

Algebra II

State Standard Number	State Standard Area/Description	Unit Name	Course Topic Description
MA.912.A	Algebra	See detailed benchmarks below	
MA.912.A.1	Expand and deepen understanding of real and complex numbers by comparing expressions and performing arithmetic computations, especially those involving square roots and exponents. Use the properties of real numbers to simplify algebraic expressions and equations, and they convert between different measurement units using dimensional analysis.	See detailed benchmarks below	
MA.912.A.1.1	Know equivalent forms of real numbers (including integer exponents and radicals, percents, scientific notation, absolute value, rational numbers, irrational numbers).		
MA.912.A.1.2	Compare real number expressions.		
MA.912.A.1.3	Simplify real number expressions using the laws of exponents.	Radical Functions	Section A
MA.912.A.1.4	Perform operations on real numbers (including integer exponents, radicals, percents, scientific notation, absolute value, rational numbers, and irrational numbers) using multi-step and real-world problems.		
MA.912.A.1.5	Use dimensional (unit) analysis to perform conversions between units of measure, including rates.		
MA.912.A.1.6	Identify the real and imaginary parts of complex numbers and perform basic operations.	Linear and Quadratic Functions	Section E
MA.912.A.1.7	Represent complex numbers geometrically.		
MA.912.A.1.8	Use the zero product property of real numbers in a variety of contexts to identify solutions to equations.	Linear and Quadratic Functions	Section E

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MA.912.A.2	Draw and interpret graphs of relations. Understand the notation and concept of a function, find domains and ranges, and link equations to functions.	See detailed benchmarks below	
MA.912.A.2.1	Create a graph to represent a real-world situation.		
MA.912.A.2.2	Interpret a graph representing a real-world situation.		
MA.912.A.2.3	Describe the concept of a function, use function notation, determine whether a given relation is a function, and link equations to functions.	Linear and Quadratic Functions	Section A
MA.912.A.2.4	Determine the domain and range of a relation.	Linear and Quadratic Functions	Section A
MA.912.A.2.5	Graph absolute value equations and inequalities in two variables.		
MA.912.A.2.6	Identify and graph common functions (including but not limited to linear, rational, quadratic, cubic, radical, absolute value).	Linear and Quadratic Functions	Sections A,C,D
		Radical Functions	Section B
		Rational Functions	Sections B,C
MA.912.A.2.7	Perform operations (addition, subtraction, division and multiplication) of functions algebraically, numerically, and graphically.	Linear and Quadratic Functions	Section A
MA.912.A.2.8	Determine the composition of functions.	Linear and Quadratic Functions	Section A
MA.912.A.2.9	Recognize, interpret, and graph functions defined piece-wise, with and without technology.		
MA.912.A.2.10	Describe and graph transformations of functions.	Linear and Quadratic Functions	Section D
		Radical Functions	Section B
		Rational Functions	Section B
		Exponents and Logarithmic Functions	Sections B,D

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MA.912.A.2.11	Solve problems involving functions and their inverses.	Linear and Quadratic Functions	Section A
MA.912.A.2.12	Solve problems using direct, inverse, and joint variations.	Rational Functions	Section A
MA.912.A.2.13	Solve real-world problems involving relations and functions.		
MA.912.A.3	Solve linear equations and inequalities.	See detailed benchmarks below	
MA.912.A.3.1	Solve linear equations in one variable that include simplifying algebraic expressions.	Linear and Quadratic Functions	Section B
MA.912.A.3.2	Identify and apply the distributive, associative, and commutative properties of real numbers and the properties of equality.	Linear and Quadratic Functions	Section B
MA.912.A.3.3	Solve literal equations for a specified variable.		
MA.912.A.3.4	Solve and graph simple and compound inequalities in one variable and be able to justify each step in a solution.	Linear and Quadratic Functions	Sections B
MA.912.A.3.5	Symbolically represent and solve multi-step and real-world applications that involve linear equations and inequalities.		
MA.912.A.3.6	Solve and graph the solutions of absolute value equations and inequalities with one variable.	Linear and Quadratic Functions	Sections B,C
MA.912.A.3.7	Rewrite equations of a line into slope-intercept form and standard form.	Linear and Quadratic Functions	Section C
MA.912.A.3.8	Graph a line given any of the following information: a table of values, the x- and y-intercepts, two points, the slope and a point, the equation of the line in slope-intercept form, standard form, or point-slope form.	Linear and Quadratic Functions	Section C
MA.912.A.3.9	Determine the slope, x-intercept, and y-intercept of a line given its graph, its equation, or two points on the line.	Linear and Quadratic Functions	Section C

