

Algebra I Honors

5 credits - Level: Honors (Meets the graduation requirement for algebra)

Grades: 9-10

Prerequisite: Minimum final grade of an A with no more than one B in all four marking periods in 8th grade Honors math (pre-algebra).

Algebra I Honors serves the able and motivated members of the student body. The course assumes that the student has a strong knowledge of mathematics concepts in general and has demonstrated ability in the core foundational concepts and skills underlining algebra. Students will further their exploration and mastery in algebra by studying polynomials, functions, systems of equations, graphing functions and problem solving.

PROFICIENCIES

INTRODUCTION TO ALGEBRA

- simplify numerical expressions and evaluate algebraic expressions
- simplify expressions with & without grouping symbols
- find solution sets of equations over a given domain
- translate phrases into variable expressions
- translate word sentences into equations
- translate simple word problems into equations
- use the 5 step plan to solve word problems over a given domain
- graph real numbers on a number line and to compare real numbers
- use opposites and absolute values

WORKING WITH REAL NUMBERS

- use number properties to simplify expressions
- add real numbers using a number line or properties about opposites
- add real numbers using rules for addition
- subtract real numbers and simplify expressions involving differences
- use the distributive property to simplify expressions

SOLVING EQUATIONS AND PROBLEMS

- solve equations using addition or subtraction
- solve equations using multiplication or division
- solve equations by using more than one transformation
- use the 5 step plan to solve word problems
- solve equations with the variable on both sides
- organize the facts of a problem in a chart
- solve problems involving cost income and value
- prove statements in algebra

POLYNOMIALS

- write and simplify expressions involving exponents
- add and subtract polynomials
- multiply monomials
- find powers of monomials
- multiply a polynomial by a monomial
- multiply polynomials
- transform a formula
- solve some word problems involving uniform motion
- solve some problems involving area
- recognize problems that do not have solutions

FACTORING POLYNOMIALS

- factor integers and find the GCF of several integers
- simplify quotients of monomials and find the GCF of several monomials
- divide polynomials by monomials and find monomial factors of polynomials
- find the product of two binomials mentally
- simplify products of the form $(a+b)(a-b)$ and factor differences of two squares
- find squares of binomials and factor perfect square trinomials
- factor quadratic trinomials whose quadratic coefficient is 1 and whose constant term is positive
- factor quadratic trinomials whose quadratic coefficient is 1 and whose constant term is negative
- factor general quadratic trinomials with integral coefficients
- factor a polynomial by grouping
- factor polynomials completely
- use factoring in solving polynomial equations
- solve problems by writing and factoring quadratic expressions

FRACTIONS

- simplify algebraic expressions
- multiply algebraic fractions
- divide algebraic fractions
- express 2 or more fractions with their LCD
- add and subtract algebraic fractions
- write mixed expressions as fractions in simplest form
- divide polynomials

APPLYING FRACTIONS

- solve problems involving ratios
- solve problems using proportions
- solve equations with fractional coefficients
- solve fractional equations
- work with percents and decimals
- solve problems involving percents
- solve mixture problems
- solve work problems
- use negative exponents
- use scientific notation

INTRODUCTION TO FUNCTIONS

- solve equations in two variables over given domains of the variables
- graph ordered pairs and linear equations in two variables
- find the slope of a line
- use the slope-intercept form of a linear equation
- find an equation of a line given the slope and one point on the line, or given 2 points on the line
- understand what a function is and define a function by using tables and graphs
- define a function by using equations
- graph linear and quadratic functions
- use direct variation to solve problems

SYSTEMS OF LINEAR EQUATIONS

- use graphs to solve systems of linear equations
- use the substitution method to solve systems of linear equations
- use systems of linear equations in 2 variables to solve problems
- use addition or subtraction to solve systems of linear equations in 2 variables
- use multiplication with the addition-or-subtraction method to solve systems of linear equations
- use systems of equations to solve wind and water current problems
- use systems of linear equations to solve digit, age and fraction problems

INEQUALITIES

- transform inequalities in order to solve them
- find the solution sets of combined inequalities
- graph linear inequalities in 2 variables
- graph the solution set of a system of two linear inequalities in 2 variables

RATIONAL AND IRRATIONAL NUMBERS

- learn and apply some properties of rational numbers
- express rational numbers as decimals or fractions
- find the square roots of numbers that have rational square roots
- simplify radicals and to find decimal approximations of irrational square roots
- find square roots of variable expressions and to use them to solve equations and problems
- use the Pythagorean Theorem and its converse to solve geometric problems
- simplify products and quotients of radicals
- simplify sums and differences of radicals
- multiply binomials containing square-root radicals and to rationalize binomial denominators that contain square-root radicals
- solve simple radical equations

QUADRATIC FUNCTIONS

- solve quadratic equations involving perfect squares
- solve quadratic equations by completing the square
- learn the quadratic formula and use it to solve equations
- use the discriminant to find the number of roots of the equation $ax^2+bx+c=0$ and the number of x-intercepts of the graph of the related equation $y=ax^2+bx+c$
- choose the best method for solving a quadratic equation
- use quadratic equations to solve problems
- use quadratic direct variation and inverse variation as a square in problem solving
- solve problems involving joint variation and combined variation