

Algebra II

Expressions

Radical Expressions and Rational Exponents

1. Apply the properties of exponents to translate between radical and exponential forms of expressions. [A2.E.1](#)
 2. Simplify and perform operations with radical expressions with and without variables; rationalizing denominators should include conjugates. [A2.E.2](#)
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Complex Number

3. Understand an imaginary number to be a product of any real number and the imaginary unit i where $i^2 = -1$. [A2.E.3](#)
 4. Understand a complex number to be a number of the form $a + bi$ where a and b are real numbers and i is the imaginary unit. [A2.E.4](#)
 5. Add, subtract, multiply, and divide complex numbers. [A2.E.5](#)
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Algebraic Functions

Compositions

1. Compose functions and evaluate their composition [A2.AF.1](#)
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Graph and Key Features

2. Graph rational functions, identifying zeros and asymptotes (vertical and horizontal) when suitable factorizations are available and showing end behavior, with or without the appropriate technology. [A2.AF.2](#)
 3. Compare properties of graphs, tables, equations, and verbal descriptions of two functions. [A2.AF.3](#)
 4. Calculate and interpret the average rate of change of a function, both symbolically and from a table over a specified interval. Estimate the rate of change from a graph. [A2.AF.4](#)
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Transformations

5. Given a graph, explain the effects of the transformation from the parent function including square root and cubic functions, rational, and absolute value functions. [A2.AF.5](#)
6. Describe the transformation of functions in the coordinate plane including translation, reflection, and dilation. [A2.AF.6](#)

Inverses

7. Explain how restricting the domain of a function allows for the creation of its inverse. [A2.AF.7](#)
 8. Write and graph the inverse of a given function; understand that the graph of an inverse function is a reflection of the function over the line $y = x$. [A2.AF.8](#)
 9. Verify if two functions are inverses of each other using composition of functions [A2.AF.9](#)
 10. Using ordered pairs, determine the inverse of a function given a graph or table [A2.AF.10](#)
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Linear Functions, Equations and Inequalities

Arithmetic Sequences

1. Write and use arithmetic sequences recursively and explicitly to model situations; translate between the two forms when given a graph, a description of the relationship, or two input-output pairs. [A2.LF.1](#)
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Matrices

2. Multiply a matrix by a scalar [A2.LF.2](#)
 3. Add and subtract matrices. [A2.LF.3](#)
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Systems of Equations

4. Solve systems of linear equations in three variables [A2.LF.4](#)
 5. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. [A2.LF.5](#)
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Quadratic Functions, Equations, and Inequalities

Create and Solve

1. Select, justify and apply appropriate methods to solve quadratic equations in one variable. Recognize complex solutions and write them as $a + bi$ for real numbers a and b . [A2.QF.1](#)
 2. Represent and solve real-world problems using quadratic equations and inequalities. [A2.QF.2](#)
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Graph and Key Features

3. Use the discriminant to determine the number and type of solutions of a quadratic equation. [A2.QF.3](#)
 4. Sketch the graph of a quadratic function given a verbal description and show key features. [A2.QF.4](#)
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System of Equations

5. Solve a system of equations consisting of a linear equation and a nonlinear equation in two variables algebraically or graphically with or without technology. [A2.QF.5](#)
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Exponential and Logarithmic Functions and Equations

Create and Solve

1. Use the properties of exponents to find equivalent expressions and to solve equations, including those involving rational exponents. [A2.EL.1](#)
2. Interpret the solution of a logarithmic equation as reasonable or unreasonable in context. [A2.EL.2](#)

Logarithms

3. Translate between logarithmic and exponential forms of an equation. [A2.EL.3](#)
4. Use properties of logarithms to simplify and evaluate logarithmic expressions, with or without technology. [A2.EL.4](#)
5. Use the inverse relationship between exponents and logarithms to solve problems. [A2.EL.5](#)

Graph and Key Features

6. Graph logarithmic functions, showing intercepts and end behavior. [A2.EL.6](#)

Trigonometric Functions and Equations

Create and Solve

1. Select trigonometric functions that model real-world contexts. [A2.TF.1](#)
2. Develop the Pythagorean identity, $\sin^2(\theta) + \cos^2(\theta) = 1$. [A2.TF.2](#)
3. Apply the Pythagorean identity to find the remaining trigonometric functions when given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. [A2.TF.3](#)

Graphs and Key Features

4. Explain how changes in amplitude, period, and midline affect the graph of sine and cosine functions, using transformations and real-world contexts to support understanding. [A2.TF.4](#)

Unit Circle

5. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. [A2.TF.5](#)
6. Explain how the unit circle can be used to model sine, cosine, tangent, secant, cosecant, and cotangent for all real numbers [A2.TF.6](#)

Polynomial, Rational, and Other Functions and Equations

Create and Solve

1. Construct a possible polynomial given a graph. [A2.PR.1](#)
2. Create equations and inequalities with one variable and use them to solve problems, including absolute value functions [A2.PR.2](#)
3. Solve formulas for a specific variable. [A2.PR.3](#)
4. Solve rational and radical equations containing one variable specifying extraneous solutions. [A2.PR.4](#)

Graph and Key Features

5. Explain how the multiplicity of zeros affects the shape of a polynomial graph, using reasoning and visual patterns to justify the behavior at each intercept. [A2.PR.5](#)
6. Interpret the key features of polynomial functions that model a relationship between two quantities in a given context; translate between different representations of the function, especially graphs, tables, and equations. [A2.PR.6](#)
7. Determine the domain and range of polynomial and rational functions. [A2.PR.7](#)
8. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior, with or without the appropriate technology. [A2.PR.8](#)

Factor Polynomials

9. Apply the remainder and factor theorems to identify factors and find solutions to polynomial equations of degree greater than 2 and explain how each theorem supports the reasoning process. [A2.PR.9](#)
10. Factor polynomials using polynomial identities, including difference of squares, sum and difference of cubes, and the square of a sum or difference. [A2.PR.10](#)

Rational Expressions

11. Divide polynomial expressions using factorization, long division, and synthetic division, with and without a remainder. [A2.PR.11](#)

Systems of Equations

12. Explain why a solution to the equation $f(x) = g(x)$ is the x-coordinate where the y-coordinate of $f(x)$ and $g(x)$ are the same using graphs, tables, or approximations, include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, exponential, or rational and where at least one of the functions is not linear. [A2.PR.12](#)
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Statistics and Probability

Statistical Experiments and Studies

1. Represent and use mathematical models for bivariate data sets to answer questions, draw conclusions, and make decisions. [A2.SP.1](#)
2. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate [A2.SP.2](#)
3. Distinguish between sample surveys, experiments, and observational studies and explain the purpose of randomization in statistical studies. [A2.SP.3](#)
4. Use data from a random sample to make inferences about a population. [A2.SP.4](#)
5. Compare theoretical and experimental probabilities using simulations. [A2.SP.5](#)
6. Read and explain, in context, the validity of data from outside reports by identifying the variables as quantitative or categorical and describing how the data was collected. [A2.SP.6](#)
7. Indicate any potential biases or flaws and identifying inferences the author of the report made from sample data. [A2.SP.7](#)