

# NFC ACADEMY



## COURSE OVERVIEW

Algebra I Honors is a full year, high school credit course that is intended for the student who has successfully mastered the core algebraic concepts covered in the prerequisite course, Mathematics 800 Fundamentals. Within the Algebra I Fundamentals course, the student will explore basic algebraic fundamentals such as evaluating, creating, solving and graphing linear, quadratic, and polynomial functions.

## OBJECTIVES

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- **FOUNDATIONS OF ALGEBRA:** Student will identify different real number properties, and how to use them to solve algebraic expressions.
- **LINEAR EQUATIONS:** Student will translate word problems into algebraic equations, and solve them using real number properties, converting between fractions, decimals, and percent.
- **FUNCTIONS:** Student will understand the characteristics of functions, how to plot them, how to derive their equations, and determine what type of function a graph represents.
- **INEQUALITIES:** Student will write, graph, and solve inequalities using real number properties.
- **LINEAR SYSTEMS:** Student will determine the solution of a pair of linear equations, using the addition method, substitution method and matrices.

- **POLYNOMIALS:** Student will add, subtract, multiply, and divide monomials and polynomials, as well as factor polynomials, using several different methods.
- **EXPONENTIAL AND RADICAL FUNCTIONS:** Student will simplify powers of products, a power raised to a power, and quotients of powers, using the rule of exponents, and add, subtract, multiply, and divide radical expressions to solve equations.
- **QUADRATICS:** Student will identify, write, and graph various triangle, circle and quadratic equations and inequalities using the Pythagorean theorem, and by factoring, completing the square, and using the square root method.
- **RATIONAL EXPRESSIONS:** Student will add and subtract fractions with like and unlike denominators, solve proportions, equations and inequalities containing rational expressions, and solve different word problems using rational equations.
- **PROBABILITY AND STATISTICS:** Student will determine the central tendencies of a given data set, as well as evaluate probability of possible outcomes using multiple methods.

## **CURRICULUM CONTENT & SKILL FOCUS**

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### **UNIT 1: FOUNDATIONS OF ALGEBRA**

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- Identify a variable expression and its components: variable, coefficient, constant.
- Translate expressions written as English phrases into algebraic expressions and interpret algebraic expressions.
- Convert terminating, or repeating decimals to fractions.
- Identify the additive identity and multiplicative inverse of a number.
- Add, subtract, multiply, or divide signed numbers.
- Identify the commutative and associative properties of addition and multiplication, and the distributive property.
- Simplify algebraic expressions by using real number properties, absolute value symbols, order of operations, removing parentheses and combining like terms.

- Recognize the sums or products of non-zero rational and irrational numbers as rational or irrational.

## **UNIT 2: LINEAR EQUATIONS**

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- Translate sentences into algebraic equations.
- Use the addition and multiplication properties of equality to solve equations.
- Solve two-step equations by using both the addition and multiplication properties of equality.
- Solve multi-step equations by combining like terms on one or both sides of the equation first.
- Solve a word problem by writing and solving a related equation.
- Solve word problems with more than two unknowns using an equation.
- Convert between fractions, decimals, and percent.
- Calculate percent increase and decrease.
- Solve investment word problems, and mixture word problems.

## **UNIT 3: FUNCTIONS**

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- Write an equation to express a relationship between coordinates in the plane and find the domain and range of a relation.
- Identify and evaluate a function for a value of the dependent variable using a function rule, graph, or table, and find the value of the independent variable of a function given the dependent variable.
- Identify the graph of a function and graph a function from its equation.
- Identify an arithmetic sequence, find the common difference, extend an arithmetic sequence, and find the  $n$ th term
- Identify a function as being a direct variation, determine the constant of variation, and write the equation of a direct variation.
- Write a linear equation in general form, in slope-intercept form, and graph it by finding solutions of the equation.
- Identify the graph of an absolute value function in the form  $y = |x| + c$ , and  $y = |x + c|$ .
- Find the slope of, and write an equation for, a line parallel, or perpendicular, to a given line.

- Solve and graph piecewise functions and draw their corresponding graph.

## **UNIT 4: INEQUALITIES**

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- Use set builder notation to express a set.
- Graph a set of numbers on the number line and write the set that is represented by a graph.
- Solve an inequality and graph the solution set of an inequality.
- Determine if a value is a solution of an inequality.
- Translate phrases into inequality statements, and solve an inequality using the multiplication property of inequality.
- Write a compound inequality as a union or intersection, graph it, and solve it.
- Solve and graph the solution sets of absolute value equations, and inequalities.

