

# **Mercer County Public Schools**

## **PRIORITIZED CURRICULUM**

### **Mathematics Content Maps Algebra II**

**Revised August 07**

# CONCEPT MAP

## ALGEBRA II

Suggested Sequence:

1. Solving Equations/Inequalities
2. Functions and Relations
  - A. Defining
  - B. Graphing Linear Equations/Inequalities
  - C. Finding Linear Equations/Inequalities
3. Solving Linear Systems
4. Quadratic Equations
  - A. Graphing
  - B. Solving
5. Polynomial Functions
6. Conics
7. Rational Expressions
8. Logarithms

WEEKLY PACING GUIDE  
ALGEBRA II  
(based on McDougal Littell Algebra II textbook)

Week 1 and 2	Chapter 1	Equations and Inequalities
Week 3 and 4	Chapter 2	Linear Equations and Functions
Week 5 and 6	Chapters 3 & 4	Solving Linear Systems/ Matrices
Week 7-10	Chapter 5	Quadratic Functions
Week 11-12	Chapter 6	Polynomial Functions
Week 13-14	Chapter 10	Conics
Week 15-16	Chapters 7 & 9	Radical Operations/ Rational Equations
Week 17	Chapter 8	Logarithms
Week 17-18	Testing/Snow Days/ Special Activities	

**Key Concepts:**

Estimated Days to Complete: 10

**Key Vocabulary:**

**Solving 1 Variable  
Equations and  
Inequalities**

**Topic:**  
**Solving Equations/Equalities**  
M.O. A2. (none) A.1.2.2 (review)

All inequality symbols

**Manipulating Formulas  
and Application in real  
world problems**

Order of operations

Linear equations

**Solving Absolute Value  
Equalities/Inequalities**

**Enduring Understanding:**  
Equations or inequalities define a problem.

Absolute value

Distributive property

**Graphing solutions on a  
numberline**

**Essential Question(s):**  
How do equations define real world problems?

**FOIL**  
(supplement)

**Real Numbers and  
Properties of Real  
Numbers**

**Examples:**

Numberline graphing

Special Inequality and  
Inequality procedures

Algebraic Expressions

Apply number  
properties to solving  
equations

Application Word  
Problems

**Key Concepts:**

**Vertical Line Test**

**Mapping**

**Simple functions**

**Slope**

**Discrete Math**

**Estimated Days to Complete: 35**

**M.O. A2.7 2.2.8  
Defining Linear Functions and Relations**

**Enduring Understanding:** Functions create structure.

**Essential Question(s):** Why is a function different from a relation?  
Why do function operations use order of operations?

**Examples:**

**Evaluate simple functions**

**Determine if a relation is a function**

**Introduce counting principal and permutations**

**Determine slope classify lines using slope**

**Key Vocabulary:**

**domain**

**range**

**relation**

**function**

**FOIL**

**Order of operations**

**evaluate**

**coordinates**

**counting priniple**

**factorial**

**permutation**

**horizontal/vertival**

**slone**

**Key Concepts:**

**Standard Form and Slope Intercept Form**

**Absolute Value and Step Functions**

**Direct Variations**

**Graphing Linear Inequalities**

**Scatter Plots and Prediction Lines**

**Estimated Days to Complete: 8**

**Topic:**  
**Graphing Linear Equations and Inequalities**  
**M.O. A 2.2.8**

**Enduring Understanding:** Lines represent relationships

**Essential Question(s):** Why is slope important?  
Explain how a line predicts trends.  
Why are different forms necessary?

**Examples:**

**Use x and y intercepts to graph or chart standard form equations**

**Use slope and y intercepts to graph slope intercept form equations**

**Explore special functions--absolute value, step, direct variation, scatter plots in two variables**

**Graph one variable expressions, inequalities and absolute value on a numberline**

**Graph scatter plots and determine line of best fit and trends**

**Key Vocabulary:**

x intercept

y intercept

slope

all inequality symbols

x -y chart

sample space

correlation

trend line

data prediction

line of best fit

direct variation

**Key Concepts:**

Estimated Days to Complete: 35

**Key Vocabulary:**

**From 2 Points**

M.O. A2.2.1  
Topic 2.2.8  
**Finding Linear Equations/ Inequalities**

**From Point/Slope**

**From Perpendicular/Parallel Slopes**

**Enduring Understanding:** Equations or inequalities define a problem.

**From a Graph**

**Essential Question(s):** How do equations define real world problems?

**Prediction Equation**

**Examples:**

**Write an equation/inequality given 2 points, or point and slope**

**Write equations that are parallel or perpendicular to other equations**

**Find linear equations/inequalities given a graph**

**Make prediction equations given a set of data**

**Key Concepts:**

**Graphing 2D and 3D Systems for equations & inequalities**

**Substitution with 2D and 3D Systems**

**Elimination 2D and 3D Systems**

**Matrix Operations 2D and 3D Systems**

**Cramer's Rule**

**Linear Programming**

**Estimated Days to Complete: 10**

**Topic:  
Solving Linear Systems  
M.O. A2.2.6 2.2.8 2.2.10**

**Enduring Understanding:** There's more than one way to skin a cat. One solution may have many approaches.

**Essential Question(s):** Why can the same information be determined from so many different methods?

When is each method the best choice?