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MA.912.A.3.10	Write an equation of a line given any of the following information: two points on the line, its slope and one point on the line, or its graph. Also, find an equation of a new line parallel to a given line, or perpendicular to a given line, through a given point on the new line.	Linear and Quadratic Functions	Section C
MA.912.A.3.11	Write an equation of a line that models a data set and use the equation or the graph to make predictions. Describe the slope of the line in terms of the data, recognizing that the slope is the rate of change.	Linear and Quadratic Functions	Section C
MA.912.A.3.12	Graph a linear equation or inequality in two variables with and without graphing technology. Write an equation or inequality represented by a given graph.	Linear and Quadratic Functions	Section C
MA.912.A.3.13	Use a graph to approximate the solution of a system of linear equations or inequalities in two variables with and without technology.	Systems of Equations	Section B
MA.912.A.3.14	Solve systems of linear equations and inequalities in two and three variables using graphical, substitution, and elimination methods.	Systems of Equations	Sections B,D
MA.912.A.3.15	Solve real-world problems involving systems of linear equations and inequalities in two and three variables.	Systems of Equations	Sections B,C,D
MA.912.A.4	Perform operations on polynomials. Find factors of polynomials, learning special techniques for factoring quadratics. Understand the relationships among the solutions of polynomial equations, the zeros of a polynomial function, the x-intercepts of a graph, and the factors of a polynomial.	See detailed benchmarks below	

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MA.912.A.4.1	Simplify monomials and monomial expressions using the laws of integral exponents.	Radical Functions	Section A
MA.912.A.4.2	Add, subtract, and multiply polynomials.		
MA.912.A.4.3	Factor polynomial expressions.	Linear and Quadratic Functions	Section E
MA.912.A.4.4	Divide polynomials by monomials and polynomials with various techniques, including synthetic division.		
MA.912.A.4.5	Graph polynomial functions with and without technology and describe end behavior.	Linear and Quadratic Functions	Section C,D
MA.912.A.4.6	Use theorems of polynomial behavior (including but not limited to the Fundamental Theorem of Algebra, Remainder Theorem, the Rational Root Theorem, Descartes' Rule of Signs, and the Conjugate Root Theorem) to find the zeros of a polynomial function.		
MA.912.A.4.7	Write a polynomial equation for a given set of real and/or complex roots.	Linear and Quadratic Functions	Section G
MA.912.A.4.8	Describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression, with and without technology.	Linear and Quadratic Functions	Section E,F
MA.912.A.4.9	Use graphing technology to find approximate solutions for polynomial equations.		
MA.912.A.4.10	Use polynomial equations to solve real-world problems.	Linear and Quadratic Functions	Section F,G
MA.912.A.4.11	Solve a polynomial inequality by examining the graph with and without the use of technology.	Linear and Quadratic Functions	Section F
MA.912.A.4.12	Apply the Binomial Theorem.	Probability and Statistics	Section C

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MA.912.A.5	Simplify rational expressions and solve rational equations using what they have learned about factoring polynomials.	See detailed benchmarks below	
MA.912.A.5.1	Simplify algebraic ratios.		
MA.912.A.5.2	Add, subtract, multiply, and divide rational expressions.		
MA.912.A.5.3	Simplify complex fractions.		
MA.912.A.5.4	Solve algebraic proportions.		
MA.912.A.5.5	Solve rational equations.	Rational Functions	Section C
MA.912.A.5.6	Identify removable and non-removable discontinuities and vertical, horizontal, and oblique asymptotes of a graph of a rational function, find the zeros, and graph the function.	Rational Functions	Section B
MA.912.A.5.7	Solve real-world problems involving rational equations (mixture, distance, work, interest, and ratio).		
MA.912.A.6	Simplify and perform operations on radical expressions and equations. Rationalize square root expressions and understand and use the concepts of negative and rational exponents. Add, subtract, multiply, divide, and simplify radical expressions and equations with rational exponents. Solve radical equations and equations with terms that have rational exponents.	See detailed benchmarks below	
MA.912.A.6.1	Simplify radical expressions.	Radical Functions	Section A
MA.912.A.6.2	Add, subtract, multiply and divide radical expressions (square roots and higher).		
MA.912.A.6.3	Simplify expressions using properties of rational exponents.	Radical Functions	Section A
MA.912.A.6.4	Convert between rational exponent and radical forms of expressions.	Radical Functions	Section A
MA.912.A.6.5	Solve equations that contain radical expressions.	Radical Functions	Section C

