**Curriculum**

**Algebra I**

**Course Overview**

This course introduces and derives the underlying properties of algebra and the number system. Emphasis is placed on the basic skills of algebra: factoring, solving linear equations and systems of linear equations, and graphing of linear functions. The course also introduces second-degree equations and functions and solutions of quadratic equations.

**Department Standards**

Students will be able to comprehend mathematical concepts.

Students will be able to apply mathematical procedures accurately, efficiently, and appropriately.

Students will be able to formulate, represent, and solve mathematical problems.

Students will develop logical mathematical thought and precise mathematical communication.

**Benchmarks**:

Students will be able to:

demonstrate a basic understanding of algebra;

demonstrate an understanding of functions;

write linear equations and functions;

find the products and factors of polynomials;

demonstrate a knowledge of the real number system;

use mathematical modelling to solve problems, and

recognize patterns and use this recognition to solve problems.

**Performance Indicators**

First Quarter

Students will be able to:

translate between words and algebra;

evaluate algebraic expressions;

add and subtract real numbers;

multiply and divide real numbers;

evaluate expressions containing exponents;

evaluate expressions containing roots;

classify numbers within the real number system;

use the order of operations to simplify expressions;

use the commutative, associative, and distributive properties to simplify expressions;

combine like terms;

graph ordered pairs in the coordinate plane;

graph functions from ordered pairs;

solve one-step equations in one variable by using addition or subtraction;

solve one-step equations in one variable by using multiplication or division;

solve equations in one variable that contain more than one operation;

solve equations in one variable that contain variables on both sides;

solve a formula for a given variable;

solve an equation in two or more variables for one of the variables;

solve equations in one variable that contain absolute-value expressions;

write and use ratios, rates, and unit rates;

write and solve proportions;

use proportions to solve problems involving geometric figures; T.S. 3.1

use proportions and similar figures to measure objects indirectly;

solve problems involving percents; T.S 3.1

use common applications of percents;

estimate with percents;

find percent increase and decrease;

identify solutions of inequalities with one variable;

write and graph inequalities with one variable; T.S. 4.2

solve one-step inequalities by using addition or subtraction;

solve one-step inequalities by using multiplication or division;

solve inequalities that contain more than one operation;

solve inequalities that contain variable terms on both sides;

solve compound inequalities with one variable;

graph solution sets of compound inequalities with one variable;

solve inequalities with one variable involving absolute-value expressions.

Second Quarter

Students will be able to:

match simple graphs with situations;

graph the relationship;

identify functions;

find the domain and range of relations and functions;

determine if a relation is a function;

identify independent and dependent variables; T.S. 3.2

write an equation in function notation and evaluate a function for given input values;

graph functions given a limited domain;

graph functions given a domain of all real numbers; T.S. 3.3

create and interpret scatter plots;

use trend lines to make predictions;T.S. 3.2

recognize and extend an arithmetic sequence;

find a given term of an arithmetic sequence;

identify linear functions and equations;

graph linear functions that represent real-world situations and give their domain and range;

find x- and y-intercepts and interpret their meanings in real-world situations; T.S. 4.3

use x- and y-intercepts to graph lines;

find rates of change and slopes;

calculate the slope using the slope formula;

apply the formula for midpoint;

use the distance formula to find the distance between two points;

identify, write, and graph direct variation;

write a linear equation in slope-intercept form;

graph a line using slope-intercept form;

write a linear equation using point-slope form;

identify, graph, and write equations for parallel and perpendicular lines;

identify solutions of systems of linear equations in two variables; T.S. 4.4

solve systems of linear equations in two variables by graphing, substitution, or elimination;

classify systems of linear equations and determine the number of solutions;

graph and solve linear inequalities in two variables;

graph and solve systems of linear inequalities in two variables.

Third Quarter

Students will be able to:

evaluate expressions containing zero and integer exponents;

simplify expressions containing zero and integer exponents;

convert between standard and scientific notation;

use multiplication and division properties of exponents to evaluate and simplify expressions;

evaluate and simplify expressions containing rational exponents;

classify polynomials and write polynomials in standard form;

evaluate polynomial expressions;

add and subtract polynomials;

multiply polynomials including special products of binomials;

write the prime factorization of numbers;

find the GCF of monomials;

factor polynomials by using the greatest common factor;

factor quadratic trinomials of the form ax2 + bx + c; T.S. 4.4

factor perfect-square trinomials;

factor the difference of two squares;

identify quadratic functions;

graph a quadratic function and give its domain and range;

find the equation of the axis of symmetry;

find the zeros of a quadratic function from its graph; T.S. 3.2

find the axis of symmetry and the vertex of a parabola;

graph a quadratic function in the form y = ax2 + bx + c;

graph and transform quadratic functions; T.S. 4.1

solve quadratic equations by graphing;

solve quadratic equations by factoring;

solve quadratic equations by completing the square;

solve quadratic equations by using the Quadratic Formula;

determine the number of solutions of a quadratic equation by using the discriminant.

