Mathematics: New York State Core Curriculum: Algebra Strand

Performance Indicators Organized by Grade Level and Band under Major Understandings

Students will represent and analyze algebraically a wide variety of problem solving situations.	
4.A.1 Var. & Express	Evaluate and express relationships using open sentences with one operation.
5.A.1 Var. & Express	Define and use appropriate terminology when referring to constants, variables, and algebraic expressions
5.A.2 Var. & Express	Translate simple verbal expressions into algebraic expressions.
6.A.1 Var. & Express	Translate two-step verbal expressions into algebraic expressions.
7.A.1 Var. & Express	Translate two-step verbal expressions into algebraic expressions.
8.A.1 Var. & Express	Translate verbal sentences into algebraic inequalities.
8.A.2 Var. & Express	Write verbal expressions that match given mathematical expressions.
8.A.3 Var. & Express	Describe a situation involving relationships that matches a given graph.
8.A.4 Var. & Express	Create a graph given a description or an expression for a situation involving a linear or nonlinear relationship.
8.A.5 Var. & Express	Use physical models to perform operations with polynomials.
A.A.1 Var. & Express	Translate a quantitative verbal phrase into an algebraic expression.
A.A.2 Var. & Express	Write a verbal expression that matches a given mathematical expression.
A.A.3 Eqn. & Ineq.	Distinguish the difference between an algebraic expression and an algebraic equation.
A.A.4 Eqn. & Ineq.	Translate verbal sentences into mathematical equations or inequalities.
A.A.5 Eqn. & Ineq.	Write algebraic equations or inequalities that represent a situation.
A.A.6 Eqn. & Ineq.	Analyze and solve verbal problems whose solution requires solving a linear equation in one variable or linear inequality in one variable.
A.A.7 Eqn. & Ineq.	Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables.
A.A.8 Eqn. & Ineq.	Analyze and solve verbal problems that involve quadratic equations.
A.A.9 Eqn. & Ineq.	Analyze and solve verbal problems that involve exponential growth and decay.
A.A.10 Eqn. & Ineq.	Solve systems of two linear equations in two variables algebraically (See A.G.7).
A.A.11 Eqn. & Ineq.	Solve a system of one linear and one quadratic equation in two variables, where only factoring is required.
A2.A.1 Eqn. & Ineq.	Solve absolute value equations and inequalities involving linear expressions in one variable.
A2.A.2 Eqn. & Ineq.	Use the discriminant to determine the nature of the roots of a quadratic equation.
A2.A.3 Eqn. & Ineq.	Solve systems of equations involving one linear equation and one quadratic equation algebraically.
A2.A.4 Eqn. & Ineq.	Solve quadratic inequalities in one and two variables, algebraically and graphically.
A2.A.5 Eqn. & Ineq.	Use direct and inverse variation to solve for unknown values.
A2.A.6 Eqn. & Ineq.	Solve an application which results in an exponential function.

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Students will perform algebraic procedures accurately.	
2.A.1 Eqns. & Ineqs.	Use the symbols <, >, = (with and without the use of a number line) to compare whole numbers up to 100.
3.A.1 Eqns. & Ineqs.	Use the symbols <, >, = (with and without the use of a number line) to compare whole numbers and unit fractions (1/2, 1/3, 1/4, 1/5, 1/6, and 1/10).
4.A.2 Eqns. & Ineqs.	Use the symbols <, >, =, and ≠ (with and without the use of a number line) to compare whole numbers and unit fractions and decimals (up to hundredths).
4.A.3 Eqns. & Ineqs.	Find the value or values that will make an open sentence true, if it contains < or >.
5.A.3 Var. & Express	Substitute assigned values into variable expressions and evaluate using order of operations.
5.A.4 Eqns. & Ineqs.	Solve simple one-step equations using basic whole-number facts.
5.A.5 Eqns. & Ineqs.	Solve and explain simple one-step equations using inverse operations involving whole numbers.
5.A.6 Eqns. & Ineqs.	Evaluate the perimeter formula for given input values.
6.A.2 Var. & Express	Use substitution to evaluate algebraic expressions (may include exponents of one, two and three).
6.A.3 Eqns. & Ineqs.	Translate two-step verbal sentences into algebraic equations.
6.A.4 Eqns. & Ineqs.	Solve and explain two-step equations involving whole numbers using inverse operations.
6.A.5 Eqns. & Ineqs.	Solve simple proportions within context.
6.A.6 Eqns. & Ineqs.	Evaluate formulas for given input values (circumference, area, volume, distance, temperature, interest, etc.).
7.A.2 Var. & Express	Add and subtract monomials with exponents of one.
7.A.3 Var. & Express	Identify a polynomial as an algebraic expression containing one or more terms.
7.A.4 Eqns. & Ineqs.	Solve multi-step equations by combining like terms, using the distributive property, or moving variables to one side of the equation.
7.A.5 Eqns. & Ineqs.	Solve one-step inequalities (positive coefficients only) (See 7.G.10).
7.A.6 Eqns. & Ineqs.	Evaluate formulas for given input values (surface area, rate, and density problems).
8.A.6 Var. & Express	Multiply and divide monomials.
8.A.7 Var. & Express	Add and subtract polynomials (integer coefficients).
8.A.8 Var. & Express	Multiply a binomial by a monomial or a binomial (integer coefficients).
8.A.9 Var. & Express	Divide a polynomial by a monomial (integer coefficients).
8.A.10 Var. & Express	Factor algebraic expressions using the GCF.
8.A.11 Var. & Express	Factor a trinomial in the form $ax^2 + bx + c$; a=1 and c having no more than three sets of factors.
8.A.12 Eqns. & Ineqs.	Apply algebra to determine the measure of angles formed by or contained in parallel lines cut by a transversal and by intersecting lines.
8.A.13 Eqns. & Ineqs.	Solve multi-step inequalities and graph the solution set on a number line.
8.A.14 Eqns. & Ineqs.	Solve linear inequalities by combining like terms, using the distributive property, or moving variables to one side of the inequality (include multiplication or division of inequalities by a negative number).

