “Does this solution make sense? How do you know?”
* Reinforce that students check their work as they progress within and after a task.
* Strengthen students’ ability to verify solutions through justifications.

[MA.K12.MTR.7.1:](https://www.cpalms.org//PreviewStandard/Preview/15881) Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:

* Connect mathematical concepts to everyday experiences.
* Use models and methods to understand, represent and solve problems.
* Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

**Clarifications:**
Teachers who encourage students to apply mathematics to real-world contexts:

* Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
* Challenge students to question the accuracy of their models and methods.
* Support students as they validate conclusions by comparing them to the given situation.
* Indicate how various concepts can be applied to other disciplines.

[ELA.K12.EE.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15201) Cite evidence to explain and justify reasoning.

**Clarifications:**
K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they’ve directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

[ELA.K12.EE.2.1:](https://www.cpalms.org//PreviewStandard/Preview/15202) Read and comprehend grade-level complex texts proficiently.

**Clarifications:**
See [Text Complexity](https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/best/la/appendixb.pdf) for grade-level complexity bands and a text complexity rubric.

[ELA.K12.EE.3.1:](https://www.cpalms.org//PreviewStandard/Preview/15203) Make inferences to support comprehension.

**Clarifications:**
Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

[ELA.K12.EE.4.1:](https://www.cpalms.org//PreviewStandard/Preview/15204) Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**
In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think \_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_.” The collaborative conversations are becoming academic conversations.

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

[ELA.K12.EE.5.1:](https://www.cpalms.org//PreviewStandard/Preview/15205) Use the accepted rules governing a specific format to create quality work.

**Clarifications:**
Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

[ELA.K12.EE.6.1:](https://www.cpalms.org//PreviewStandard/Preview/15206) Use appropriate voice and tone when speaking or writing.

**Clarifications:**
In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

[ELD.K12.ELL.MA.1:](https://www.cpalms.org//PreviewStandard/Preview/8642) English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

[ELD.K12.ELL.SI.1](https://cpalms.org/PreviewStandard/Preview/8640) English language learners communicate for social and instructional purposes within the school setting.