Fourth Quarter

Students will be able to:

recognize and extend geometric sequences;

find the *n*th term of a geometric sequence;

evaluate exponential functions;

identify and graph exponential functions;

solve problems involving exponential growth and decay; T.S. 3.1

compare linear, quadratic, and exponential functions; T.S. 3.4

identify square root functions and their domains and ranges;

graph square root functions;

simplify radical expressions;

add and subtract radical expressions;

multiply and divide radical expressions;

rationalize denominators;

solve radical equations;

identify, write, and graph inverse variations;

identify excluded values of rational functions;

graph rational functions; T.S. 4.3

simplify rational expressions;

identify excluded values of rational expressions;T.S. 4.4

multiply and divide rational expressions;

add and subtract rational expressions;

divide a polynomial by a monomial or binomial;

solve rational equations;

identify extraneous solutions.

**Assessments**

First Quarter

Daily assignments

Quizzes

Chapter Tests

Second Quarter

Daily assignments

Quizzes

Chapter Tests

Two hour Semester One Exam

Third Quarter

Daily assignments

Quizzes

Chapter Tests

Fourth Quarter

Daily assignments

Quizzes

Chapter Tests

Two hour Semester Two Exam

**Core Topics**

First Quarter

Foundations for Algebra

Equations

Inequalities

Second Quarter

Functions

Linear functions

Systems of equations and inequalities

Third Quarter

Exponents and polynomials

Factoring polynomials

Quadratic Functions and Equations

Fourth Quarter

Exponential and radical functions

Rational functions and equations

**Specific Content**

First Quarter

Variables and expressions

Operations with real numbers

Powers and exponents

Order of operations

Simplifying expressions

Introduction to functions

Solving equations

Solving for a variable

Solving absolute-value equations

Rates, ratios, and proportions

Application of proportions

Percents

Applications of percents

Percent increase and decrease

Graphing and writing inequalities

Solving inequalities

Inequalities with absolute value

Second Quarter

Relations and functions

Writing Functions

Graphing Functions

Scatter plots and trend lines

Identification of Linear Functions

Using intercepts

Rate of change and slope

Slope, midpoint and distance formulas

Direct variation

Slope-intercept form

Point-slope form

Slopes of parallel and perpendicular lines

Systems of equations by graphing

Systems of equations by substitution

Systems of equations by elimination

Special systems

Graphing of Inequalities

Systems of Inequalities

Third Quarter

Integer exponents

Scientific notation

Multiplication and division properties of exponents

Rational exponents

Polynomials

Operations with polynomials

Special products of binomials

Factors and greatest common factors

Factorization of polynomials

Factoring special products

Identification of quadratic functions

Characteristics of quadratic functions

Graphing quadratic functions

Transformations of quadratic functions

Fourth Quarter

Solutions to quadratic equations by graph

Solutions to quadratic equations by factoring

Solutions to quadratic equations by square root

Solutions to quadratic equations by completing the square

The quadratic formula and the discriminant

Arithmetic and geometric sequences

Exponential functions

Exponential growth and decay

Linear, quadratic and exponential models

Radical expressions

Addition and subtraction of radical expressions

Multiplying and dividing radical expressions

Solving radical equations

Inverse variation

Rational functions

Simplification of rational expressions

Operations with rational expressions

Solutions to Rational Equations

**Resources**

Textbook: *Algebra I*, by Burger, Chard, Kennedy, Leinwand, Renfro, Roby and Waits, Holt McDougal 2011

*Punchline - Bridge to Algebra* - Steve Marcy and Janis Marcy

*Pizzazz worksheets* - Steve Marcy and Janis Marcy

Resource worksheets

Geometer’s Sketchpad

SmartBoard

go.hwr.com – homework help

Desmos Graphing Program

GeoGebra Graphing Program