

# CONCEPT MAP

# ALGEBRA I / ALGEBRA I SUPPORT

August 2011

Suggested Sequence:

1. Foundations for Algebra
2. Solving Equations
3. Solving Inequalities
4. An Introduction to Functions
5. Linear Functions
6. Systems of Equations and Inequalities
7. Exponents and Exponential Functions
8. Polynomials and Factoring
9. Quadratic Functions and Equations
10. Radical Expressions and Equations
11. Rational Expressions and Functions
12. Data Analysis and Probability

# ALGEBRA I

## Prioritized Curriculum

CSOs	Essential	Important	Need to Know
M.O.A1.2.1	X		
M.O.A1.2.2	X		
M.O.A1.2.3	X		
M.O.A1.2.4		X	
M.O.A1.2.5	X		
M.O.A1.2.6	X		
M.O.A1.2.7	X		
M.O.A1.2.8		X	
M.O.A1.2.9	X		
M.O.A1.2.10	X		
M.O.A1.2.11		X	
M.O.A1.2.12	X		
M.O.A1.2.13	X		
M.O.A1.2.14	X		
M.O.A1.2.15		X	
M.O.A1.2.16	X		
M.O.A1.2.17	X		
M.O.A1.2.18	X		
M.O.A1.2.19	X		
M.O.A1.2.20		X	
M.O.A1.2.21	X		

## Foundations for Algebra

### Key Concepts:

- Variables and Expressions
- Order of Operations & Evaluating Expressions
- Real Numbers and the Number Line
- Properties of Real Numbers
- Adding and Subtracting Real Numbers
- Multiplying and Dividing Real Numbers
- The Distributive Property
- An Introduction to Equations
- Patterns, Equations, and Graphs

**CSOs: A1.2.1, A1.2.4, A1.2.10, A1.2.21**

Estimated days to complete: 5

### Enduring Understanding:

Introduce students to variables and expressions and explores real-number operations.

### Essential Question(s):

- How can you represent quantities, patterns, and relationships?
- How are properties related to algebra?

### Key Vocabulary:

- Absolute value
- Additive inverse
- Algebraic expression
- Base
- Coefficient
- Constant
- Counterexample
- Deductive reasoning
- Distributive property
- Element of the set
- Equation
- Equivalent expression
- Evaluate
- Exponent
- Inductive reasoning
- Inequality
- Integer
- Irrational number
- Like terms
- Multiplicative inverse
- Natural number
- Numerical expression
- Open sentence
- Opposite
- Order of operations
- Perfect square
- Power
- Quantity
- Radical
- Radicand
- Rational number
- Real number
- Reciprocal
- Set
- Simplify
- Solution of an equation
- Square root
- Subset
- Term
- Variable
- Whole number

## Solving Equations

### Key Concepts:

- Solving One-Step Equations
- Solving Two-Step Equations
- Solving Multi-Step Equations
- Solving Equations with Variables on Both Sides
- Literal Equations and Formulas
- Ratios, Rates, and Conversions
- Solving Proportions
- Proportions and Similar Figures
- Percents
- Change Expressed as a Percent

**CSOs: A1.2.1, A1.2.2, A1.2.3**

Estimated days to complete: 20

### Enduring Understanding:

Students will solve equations and proportions in various settings.

### Essential Question(s):

- What kinds of relationships can proportions represent?
- Can equations that appear to be different be equivalent?
- How can you solve equations?

### Key Vocabulary:

- addition property of equality
- conversion
- cross products
- cross products property
- division property of equality
- equivalent equations
- formula
- identity
- inverse operations
- isolate
- literal equation
- multiplication property of equality
- percent error
- percent change
- percent decrease
- percent increase
- proportion
- rate
- ratio
- relative error
- scale
- scale drawing
- scale model
- similar figures
- subtraction property of equality
- unit analysis
- unit rate

## Solving Inequalities

### Key Concepts:

- Inequalities and Their Graphs
- Solving Inequalities Using Addition or Subtraction
- Solving Inequalities Using Multiplication or Division
- Solving Multi-Step Inequalities
- Working with Sets
- Compound Inequalities
- Absolute Value Equations and Inequalities
- Unions and Intersections of Sets

**CSOs: A1.2.1, A1.2.2**

Estimated days to complete: 15

### Enduring Understanding:

Introduce students to solving inequalities and absolute value equations and inequalities.

### Essential Question(s):

- Can inequalities that appear to be different be equivalent?
- How can you solve inequalities?