**Examples:**

**Graph 2D or 3D systems to determine solutions**

**Apply Cramer's rule and other matrix operations to solve 2D or 3D systems**

**Use methods of substitution and elimination to solve 2D or 3D systems**

**Use linear programming to determine maximum or minimum values**

**Key Vocabulary:**

**element**

**row / column**

**intercept**

**equation of plane**

**diagonal**

**determinant**

**restrictions**

**consistent**

**dependent**

**independent**

**no unique solution**

**traces**

**Key Concepts:**

**Graph Standard Form  
quadratic Functions**

**Graphing on a  
Calculator**

**Graph Vertex Form  
Quadratic functions**

**Graph Intercept form  
Quadratic Functions**

**Estimated Days to Complete: 5**

**Topic:  
Graphing Quadratic Equations  
M.O. A.2.2.8 2.2.9 2.2.15**

**Enduring Understanding:** Variations on quadratic equation components determine position in a plane.

**Essential Question(s):** How does a quadratic equation define and describe a parabola?

**Examples:**

**Use graphing utilities to represent quadratic equations varying components and describing results**

**Graph standard form vertex form and intercept form equations**

**Deal with unique issues involving graphing inverse functions on a calculator**

**Key Vocabulary:**

**Standard form**

**Vertex form**

**vertex**

**axis of symmetry**

**direction of opening**

**symmetry**

**parabola**

**quadratic function**

**distributive property**

**square root functions**

**intercept form**

**intercepts**

**Key Concepts:**  
**Key Concepts:**

**Factoring  
(Zero Product)**

**Completing Square**

**Quadratic Formula**

**Solve using Square Root  
Principal**

**Complex Numbers  
Operations**

**Solve equations &  
Inequalities by Graphing**

**Writing Quad Functions  
and Quad Regression**

**Estimated Days to Complete: 16**

**Topic:**  
**Solving Quadratic  
Equations/Inequalities**

**M.O. A.2.2.2 2.2.3 2.2.4 2.2.7 2.2.8 2.2.9**

**Enduring Understanding:** Quadratic procedures extend beyond quadratics.

Numbers extend beyond the real.

**Essential Question(s):** How can quadratic equations model real world situations?

How can you apply real number operations to complex?

Why are imaginary numbers necessary?

How can the solution be reached?

**Use zero-product rule  
and factoring to solve  
quadratic equations and  
problems**

**Perform +,-,x,/,  
exponent operations on  
complex numbers**

**Use quadratic formula,  
sq root principal,  
graphing or completing  
square to solve or  
predict zero  
descriptions**

**Define Complex  
Number System using  
Venn diagrams**

**Write quad functions given zeros**

**Key Vocabulary:**

**Zero product property**

**root**

**zeros**

**x intercept**

**solution**

**answer**

**value**

**discriminant**

**complex number system**

**imaginary numbers**

**conjugates**

**irrational numbers**

Estimated Days to Complete: 12

**Key Vocabulary:**

**Exponent Operations  
and Expressions**

**Evaluating and  
Graphing Polynomial  
Functions**

**Factoring and Solving  
Polynomial Functions**

**Finding zeros of  
Polynomial Functions**

**Operations with  
Polynomials**

**Binomial Theorem  
(supplement)**

**Analyze and Find  
Polynomial functions**

**Topic:**  
**Polynomial Functions**  
**M.O.: A.2.2.4 2.2.7 2.2.8**

**Enduring Understanding:** Defining the problem means selecting the appropriate procedural tool.

**Essential Question(s):** How can you use quadratic procedures to solve non-quadratic situations?

**Examples:**

Apply exponent operations when solving polynomial, radical equations and inverse functions