Mathematics: New York State Core Curriculum: Algebra Strand

Performance Indicators Organized by Grade Level and Band under Major Understandings

Students will perform algebraic procedures accurately.	
A.A.12 Var. & Express	Multiply and divide monomial expressions with a common base, using the properties of exponents.
A.A.13 Var. & Express	Add, subtract, and multiply monomials and polynomials.
A.A.14 Var. & Express	Divide a polynomial by a monomial or binomial, where the quotient has no remainder.
A.A.15 Var. & Express	Find values of a variable for which an algebraic fraction is undefined.
A.A.16 Var. & Express.	Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them to lowest terms.
A.A.17 Var. & Express	Add or subtract fractional expressions with monomial or like binomial denominators.
A.A.18 Var. & Express.	Multiply and divide algebraic fractions and express the product or quotient in simplest form.
A.A.19 Var. & Express.	Identify and factor the difference of two perfect squares.
A.A.20 Var. & Express.	Factor algebraic expressions completely, including trinomials with a lead coefficient of one (after factoring a GCF).
A.A.21 Eqns. & Ineqs.	Determine whether a given value is a solution to a given linear equation in one variable or linear inequality in one variable.
A.A.22 Eqns. & Ineqs.	Solve all types of linear equations in one variable.
A.A.23 Eqns. & Ineqs.	Solve literal equations for a given variable.
A.A.24 Eqns. & Ineqs.	Solve linear inequalities in one variable.
A.A.25 Eqns. & Ineqs.	Solve equations involving fractional expressions.
A.A.26 Eqns. & Ineqs.	Solve algebraic proportions in one variable which result in linear or quadratic equations.
A.A.27 Eqns. & Ineqs.	Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients and integral roots.
A.A.28 Eqns. & Ineqs.	Understand the difference and connection between roots of a quadratic equation and factors of a quadratic expression.
A2.A.7 Var. & Express	Factor polynomial expressions completely, using any combination of the following techniques: common factor extraction, difference of two perfect squares, quadratic trinomials.
A2.A.8 Var. & Express	Apply the rules of exponents to simplify expressions involving negative and/or fractional exponents.
A2.A.9 Var. & Express	Rewrite algebraic expressions that contain negative exponents using only positive exponents.
A2.A.10 Var. & Expres	Rewrite algebraic expressions with fractional exponents as radical expressions.
A2.A.11 Var. & Expres	Rewrite algebraic expressions in radical form as expressions with fractional exponents.
A2.A.12 Var. & Expres	Evaluate exponential expressions, including those with base e.
A2.A.13 Var. & Expres	Simplify radical expressions.
A2.A.14 Var. & Expres	Perform addition, subtraction, multiplication, and division of radical expressions.
A2.A.15 Var. & Expres	Rationalize denominators involving algebraic radical expressions.
A2.A.16 Var. & Expres	Perform arithmetic operations with rational expressions and rename to lowest terms.
A2.A.17 Var. & Expres	Simplify complex fractional expressions.
A2.A.18 Var. & Expres	Evaluate logarithmic expressions in any base.
A2.A.19 Var. & Expres	Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms.
A2.A.20 Eqns. & Ineq.	Determine the sum and product of the roots of a quadratic equation by examining its coefficients.
A2.A.21 Eqns. & Ineq.	Determine the quadratic equation, given the sum and product of its roots.
A2.A.22 Eqns. & Ineq.	Solve radical equations.
A2.A.23 Eqns. & Ineq.	Solve rational equations and inequalities.
A2.A.24 Eqns. & Ineq.	Know and apply the technique of completing the square.
A2.A.25 Eqns. & Ineq.	Solve quadratic equations, using the quadratic formula.
A2.A.26 Eqns & Ineq.	Find the solution to polynomial equations of higher degree that can be solved using factoring and/or the quadratic formula.
A2.A.27 Eqns & Ineq.	Solve exponential equations with and without common bases.
A2.A.28 Eqns & Ineq.	Solve a logarithmic equation by rewriting as an exponential equation.

