

Michigan State Core Curriculum
Standards adopted 2007
Algebra I

Strand	Reference	Description	Boardworks High School Algebra presentations
L1.Reasoning about numbers, systems, and quantitative situations	L1.1	Number Systems and Number Sense	
	L1.1.1	Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers.	Classifying numbers Calculating with integers Multiplying parentheses The distributive property Exponents Zero, negative and fractional exponents
	L1.1.2	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse of a number has the opposite sign.	Calculating with integers
	L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.	Calculating with integers Multiplying parentheses The distributive property
	L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1.	Exponents Zero, negative and fractional exponents
	L1.1.5	Justify numerical relationships.	–
	L1.2	Representations and Relationships	
	L1.2.2	Interpret representations that reflect absolute value relationships.	Absolute value functions
	L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.	Types of data Comparing data Bar graphs Box and whisker plots Histograms Misleading charts
	L2.1	Calculation Using Real and Complex Numbers	

L2. Calculation, algorithms and estimation	L2.1.1	Explain the meaning and uses of weighted averages.	The mode The mean The median Which measure of central tendency?
	L2.1.2	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and exponents.	Exponents and roots Exponent laws Negative exponents and reciprocals Rational exponents Manipulating radicals
	L2.1.4	Know that the imaginary number i is one of two solutions to $x^2 = -1$.	–
	A1.1	Construction, Interpretation, and Manipulation of Expressions	
	A1.1.1	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables.	Equations, formulas and identities
	A1.1.2	Know the properties of exponents and roots and apply them in algebraic expressions.	Exponents and roots Exponent laws Negative exponents and reciprocals Rational exponents Radicals
	A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities.	Factoring Factoring quadratic expressions Quadratic equations and factoring Completing the square
	A1.2	Solutions of Equations and Inequalities	
	A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.	Solving linear equations Equations with parentheses and fractions Using equations to solve problems Inequalities Solving linear inequalities Inequalities and regions Inequalities in two variables

**A1.Expressions,
equations and
inequalities**

A1.2.2	Associate a given equation with a function whose zeros are the solutions of the equation.	Graphs of quadratic functions
A1.2.3	Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately.	Solving linear equations Equations with parentheses and fractions Using equations to solve problems Factoring Factoring quadratic expressions Quadratic equations and factoring Completing the square Inequalities Solving linear inequalities Inequalities and regions Inequalities in two variables The quadratic formula Problems leading to quadratic equations 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
A1.2.4	Solve absolute value equations and inequalities and justify steps in the solution.	Absolute value functions
A1.2.6	Solve power equations and equations including radical expressions; justify steps in the solution, and explain how extraneous solutions may arise.	Manipulating formulas Manipulating radicals
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.	Manipulating formulas
A2.1	Definitions, Representations, and Attributes of Functions	
A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.	Functions and relations Domain, range and composite functions

A2.Functions

A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain.	Function notation Functions and relations Domain, range and composite functions
A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.	Plotting and sketching graphs
A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined.	Functions and relations Domain, range and composite functions Absolute value functions
A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions.	Sequences and rules Arithmetic sequences Geometric sequences Other types of sequences
A2.1.6	Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations.	Plotting and sketching graphs
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(s).	Plotting and sketching graphs
A2.2	Operations and Transformations with Functions	
A2.2.1	Combine functions by addition, subtraction, multiplication, and division.	Operations with polynomials Dividing polynomials The factor theorem
A2.2.2	Apply given transformations to parent functions and represent symbolically.	Transforming functions part 1 Transforming functions part 2
A2.2.3	Determine whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs.	Inverse functions
A2.3	Representations of Functions	
A2.3.1	Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior.	Graphs of important non-linear functions Plotting and sketching graphs
A2.3.2	Describe the tabular pattern associated with functions having a constant rate of change (linear); or variable rates of change.	Linear graphs Non-linear functions Graphs of important non-linear functions

A2.3.3	Write the general symbolic forms that characterize each family of functions.	Graphs of important non-linear functions
A2.4	Models of Real-World Situations Using Families of Functions	
A2.4.1	Identify the family of function best suited for modeling a given real-world situation.	Real life graphs Scatter plots Non-linear relationships Graphs of important non-linear functions
A2.4.2	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers.	Real life graphs Graphs of important non-linear functions
A2.4.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled.	Real life graphs Graphs of important non-linear functions
A3.1	Lines and Linear Functions	
A3.1.1	Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate information and convert between forms.	Linear graphs Slopes and intercepts Coordinate geometry The equation of a straight line
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.	Linear graphs Slopes and intercepts Parallel and perpendicular lines
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.	Slopes and intercepts
A3.1.4	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have slopes that multiply to give -1.	Parallel and perpendicular lines
A3.2	Exponential and Logarithmic Functions	
A3.2.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information.	Exponentials and logarithms
A3.2.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how base affects the rate of growth or decay.	Exponentials and logarithms Exponential growth and decay
A3.2.5	Relate exponential functions to real phenomena, including half-life and doubling time.	Exponential growth and decay
A3.3	Quadratic Functions	

A3.Families of functions

A3.3.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information.	Graphs of quadratic functions
A3.3.2	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function.	Graphs of quadratic functions
A3.3.3	Convert quadratic functions from standard to vertex form by completing the square.	Completing the square
A3.3.4	Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.	Solving quadratic equations
A3.3.5	Express quadratic functions in vertex form to identify their maxima or minima and in factored form to identify their zeros.	Solving quadratic equations
A3.4	Power Functions	
A3.4.1	Write the symbolic form and sketch the graph of power functions.	Graphs of important non-linear functions Plotting and sketching graphs
A3.4.2	Express directly and inversely proportional relationships as functions and recognize their characteristics.	Functions and relations Domain, range and composite functions Inverse functions
A3.4.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry.	Graphs of quadratic functions Plotting and sketching graphs Even, odd and periodic functions
A3.5	Polynomial Functions	
A3.5.1	Write the symbolic form and sketch the graph of simple polynomial functions.	Graphs of important non-linear functions Graphs of quadratic functions Plotting and sketching graphs
A3.5.2	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial functions of degree greater than 2.	Graphs of quadratic functions Plotting and sketching graphs
A3.5.3	Determine the maximum possible number of zeroes of a polynomial function and understand the relationship between the x-intercepts of the graph and the factored form of the function.	Graphs of quadratic functions Solving quadratic equations Plotting and sketching graphs
S2.1	Scatterplots and Correlation	
S2.1.1	Construct a scatterplot for a bivariate data set with appropriate labels and scales.	Scatter plots

S2.Bivariate data - examining relationships	S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and strong correlation.	Scatter plots Lines of best fit
	S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association.	Measuring correlation Scatter plots
	S2.1.4	Differentiate between correlation and causation. Know that a strong correlation does not imply a cause-and-effect relationship. Recognize the role of lurking variables in correlation.	Scatter plots
	S2.2	Linear Regression	
	S2.2.1	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a regression line.	Linear regression
	S2.2.2	Use the equation of the least squares regression line to make appropriate predictions.	Linear regression