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MA.912.A.7	Draw graphs of quadratic functions. Solve quadratic equations and solve these equations by factoring, completing the square and by using the quadratic formula. Use graphing calculators to find approximate solutions of quadratic equations.	See detailed benchmarks below	
MA.912.A.7.1	Graph quadratic equations with and without graphing technology.	Linear and Quadratic Functions	Section D
MA.912.A.7.2	Solve quadratic equations over the real numbers by factoring, and by using the quadratic formula.	Linear and Quadratic Functions	Section E
MA.912.A.7.3	Solve quadratic equations over the real numbers by completing the square.	Linear and Quadratic Functions	Section E
MA.912.A.7.4	Use the discriminant to determine the nature of the roots of a quadratic equation.	Linear and Quadratic Functions	Section E
MA.912.A.7.5	Solve quadratic equations over the complex number system.	Linear and Quadratic Functions	Section E
MA.912.A.7.6	Identify the axis of symmetry, vertex, domain, range and intercept(s) for a given parabola.	Linear and Quadratic Functions	Section F
MA.912.A.7.7	Solve non-linear systems of equations with and without using technology.	Linear and Quadratic Functions Radical Functions Rational Functions Exponential and Logarithmic Functions Trigonometric Functions	Section D,E Section B Section B Sections B,D Section E
MA.912.A.7.8	Use quadratic equations to solve real-world problems.	Linear and Quadratic Functions	Section F,G
MA.912.A.7.9	Solve optimization problems.	Linear and Quadratic Functions	Section F
MA.912.A.7.10	Use graphing technology to find approximate solutions of quadratic equations.		

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MA.912.A.8	Understand the concepts of logarithmic and exponential functions. Graph exponential functions and solve problems of growth and decay. Understand the inverse relationship between exponents and logarithms and use it to prove laws of logarithms and to solve equations. Convert logarithms between bases and simplify logarithmic expressions.	See detailed benchmarks below	
MA.912.A.8.1	Define exponential and logarithmic functions and determine their relationship.	Exponential and Logarithmic Functions	Section A
MA.912.A.8.2	Define and use the properties of logarithms to simplify logarithmic expressions and to find their approximate values.	Exponential and Logarithmic Functions	Section A
MA.912.A.8.3	Graph exponential and logarithmic functions.	Exponential and Logarithmic Functions	Sections A,B,D
MA.912.A.8.4	Prove laws of logarithms.		
MA.912.A.8.5	Solve logarithmic and exponential equations.	Exponential and Logarithmic Functions	Section E
MA.912.A.8.6	Use the change of base formula.	Exponential and Logarithmic Functions	Section E
MA.912.A.8.7	Solve applications of exponential growth and decay.	Exponential and Logarithmic Functions	Section C
MA.912.A.9	Write equations and draw graphs of conic sections (circle, ellipse, parabola, and hyperbola), thus relating an algebraic representation to a geometric one.	See detailed benchmarks below	
MA.912.A.9.1	Write the equations of conic sections in standard form and general form, in order to identify the conic section and to find its geometric properties (foci, asymptotes, eccentricity, etc.).	Conic Sections	Section B
MA.912.A.9.2	Graph conic sections with and without using graphing technology.	Conic Sections	Section B

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MA.912.A.9.3	Solve real-world problems involving conic sections.		
MA.912.A.10	In a general sense, all of mathematics is problem solving. In all of mathematics, use problem-solving skills, choose how to approach a problem, explain the reasoning, and check the results	See detailed benchmarks below	
MA.912.A.10.1	Use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guessing-and-checking, solving a simpler problem, writing an equation, working backwards, and creating a table.		
MA.912.A.10.2	Decide whether a solution is reasonable in the context of the original situation.		
MA.912.A.10.3	Decide whether a given statement is always, sometimes, or never true (statements involving linear or quadratic expressions, equations, or inequalities rational or radical expressions or logarithmic or exponential functions).		
MA.912.A.10.4	Use counterexamples to show that statements are false.		