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Performance Indicators Organized by Grade Level and Band under Major Understandings

Students will recognize, use, and represent algebraically patterns, relations, and functions.	
PK.A.1 Patt, Rel, & Fcn	Duplicate simple patterns using concrete objects.
K.A.1 Patt, Rel, & Fcn	Use a variety of manipulatives to create patterns using attributes of color, size, or shape.
K.A.2 Patt, Rel, & Fcn	Recognize, describe, extend, and create patterns that repeat (e.g., ABABAB or ABAABAAAB).
1.A.1 Patt, Rel, & Fcn	Determine and discuss patterns in arithmetic (what comes next in a repeating pattern, using numbers or objects).
2.A.2 Patt, Rel, & Fcn	Describe and extend increasing or decreasing (+,-) sequences and patterns (numbers or objects up to 100).
3.A.2 Patt, Rel, & Fcn	Describe and extend numeric (+, -) and geometric patterns.
4.A.4 Patt, Rel, & Fcn	Describe, extend, and make generalizations about numeric (+,−,×,÷) and geometric patterns.
4.A.5 Patt, Rel, & Fcn	Analyze a pattern or a whole-number function and state the rule, given a table or an input/output box.
5.A.7 Patt, Rel, & Fcn	Create and explain patterns and algebraic relationships (e.g.,2, 4, 6, 8...) algebraically: 2n (doubling).
5.A.8 Patt, Rel, & Fcn	Create algebraic or geometric patterns using concrete objects or visual drawings (e.g., rotate and shade geometric shapes).
7.A.7 Patt, Rel, & Fcn	Draw the graphic representation of a pattern from an equation or from a table of data.
7.A.8 Patt, Rel, & Fcn	Create algebraic patterns using charts/tables, graphs, equations, and expressions.
7.A.9 Patt, Rel, & Fcn	Build a pattern to develop a rule for determining the sum of the interior angles of polygons.
7.A.10 Patt, Rel, & Fcn	Write an equation to represent a function from a table of values.
8.A.15 Patt, Rel, & Fcn	Understand that numerical information can be represented in multiple ways: arithmetically, algebraically, and graphically.
8.A.16 Patt, Rel, & Fcn	Find a set of ordered pairs to satisfy a given linear numerical pattern (expressed algebraically); then plot the ordered pairs and draw the line.
8.A.17 Patt, Rel, & Fcn	Define and use correct terminology when referring to function (domain and range).
8.A.18 Patt, Rel, & Fcn	Determine if a relation is a function.
8.A.19 Patt, Rel, & Fcn	Interpret multiple representations using equation, table of values, and graph.
A.A.29 Patt, Rel, & Fcn	Use set-builder notation and/or interval notation to illustrate the elements of a set, given the elements in roster form.
A.A.30 Patt, Rel, & Fcn	Find the complement of a subset of a given set, within a given universe.
A.A.31 Patt, Rel, & Fcn	Find the intersection of sets (no more than three sets) and/or union of sets (no more than three sets).
A.A.32 Coordinate	Explain slope as a rate of change between dependent and independent variables.
A.A.33 Coordinate	Determine the slope of a line, given the coordinates of two points on the line.
A.A.34 Coordinate	Write the equation of a line, given its slope and the coordinates of a point on the line.
A.A.35 Coordinate.	Write the equation of a line, given the coordinates of two points on the line.
A.A.36 Coordinate	Write the equation of a line parallel to the x- or y-axis.
A.A.37 Coordinate.	Determine the slope of a line, given its equation in any form.
A.A.38 Coordinate	Determine if two lines are parallel, given their equations in any form.
A.A.39 Coordinate	Determine whether a given point is on a line, given the equation of the line.
A.A.40 Coordinate.	Determine whether a given point is in the solution set of a system of linear inequalities.
A.A.41 Coordinate	Determine the vertex and axis of symmetry of a parabola, given its equation (See A.G.10).
A.A.42 Trig. Fcns	Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides.
A.A.43 Trig. Fcns	Determine the measure of an angle of a right triangle, given the length of any two sides of the triangle.
A.A.44 Trig. Fcns.	Find the measure of a side of a right triangle, given an acute angle and the length of another side.
A.A.45 Trig. Fcns.	Determine the measure of a third side of a right triangle using the Pythagorean theorem, given the lengths of any two sides.