### Key Vocabulary:

- Complement of a set
- Compound inequality
- Disjoint set
- Empty set
- Equivalent inequalities
- Intersection
- Interval notation
- Roster form
- Set-builder notation
- Solution of an inequality
- Union
- Universal set

## An Introduction to Functions

### Key Concepts:

- Using Graphs to Relate Two Quantities
- Patterns and Linear Functions
- Patterns and Nonlinear Functions
- Graphing a Function Rule
- Writing a Function Rule
- Formalizing Relations and Functions
- Sequences and Functions

**CSOs: A1.2.5, A1.2.21**

Estimated days to complete: 15

### Enduring Understanding:

Introduces students to the topic of functions.

### Essential Question(s):

- How can you represent and describe functions?
- Can functions describe real-world situations?

### Key Vocabulary:

- Arithmetic sequence
- Common difference
- Continuous graph
- Dependent variable
- Discrete graph
- Domain
- Function
- Function notation
- Input
- Independent variable
- Linear function
- Nonlinear function
- Output
- Range
- Relation
- Sequence
- Term of a sequence
- Vertical line test

## Linear Functions

### Key Concepts:

- Rate of Change and Slope
- Direct Variation
- Slope-Intercept Form
- Point-Slope Form
- Standard Form
- Parallel and Perpendicular Lines
- Scatter Plots and Trend Lines
- Graphing Absolute Value Functions (*Algebra 2 CSO*)

**CSOs: A1.2.5, A1.2.6, A1.2.7, A1.2.8, A1.2.19**

Estimated days to complete: 20

### Enduring Understanding:

Students will graph equations from various forms.

### Essential Question(s):

- What does the slope of a line indicate about the line?
- What information does the equation of a line give you?
- How can you make predictions based on a scatter plot?

### Key Vocabulary:

- Absolute value function
- Direct variation
- Extrapolation
- Interpolation
- Linear equation
- Line of best fit
- Negative correlation
- No correlation
- Opposite reciprocals
- Parallel lines
- Perpendicular lines
- Point-slope form
- Positive correlation
- Rate of change
- Scatter plot
- Slope
- Slope-intercept form
- Standard form of a linear equation
- Trend line
- X-intercept
- Y-intercept

## Systems of Equations and Inequalities

### Key Concepts:

- Solving Systems by Graphing
- Solving Systems Using Substitution
- Solving Systems Using Elimination?
- Applications of Linear Systems
- Linear Inequalities
- Systems of Linear Inequalities

**CSOs: A1.2.1, A1.2. 9**

Estimated days to complete: 15

### **Enduring Understanding:**

Students will graph equations from various forms.

### **Essential Question(s):**

- How can you solve a system of equations or inequalities?
- Can systems of equations model real-world situations?

### Key Vocabulary:

- Consistent
- Dependent
- Elimination method
- Inconsistent
- Independent
- Linear inequality
- Solution of an inequality
- Solution of a system of linear equations
- Solution of a system of linear inequalities
- Substitution method
- System of linear equations
- System of linear inequalities



## Exponents and Exponential Functions

### Key Concepts:

- Zero and Negative Exponents
- Scientific Notation
- Multiplying Powers with the Same Base
- More Multiplication Properties of Exponents
- Division Properties of Exponents
- Exponential Functions
- Exponential Growth and Decay

**CSOs: A1.2.4, A1.2. 15, A1.2.21**

Estimated days to complete: 15

### **Enduring Understanding:**

Students will expand upon their understanding and skills related to exponential expressions.

### **Essential Question(s):**

- How can you represent very large and very small numbers?
- How can you simplify expressions involving exponents?
- What are the characteristics of exponential functions?

### Key Vocabulary:

- Compound interest
- Decay factor
- Exponential decay
- Exponential function
- Exponential growth
- Growth factor
- Scientific notation

## Polynomials and Factoring

### Key Concepts:

- Adding and Subtracting Polynomials
- Multiplying and Factoring
- Multiplying Binomials
- Multiplying Special Cases
- Factoring  $x^2 + bx + c$
- Factoring  $ax^2 + bx + c$
- Factoring Special Cases
- Factoring by Grouping

**CSOs: A1.2.10, A1.2. 11, A1.2.12**

Estimated days to complete: 15

### **Enduring Understanding:**

Students will connect and extend their knowledge of polynomial functions and factoring.

