

# High School Mathematics

## Algebra II

Of all high school math courses, Algebra II is probably the most useful and needed course for future work in math, science, and other applied fields of study. Students will study first and second-degree equations and inequalities, the real and complex number systems, systems of equations, matrices, functions, logarithms, sequences and series, and applications of right-triangle trigonometry. The graphing calculator will be utilized throughout the year.

### Learning Opportunities

Group work, independent work, lecture, graphing calculators, marker boards, portfolios, Math labs, real world applications, selected videos, games and activities and note making, Socratic Methods.

### Standards

Fields of Knowledge: Mathematics, Science, Technology

*Mathematical Understanding*

**7.7** Geometric and Measurement Concepts: Students use geometric and measurement concepts.

**7.8** Function and Algebra Concepts: Students use function and algebra concepts.

*Mathematical Problem Solving and Reasoning*

**7.10** Applications: Students use concrete, formal and informal strategies to solve mathematical problems, apply the process of mathematical modeling, and extend and generalize mathematical concepts. Students apply mathematics as they solve scientific and technological problems or work with technological systems.

### Content Knowledge and Skills

**Basic concepts of Algebra**

real numbers and their graphs

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simplifying expressions  
properties of real numbers  
real number operations  
solving equations in one variable  
problem solving with equations

### **Absolute value**

solving inequalities in one variable  
solving combined inequalities  
problem solving using inequalities  
absolute value equations and inequalities

### **Linear equations and functions**

open sentences in two variables  
graphs of linear equations in two variables  
the slope of a line  
finding equations of a line  
systems of linear equations in two variables  
problem solving using systems  
linear inequalities in two variables  
relations  
functions  
linear functions

### **Matrices and determinants**

definition of Terms  
addition and scalar multiplication  
matrix multiplication  
applications of matrices  
determinants  
inverses of matrices  
systems of linear equations in three variables

### **Products and factors of polynomials**

polynomials  
using laws of exponents  
multiplying polynomials  
using prime factorization  
factoring polynomials  
factoring quadratic polynomials

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solving polynomial equations  
problem solving with polynomial equations  
solving polynomial inequalities

### **Rational expressions**

quotients of monomials  
zero and negative exponents  
scientific notation and significant digits  
rational algebraic expressions  
products and quotients of rational expressions  
sums and differences of rational expressions  
complex fractions  
fractional coefficients  
fractional equations

### **Irrational and complex numbers**

roots of real numbers  
properties of radicals  
sums of radicals  
binomials containing radicals  
equations containing radicals  
rational and irrational numbers  
the imaginary number  $i$   
the complex numbers

### **Quadratic equations and functions**

completing the square  
the quadratic formula  
the discriminant  
equations in quadratic form  
graphing quadratic equations  
quadratic functions  
writing quadratic equations and functions

### **Exponential and log functions**

rational exponents  
real number exponents  
composition and inverses of functions  
definition of logarithms  
laws of logarithms  
application of logarithms

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exponential growth and decay  
the natural log function

### **Sequences and series**

types of sequences  
series and sigma notation

## **Assessment Criteria**

*Students are able to:*

simplify an expression involving the basic operations on real numbers

solve a linear equation;

solve a literal equation or formula;

solve a linear inequality

solve an absolute value equation or inequality

organize data using a table or graph;

graph a linear equation;

determine the equation of a line;

graph a linear inequality in two variables;

find a best fitting line for a set of data;

solve a linear system

solve a system of linear inequalities;

simplify an expression containing basic operations on matrices;

solve a system of linear equations using matrices

solve a quadratic equation;

graph a quadratic equation or inequality;

simplify an expression containing complex numbers and basic operations;

identify a function;

use translations or reflections to sketch the graph of a function;

interpret measures of central tendency of a set of data

simplify an expression with real number exponents using the properties of exponents;

solve a radical equation.

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evaluate a logarithmic expression;  
simplify an expression using the properties of logarithms;  
solve an exponential or logarithmic equation

simplify a polynomial;  
solve a polynomial equation;  
factor a polynomial

solve a rational equation;

identify a specific term of an arithmetic or geometric series;  
find the sum of an arithmetic or geometric series

### **Resources**

**Text:** *Algebra II* Larson, Kanold and Stiff. D.C. Heath and Company. 1993