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Students will recognize, use, and represent algebraically patterns, relations, and functions.	
A2.A.29 Pat, Rel,& Fcn	Identify an arithmetic or geometric sequence and find the formula for its nth term.
A2.A.30 Pat, Rel,& Fcn	Determine the common difference in an arithmetic sequence.
A2.A.31 Pat, Rel,& Fcn	Determine the common ratio in a geometric sequence.
A2.A.32 Pat, Rel,& Fcn	Determine a specified term of an arithmetic or geometric sequence.
A2.A.33 Pat, Rel,& Fcn	Specify terms of a sequence, given its recursive definition.
A2.A.34 Pat, Rel,& Fcn	Represent the sum of a series, using sigma notation.
A2.A.35 Pat, Rel,& Fcn	Determine the sum of the first n terms of an arithmetic or geometric series.
A2.A.36 Pat, Rel,& Fcn	Apply the binomial theorem to expand a binomial and determine a specific term of a binomial expansion.
A2.A.37 Pat, Rel,& Fcn	Define a relation and function.
A2.A.38 Pat, Rel,& Fcn	Determine when a relation is a function.
A2.A.39 Pat, Rel,& Fcn	Determine the domain and range of a function from its equation.
A2.A.40 Pat, Rel,& Fcn	Write functions in functional notation.
A2.A.41 Pat, Rel,& Fcn	Use functional notation to evaluate functions for given values in the domain.
A2.A.42 Pat, Rel,& Fcn	Find the composition of functions.
A2.A.43 Pat, Rel,& Fcn	Determine if a function is one-to-one, onto, or both.
A2.A.44 Pat, Rel,& Fcn	Define the inverse of a function.
A2.A.45 Pat, Rel,& Fcn	Determine the inverse of a function and use composition to justify the result.
A2.A.46 Pat, Rel,& Fcn	Perform transformations with functions and relations: f (x + a) , f(x)+ a, f (−x), − f (x), af (x).
A2.A.47 Coordinate	Determine the center-radius form for the equation of a circle in standard form.
A2.A.48 Coordinate	Write the equation of a circle, given its center and a point on the circle.
A2.A.49 Coordinate	Write the equation of a circle from its graph.
A2.A.50 Coordinate	Approximate the solution to polynomial equations of higher degree by inspecting the graph.
A2.A.51 Coordinate	Determine the domain and range of a function from its graph.
A2.A.52 Coordinate	Identify relations and functions, using graphs.
A2.A.53 Coordinate	Graph exponential functions of the form y = bx for positive values of b, including b = e.
A2.A.54 Coordinate	Graph logarithmic functions, using the inverse of the related exponential function.
A2.A.55 Trig Fcns	Express and apply the six trigonometric functions as ratios of the sides of a right triangle.
A2.A.56 Trig Fcns	Know the exact and approximate values of the sine, cosine, and tangent of 0º, 30º, 45º, 60º, 90º, 180º, and 270º angles.
A2.A.57 Trig Fcns	Sketch and use the reference angle for angles in standard position.
A2.A.58 Trig Fcns	Know and apply the co-function and reciprocal relationships between trigonometric ratios.
A2.A.59 Trig Fcns	Use the reciprocal and co-function relationships to find the value of the secant, cosecant, and cotangent of 0º, 30º, 45º, 60º, 90º, 180º, and 270º angles.
A2.A.60 Trig Fcns	Sketch the unit circle and represent angles in standard position.
A2.A.61 Trig Fcns	Determine the length of an arc of a circle, given its radius and the measure of its central angle.
A2.A.62 Trig Fcns	Find the value of trigonometric functions, if given a point on the terminal side of angle θ.
A2.A.63 Trig Fcns	Restrict the domain of the sine, cosine, and tangent functions to ensure the existence of an inverse function.
A2.A.64 Trig Fcns	Use inverse functions to find the measure of an angle, given its sine, cosine, or tangent.
A2.A.65 Trig Fcns	Sketch the graph of the inverses of the sine, cosine, and tangent functions.
A2.A.66 Trig Fcns	Determine the trigonometric functions of any angle, using technology.