### **Essential Question(s):**

- Can two algebraic expressions that appear to be different be equivalent?
- How are the properties of real numbers related to polynomials?

### Key Vocabulary:

- Binomial
- Degree of a monomial
- Degree of a polynomial
- Difference of two squares
- Factoring by grouping
- Monomial
- Perfect-square trinomial
- Polynomial
- Standard form of a polynomial
- trinomial

## Quadratic Functions and Equations

### Key Concepts:

- Quadratic Graphs and Their Properties
- Quadratic Functions
- Solving Quadratic Equations
- Factoring to Solve Quadratic Equations
- Completing the Square
- The Quadratic Formula and the Discriminant
- Linear, Quadratic, and Exponential Models
- Systems of Linear and Quadratic Equations

**CSOs: A1.2.9, A1.2. 14, A1.2.21**

Estimated days to complete: 15

### Enduring Understanding:

Students will solve quadratic equations using a variety of methods.

### Essential Question(s):

- What are the characteristics of quadratic functions?
- How can you solve a quadratic equation?
- How can you use functions to model real-world situations?

### Key Vocabulary:

- Axis of symmetry
- Completing the square
- Discriminant
- Maximum
- Minimum
- Parabola
- Quadratic equation
- Quadratic formula
- Quadratic function
- Root of an equation
- Vertex
- Zero of a function

## Radical Expressions and Equations

### Key Concepts:

- The Pythagorean Theorem
- Simplifying Radicals
- Operations with Radical Expressions
- Solving Radical Equations (*Algebra 2 CSO*)
- Graphing Square Root Functions (*Algebra 2 CSO*)
- Trigonometric Ratios (*Geom/Trig CSO*)

**CSOs: A1.2.1, A1.2. 9**

Estimated days to complete: 10

### Enduring Understanding:

Students will be introduced to concepts related to the square root operation.

### Essential Question(s):

- How are radical expressions represented?
- What are the characteristics of square root functions?
- How can you solve a radical equation?

### Key Vocabulary:

- Angle of depression
- Angle of elevation
- Conclusion
- Conditional
- Conjugates
- Converse
- Cosine
- Extraneous solutions
- Hypotenuse
- Hypothesis
- Leg
- Like radicals
- Pythagorean theorem
- Radical equation
- Radical expression
- Rationalize the denominator
- Sine
- Square root function
- Tangent
- Trigonometric ratios
- Unlike radicals

## Rational Expressions and Functions

### Key Concepts:

- Simplifying Rational Expressions
- Multiplying and Dividing Rational Expressions
- Dividing Polynomials
- Adding and Subtracting Rational Expressions
- Solving Rational Equations (*Algebra 2 CSO*)
- Inverse Variation
- Graphing Rational Functions

**CSOs: A1.2.5, A1.2.10, A1.2.16, A1.2.21**

Estimated days to complete: 15

### **Enduring Understanding:**

Students will connect and extend upon their knowledge of rational expressions and functions.

### **Essential Question(s):**

- How are rational expressions represented?
- What are the characteristics of rational functions?
- How can you solve a rational equation?

### Key Vocabulary:

- Asymptote
- Constant of variation for an inverse variation
- Excluded value
- Inverse variation
- Rational equation
- Rational expression
- Rational function

## Data Analysis and Probability

### Key Concepts:

- The Pythagorean Theorem
- Simplifying Radicals
- Operations with Radical Expressions
- Solving Radical Equations  
(*Algebra 2 CSO*)
- Graphing Square Root Functions  
(*Algebra 2 CSO*)
- Trigonometric Ratios  
(*Geom/Trig CSO*)

**CSOs: A1.2.18, A1.2.19, A1.2.20**

Estimated days to complete: 10

### Enduring Understanding:

Students will be introduced to the topics of data analysis and probability.

### Essential Question(s):

- How can collecting and analyzing data help you make decisions or predictions?
- How can you make and interpret different representations of data?
- How is probability related to real-world events?

### Key Vocabulary:

- Bias
- Bivariate
- Box-and-whisker plot
- Combination
- Complement of an event
- Compound event
- Dependent events
- Element
- Frequency
- Histogram
- Independent events
- Interquartile range
- Matrix
- Measure of central tendency
- Outcome
- Outlier
- Overlapping events
- Percentile
- Permutation
- Population
- Probability
- Qualitative
- Quantitative
- Quartile
- Range of a set of data
- Sample
- Scalar multiplication
- Univariate