## **UNIT 5: LINEAR SYSTEMS**

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- Identify, and determine, a solution of a linear system graphically, and determine the number of solutions of a linear system.
- Identify if a linear system is consistent, inconsistent, or equivalent.
- Determine if a point, or ordered pair lies in the solution set of a system of linear inequalities.
- Solve a system of two linear equations by the addition method, and substitution method.
- Find the system determinant, x determinant, and y determinant for a system of two linear equations.
- Solve a system of two linear equations algebraically using determinants and containing fractional coefficients.
- Write a system of linear equations to represent and solve a word problem, and coin and pricing problems.

## **UNIT 7: POLYNOMIALS**

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- Recognize a polynomial and the number of terms it has and write a polynomial in descending order.

- Add or subtract polynomials using a horizontal or vertical format.
- Find products of binomials using the FOIL method, and Use shortcuts for squaring a binomial and finding the difference of two squares.
- Divide monomials by monomials.
- Multiply and divide polynomials with more than one term by a monomial and using long division.
- Find the greatest common factor of two or more monomials, or a polynomial, using prime factorization, and factor out the GCF of a polynomial.
- Factor four-term polynomials by grouping, and trinomials into a product of binomials.
- Factor perfect square trinomials, the difference of two perfect squares, and a polynomial into prime factors.

## **UNIT 8: EXPONENTIAL AND RADICAL FUNCTIONS**

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- Evaluate and simplify expressions with zero, negative, and integer exponents.
- Convert between numbers in standard form and scientific notation.
- Simplify powers of products, a power raised to a power, and quotients of powers, using the rule of exponents.
- Identify, find the common ratio, and extend to the  $n$ th term a geometric sequence.
- Simplify square roots that have a perfect square factor, and radicals with fractional radicands.
- Rationalize a fraction.
- Add, subtract, multiply, and divide radical expressions.
- Solve equations with irrational solutions.

## **UNIT 9: QUADRATICS**

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- Determine if the given sides form a right triangle and use the Pythagorean theorem to find the missing length of a side of a right triangle.
- Find the distance between two points and find the coordinates of the midpoint of a line segment given the endpoints.

- Write the equation of a circle whose center is at the origin, determine if a point lies on a circle with center at the origin, and Find the center of a circle given the endpoints of a diameter.
- Identify a quadratic equation and write a quadratic equation in general form.
- Find ordered pairs on the graph of a quadratic function and identify the solutions of a quadratic equation from the related parabola.
- Write the vertex form of a quadratic equation from the given graph and identify the vertex of a parabola from the equation.
- Identify and graph the solution set of a quadratic inequality and determine if a point is a solution of a quadratic inequality.
- Solve quadratic equations having rational or irrational roots by factoring, completing the square, and using the square root method.

## **UNIT 10: RATIONAL EXPRESSIONS**

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- Add and subtract fractions that have a common denominator.
- Determine the lowest common denominator of rational expressions.
- Add rational expressions with unlike denominators.
- Solve proportions, and complex fractions.
- Solve equations containing rational expressions by clearing fractions.
- Solve inequalities containing rational expressions with variables in the numerators.
- Solve time, distance, mixture, and rate problems using rational equations.
- Solve work and pipe flow problems.

## **UNIT 11: PROBABILITY AND STATISTICS**

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- Find the mean, median, mode, the range and inter-quartile range of a given set of data.
- Calculate quartiles of a data set, identify outliers of a data set and determine how they affect a measure of central tendency.
- Interpret data presented in a histogram, a frequency table, a stem-and-leaf plot, box-and-whisker plot, or a graph.
- Collect, organize, and analyze data, and make predictions based on data.

- Determine the number of outcomes, or sample space, of an event using a table, a tree diagram, or using the multiplication principle.
- Evaluate numeric expressions containing factorial notation.
- Evaluate and apply the permutation formula, and combination formula.
- Determine the theoretical probability of a single event, or compound events.

## **REQUIRED RESOURCES**

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Some assignments in this course require the use of resources that must be supplied by the user. These outside resources are listed below by assignment.

## **PERFORMANCE TASKS**

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Each unit of study has Performance Tasks which are a part of the regular assignments for honor's courses. Students are expected to complete all sections of each Performance Tasks successfully.

[Online Scientific Calculator.](#)

<b>ALGEBRA I</b>		
<b>Unit</b>	<b>Assignment Title</b>	<b>Supply List</b>
All	All Assignments	Scratch Paper/Notebook
3,5	Various Assignments	Graph Paper
4,5,9	Various Assignments	Printer

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## **GRADING INFORMATION**

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### **GRADING COMPONENTS**

Lessons	40%
Quizzes	30%
Tests	30%

## **GRADING SCALE**

100-90	A
89-80	B
79-70	C
69-60	D
Below 60	F