

## Massachusetts State Core Curriculum

Standards adopted 2000

Algebra II

Strand	Reference	Description	High School Algebra Boardworks Presentations
<b>Number sense and operation</b>	All.N.1	Define complex numbers (e.g., $a + bi$ ) and operations on them, in particular, addition, subtraction, multiplication, and division. Relate the system of complex numbers to the systems of real and rational numbers. (12.N.1)	–
	All.N.2	Simplify numerical expressions with powers and roots, including fractional and negative exponents. (12.N.2)	Exponents Zero negative and fractional exponents Manipulating radicals
	All.P.1	Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative and recursive patterns such as Pascal's Triangle. (12.P.1)	Sequences and rules Arithmetic sequences Geometric sequences Other types of sequences Binomial coefficients
	All.P.2	Identify arithmetic and geometric sequences and finite arithmetic and geometric series. Use the properties of such sequences and series to solve problems, including finding the formula for the general term and the sum, recursively and explicitly. (12.P.2)	Sequences and rules Arithmetic sequences Geometric sequences The sum of an arithmetic series The sum of a geometric series
	All.P.3	Demonstrate an understanding of the binomial theorem and use it in the solution of problems. (12.P.3)	Binomial coefficients
	All.P.4	Demonstrate an understanding of the exponential and logarithmic functions.	The laws of logarithms Solving equations involving logarithms Exponentials and logarithms Exponential growth and decay

**Patterns, relations  
and algebra**

All.P.5	Perform operations on functions, including composition. Find inverses of functions. (12.P.5)	Functions and relations Domain, range and composite functions Inverse functions
All.P.6	Given algebraic, numeric and/or graphical representations, recognize functions as polynomial, rational, logarithmic, or exponential. (12.P.6)	Graphs of important non-linear functions Graphs of quadratic functions Plotting and sketching graphs Exponentials and logarithms Simplifying rational functions
All.P.7	Find solutions to quadratic equations (with real coefficients and real or complex roots) and apply to the solutions of problems. (12.P.7)	Solving quadratic equations Problems leading to quadratic equations
All.P.8	Solve a variety of equations and inequalities using algebraic, graphical, and numerical methods, including the quadratic formula; use technology where appropriate. Include polynomial, exponential, and logarithmic functions; expressions involving the absolute values; and simple rational expressions. (12.P.8)	Solving quadratic equations Solving quadratic inequalities The laws of logarithms Solving equations involving logarithms Exponentials and logarithms Exponential growth and decay Absolute value functions Simplifying rational functions Operations with algebraic fractions Improper fractions Partial fractions
All.P.9	Use matrices to solve systems of linear equations. Apply to the solution of everyday problems. (12.P.9)	–
All.P.10	Use symbolic, numeric, and graphical methods to solve systems of equations and/or inequalities involving algebraic, exponential, and logarithmic expressions. Also use technology where appropriate. Describe the relationships among the methods. (12.P.10)	Systems of equations and graphs The elimination method for systems of equations The substitution method for systems of equations Systems of linear and quadratic equations Problems leading to systems of equations

	All.P.11	Solve everyday problems that can be modeled using polynomial, rational, exponential, logarithmic, and step functions, absolute values and square roots. Apply appropriate graphical, tabular, or symbolic methods to the solution. Include growth and decay; logistic growth; joint (e.g., $I = Prt$ , $y = k(w_1 + w_2)$ ), and combined ( $F = G(m_1m_2)/d^2$ ) variation. (12.P.11)	Solving quadratic equations Operations with polynomials Dividing polynomials The factor theorem Absolute value functions Exponential growth and decay Simplifying rational functions Operations with algebraic fractions Improper fractions Partial fractions
	All.P.12	Identify maximum and minimum values of functions in simple situations. Apply to the solution of problems. (12.P.12)	Graphs of quadratic functions Plotting and sketching graphs
	All.P.13	Describe the translations and scale changes of a given function $f(x)$ resulting from substitutions for the various parameters $a$ , $b$ , $c$ , and $d$ in $y = af(b(x + c/b)) + d$ . In particular, describe the effect of such changes on polynomial, rational, exponential, and logarithmic functions. (12.P.13)	Transforming functions part 1 Transforming functions part 2
<b>Geometry</b>	All.G.1	Define the sine, cosine, and tangent of an acute angle. Apply to the solution of problems. (12.G.1)	The three trigonometric ratios Finding trigonometric ratios Finding side lengths
	All.G.2	Derive and apply basic trigonometric identities (e.g., $\sin 2\theta + \cos 2\theta = 1$ , $\tan 2\theta + 1 = \sec 2\theta$ ) and the laws of sines and cosines. (12.G.2)	The three trigonometric ratios Finding trigonometric ratios Finding angles
	All.G.3	Relate geometric and algebraic representations of lines, simple curves, and conic sections. (12.G.4)	Coordinate geometry The equation of a straight line The equation of a circle

<b>Data analysis, statistics and probability</b>	All.D.1	Select an appropriate graphical representation for a set of data and use appropriate statistics (e.g., quartile or percentile distribution) to communicate information about the data. (12.D.2)	<ul style="list-style-type: none"> <li>The mode</li> <li>The mean</li> <li>The median</li> <li>The range and interquartile range</li> <li>Which measure of central tendency</li> <li>Comparing data</li> <li>Scatter plots</li> <li>Bar graphs</li> <li>Histograms</li> <li>Box and whisker plots</li> <li>Quartiles and box plots</li> <li>Frequency diagrams</li> <li>Cumulative frequency step polygons</li> <li>Quartiles and box plots</li> </ul>
	All.D.2	Use combinatorics (e.g., "fundamental counting principle," permutations, and combinations) to solve problems, in particular, to compute probabilities of compound events. Use technology as appropriate. (12.D.6)	<ul style="list-style-type: none"> <li>Permutations</li> <li>Combinations</li> </ul>