Use division and synthetic division on polynomial functions

Relate Pascal's

Use the binomial theorem and Pascal's triangle to expand binomials

constants

coefficients

degree

polynomials

binomial expansion

index

odd/even functions

synthetic division

zeros

multiplicity

Pascal's triangle

**Key Concepts:**

**Standard Forms for Vertical and Horizontal Parabola**

**Standard Form for Circles**

**Standard Forms for Vertical and Horizontal Ellipses**

**Standard Forms for Vertical and Horizontal Hyperbolas**

**Determine Conic Section**

**Solving Quadratic**

**Estimated Days to Complete: 6**

**Topic:  
Conics  
M.O. A 2.2.12**

**Enduring Understanding:** Planes divide a cone into four distinct figures with distinct descriptive formulas.

**Essential Question(s):** How can you determine the conic section by the equation?

**Examples:**

**Write the equations for each based on specific information**

**Graph the conic figure based on the graphing form of its equation**

**Convert equations from standard form to graphing form; determine the figure and graph it**

**Define the parts of each conic section**

**Key Vocabulary:**

**completing square**

**axis of symmetry**

**direction of opening**

**focus**

**directrix**

**latus rectum**

**center (circle)**

**radius**

**major/minor axis**

**asymtotes**

**Key Concepts:**

**Reducing Rational Expressions**

**Solving Rational Equations**

**Operations on Rational Expressions**

**Simplification and Operations on rational Exponents**

**Composite Functions**

**Inverse Functions**

**Radical Equation Graphing & Operations**

**Estimated Days to Complete: 10**

**Topic:**  
**Rational Expressions**  
**(Nice to Know)**  
**MO: A2.2.4 2.2.7**

**Enduring Understanding:** Basic fractional concepts apply to rational expressions.

**Essential Question(s):** How do you combine numerical and algebraic operations to simplify rational expressions?

**Examples:**

**Simplify rational fractions**

**Add, subtract, multiply and divide rational expressions.**

**Solve rational equations**

**Key Vocabulary:**

**conjugates**

**rational equation**

**solve**

**simplify**

**restrictions**

**composite**

**inverse**

**Key Concepts:**

**Converting log to exponential form.**

**Product/Quotient/and Power Properties**

**Estimated Days to Complete: 3**

**Topic:  
Logarithms  
MO: A 2.2.14**

**Enduring Understanding:** Logs solve a variable exponent.

**Essential Question(s):**  
Why do we need logarithmic functions?

**Examples:**

**Convert from logs to exponential form.**

**Use product, quotient, and power properties.**

**Key Vocabulary:**

**logarithms**

**natural logarithms**

**common logarithms**

**product property**

**quotient property**

**power property**

**e**

## Algebra II

M.S.A2.2	<p>Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will</p> <ul style="list-style-type: none"> <li>• demonstrate understanding of patterns, relations and functions,</li> <li>• represent and analyze mathematical situations and structures using algebraic symbols,</li> <li>• use mathematical models to represent and understand quantitative relationships, and</li> <li>• analyze change in various contexts.</li> </ul>
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Algebra II	Essential	Important	Nice to Know
M.O.A2.2.1 determine equations of lines including parallel, perpendicular, vertical and horizontal lines, and compare and contrast the properties of these equations	X		
M.O.A2.2.2 factor higher order polynomials by applying various methods including factoring by grouping and the sum and difference of two cubes; analyze and describe the relationship between the factored form and the graphical representation.	X		
M.O.A2.2.3 define complex numbers, simplify powers of 'i', perform basic operations with complex numbers, and give answers as complex numbers in simplest form.	X		
M.O.A2.2.4 simplify expressions involving radicals and fractional exponents, convert between the two forms, and solve equations containing radicals and exponents.	X		
M.O.A2.2.5 solve quadratic equations over the set of complex numbers: apply the techniques of factoring, completing the square, and the quadratic formula; use the discriminate to determine the number and nature of the roots; identify the maxima and	X		

minima; use words, graphs, tables, and equations to generate and analyze solutions to practical problems..			
M.O.A2.2.6 develop and use the appropriate field properties of matrices by adding, subtracting, and multiplying; solve a system of linear equations using matrices; and apply skills toward solving practical problems.			X
M.O.A2.2.7 define a function and find its zeros; express the domain and range using interval notation; find the inverse of a function; find the value of a function for a given element in its domain; and perform basic operations on functions including composition of functions	X		
M.O.A2.2.8 analyze families of functions and their transformations; recognize linear, quadratic, radical, absolute value, step, piece-wise, and exponential functions; analyze connections among words, graphs, tables and equations when solving practical problems with and without technology.		X	
M.O.A2.2.9 solve quadratic inequalities, graph their solution sets, and express solutions using interval notation		X	
M.O.A2.2.10 solve and graph the solution set of systems of linear inequalities in two variables by finding the maximum or minimum values of a function over the feasible region using linear programming techniques	X		
M.O.A2.2.11 solve practical problems involving direct, inverse and joint variation			X
M.O.A2.2.12 analyze the conic sections; identify and sketch the graphs of a parabola, circle, ellipse, and hyperbola and convert			X



