

Domain $x(x-1) = x^2 - x$.**Algebra****A****Grade 9-12**Arithmetic with Polynomials & Rational Functions

Standard APR.1 CC.9-12.A.APR.1 Perform arithmetic operations on polynomials. 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.

Grade 9-12Arithmetic with Polynomials & Rational Functions

Standard APR.2 CC.9-12.A.APR.2 Understand the relationship between zeros and factors of polynomial. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.

Grade 9-12Arithmetic with Polynomials & Rational Functions

Standard APR.3 CC.9-12.A.APR.3 Understand the relationship between zeros and factors of polynomials. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Grade 9-12Arithmetic with Polynomials & Rational Functions

Standard APR.4 CC.9-12.A.APR.4 Use polynomial identities to solve problems. Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.

Grade 9-12Arithmetic with Polynomials & Rational Functions

Standard APR.5 CC.9-12.A.APR.5 (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.1

Grade 9-12Arithmetic with Polynomials & Rational Functions

Standard APR.6 CC.9-12.A.APR.6 Rewrite rational expressions. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.

Grade 9-12Arithmetic with Polynomials & Rational Functions

Standard APR.7 CC.9-12.A.APR.7 (+) Rewrite rational expressions. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Grade 9-12Creating Equations

Standard CED.1 CC.9-12.A.CED.1 Create equations that describe numbers or relationship. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

Grade 9-12Creating Equations

Standard CED.2 CC.9-12.A.CED.2 Create equations that describe numbers or relationship. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*

Grade 9-12Creating Equations

Standard CED.3 CC.9-12.A.CED.3 Create equations that describe numbers or relationship. 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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

Grade 9-12Creating Equations

Standard CED.4 CC.9-12.A.CED.4 Create equations that describe numbers or relationship. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .*

Grade 9-12Reasoning with Equations and Inequalities

Standard REI.1 CC.9-12.A.REI.1 Understand solving equations as a process of reasoning and explain the reasoning. 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.

Grade 9-12Reasoning with Equations and Inequalities

Standard REI.10 CC.9-12.A.REI.10 Represent and solve equations and inequalities graphically. 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).

Grade 9-12Reasoning with Equations and Inequalities

Standard REI.11 CC.9-12.A.REI.11 Represent and solve equations and inequalities graphically. 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.*

Grade 9-12Reasoning with Equations and Inequalities

Standard
REI.12 CC.9-12.A.REI.12 Represent and solve equations and inequalities graphically. 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.

Grade 9-12Reasoning with Equations and Inequalities

Standard
REI.2 CC.9-12.A.REI.2 Understand solving equations as a process of reasoning and explain the reasoning. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Grade 9-12Reasoning with Equations and Inequalities

Standard
REI.3 CC.9-12.A.REI.3 Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Grade 9-12Reasoning with Equations and Inequalities

Standard
REI.4 CC.9-12.A.REI.4 Solve equations and inequalities in one variable. Solve quadratic equations in one variable.

Grade 9-12Reasoning with Equations and Inequalities

Standard
REI.4a CC.9-12.A.REI.4a 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.

Grade 9-12Reasoning with Equations and Inequalities

Standard
REI.4b CC.9-12.A.REI.4b 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 .

Grade 9-12Reasoning with Equations and Inequalities

Standard
REI.5 CC.9-12.A.REI.5 Solve systems of equations. 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.

Grade 9-12Reasoning with Equations and Inequalities

Standard REI.6 CC.9-12.A.REI.6 Solve systems of equations. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Grade 9-12Reasoning with Equations and Inequalities

Standard REI.7 CC.9-12.A.REI.7 Solve systems of equations. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

Grade 9-12Reasoning with Equations and Inequalities

Standard REI.8 CC.9-12.A.REI.8 (+) Solve systems of equations. Represent a system of linear equations as a single matrix equation in a vector variable.

Grade 9-12Reasoning with Equations and Inequalities

Standard REI.9 CC.9-12.A.REI.9 (+) Solve systems of equations. Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).

Grade 9-12Seeing Structure in Expressions

Standard SSE.1 CC.9-12.A.SSE.1 Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context.*

Grade 9-12Seeing Structure in Expressions

Standard SSE.1a CC.9-12.A.SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients.*

Grade 9-12Seeing Structure in Expressions

Standard SSE.1b CC.9-12.A.SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P .*

Grade 9-12Seeing Structure in Expressions

Standard SSE.2 CC.9-12.A.SSE.2 Interpret the structure of expressions. Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

Grade 9-12Seeing Structure in Expressions

Standard SSE.3 CC.9-12.A.SSE.3 Write expressions in equivalent forms to solve problems. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

Grade 9-12Seeing Structure in Expressions

Standard SSE.3a CC.9-12.A.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines.*

Grade 9-12Seeing Structure in Expressions

Standard SSE.3b CC.9-12.A.SSE.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.*

Grade 9-12Seeing Structure in Expressions

Standard SSE.3c CC.9-12.A.SSE.3c Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as $[1.15^{(1/12)}]^{(12t)} \approx 1.012^{(12t)}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*

Grade 9-12Seeing Structure in Expressions

Standard SSE.4 CC.9-12.A.SSE.4 Write expressions in equivalent forms to solve problems. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.*