MIAMI-DADE COUNTY PUBLIC SCHOOLS
District Pacing Guide

Algebra I **Course Code: 120031001**

Conceptual Category: A: Algebra

Topic IX: Polynomials

Pacing		Date(s)
Traditional	21 days	01/29/14-02/28/14
Block	10 days	01/29/14-02/28/14

COMMON CORE STATE STANDARD(S) & MATHEMATICAL PRACTICE (MP)	NEXT GENERATION SUNSHINE STATE STANDARD(S)	ESSENTIAL CONTENT	OBJECTIVES
MACC. 912. A-APR.1.1: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **(MP.2, MP.7)** **MACC.912.A-SSE.1.2**: Use the structure of an expression to identify ways to rewrite it. *For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).* **(MP.1, MP.2, MP.4, MP.7)** **MACC. 912.A-SSE.2.3**: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.**(MP.2, MP.7)**	**MA.912.A.4.1:** Simplify monomials and monomial expressions using the laws of integral exponents. ***(EOC)*** **MA.912.A.4.2**: Add, subtract, and multiply polynomials ***(FI, EOC)*** **MA.912.A.4.3**: Factor polynomial expressions ***(EOC)*** **MA.912.A.4.4**: Divide polynomials by monomials. ***(EOC)***	***POLYNOMIALS*** A. Simplify Monomial Expressions 1. Properties of Exponents i. Multiplication ii. Division B. Multiplying Polynomials 1. Special Products of Polynomials C. Dividing Polynomials 1. Dividing Polynomials by Monomials D. Factoring Polynomials 1. Factoring by GCF 2. Factoring Trinomials 3. Factoring Special Products	***NGSSS*** • Polynomials terminology • Identify a monomial, binomial, trinomial, and a polynomial • Apply properties of exponents to simplify polynomial expressions • Expand a binomial expression and combine like terms • Factor polynomial expressions, which may include a GCF, difference of two squares, and trinomials • Simplify algebraic ratios • Divide polynomials by monomials

***EOC**: End Of Course* ***FI**: Fall Interim* *WI: Winter Interim*

Algebra I **Course Code: 120031001**

INSTRUCTIONAL TOOLS

Core Text Book: **Prentice Hall Algebra 1. Honors Gold Series Florida**

Benchmark	Suggested Lessons	Teacher Notes
MA.912.A.4.1	7.1, 7.3, 7.4, 7.5	
MA.912.A.4.2	8.1, 8.2, 8.3, 8.4	
MA.912.A.4.3	8.2, 8.5, 8.6, 8.7, 8.8	
MA.912.A.4.4	11.3	

Notes:
The order in which the standards and suggested lessons are listed is not necessary the order of instruction.
Please review each section during your instructional planning and supplement or modify components as needed to best differentiate instruction.

Use ***Algebra 1 EOC Item Specifications*** as a resource document to help define grade-level content.

Vocabulary: monomial, polynomial, factor, greatest common factor (GCF), greatest monomial factor (GMF), difference of squares, perfect square trinomial, distributive property

Instructional Strategies:
The primary strategy for this cluster is to make connections between arithmetic of integers and arithmetic of polynomials. In order to understand this standard, students need to work toward both understanding and fluency with polynomial arithmetic. Furthermore, to talk about their work, students will need to use correct vocabulary, such as integer, monomial, polynomial, factor, and term.

In arithmetic of polynomials, a central idea is the distributive property, because it is fundamental not only in polynomial multiplication but also in polynomial addition and subtraction.

With the distributive property, there is little need to emphasize *misleading mnemonics*, such as FOIL, which is relevant only when multiplying two binomials, and the procedural reminder to "collect like terms" as a consequence of the distributive property. For example, when adding the polynomials 3x and 2x, the result can be explained with the distributive property as follows: $3x + 2x = (3 + 2)x = 5x$.

For polynomials, students need to reason that the sum (difference or product) of any two polynomials is indeed a polynomial. At first, restrict attention to polynomials with integer coefficients. Later, students should consider polynomials with rational or real coefficients and reason that such polynomials are closed under these operations.

For contrast, students need to reason that polynomials are not closed under the operation of division: The quotient of two polynomials is not always a polynomial. For example $(x^2 + x) \div x$ is not a polynomial. Of course, the quotient of two polynomials is sometimes a polynomial. For example, $(x^2 - 9) \div (x - 3) = x + 3$.

Hands-on materials, such as algebra tiles, can be used to establish a visual understanding of algebraic expressions and the meaning of terms, factors and coefficients. Technology may be useful to help a student recognize that two different expressions represent the same relationship. For example, since $(x – y)(x + y)$ can be rewritten as $x^2 – y^2$, they can put both expressions into a graphing calculator (or spreadsheet) and have it generate two tables (or two columns of one table), displaying the same output values for each expression.

Algebra I **Course Code: 120031001**

COMMON CORE STATE STANDARDS MATHEMATICAL PRACTICES	
	DESCRIPTION
MACC.K12.MP.1 (back to top) Make sense of problems and persevere in solving them.	Mathematically proficient students will be able to: • Explain the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals. • Make conjectures about the form and meaning of the solution and plan a solution pathway. • Consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Check answers to problems using a different method, and continually ask, “Does this make sense?” • Identify correspondences between different approaches.
MACC.K12.MP.2 (back to top) Reason abstractly and quantitatively.	Mathematically proficient students will be able to: • Make sense of quantities and their relationships in problem situations. • Decontextualize—to abstract a given situation and represent it symbolically. • Contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols • Create a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them. • Know and be flexible using different properties of operations and objects.
MACC.K12.MP.3 (back to top) Construct viable arguments and critique the reasoning of others.	Mathematically proficient students will be able to: • Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases, and can recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. • Determine domains to which an argument applies.
MACC.K12.MP.4 (back to top) Model with mathematics.	Mathematically proficient students will be able to: • Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. • Use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Apply what they know and feel comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze relationships mathematically to draw conclusions. • Interpret mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Algebra I **Course Code: 120031001**

COMMON CORE STATE STANDARDS MATHEMATICAL PRACTICES	
	DESCRIPTION
MACC.K12.MP.5 (back to top) Use appropriate tools strategically.	Mathematically proficient students will be able to: • Consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. • Make sound decisions about when each of the tools appropriate for their grade or course might be helpful, recognizing both the insight to be gained and their limitations. Example: High school students analyze graphs of functions and solutions using a graphing calculator. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts
MACC.K12.MP.6 (back to top) Attend to precision.	Mathematically proficient students will be able to: • Communicate precisely to others. • Use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Be careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.
MACC.K12.MP.7 (back to top) Look for and make use of structure.	Mathematically proficient students will be able to: • Discern a pattern or structure. Example: In the expression $x^2 + 9x + 14$, students can see the *14* as 2×7 and the *9* as $2 + 7$. • Recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. Step back for an overview and shift perspective. • See complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. Example: They can see $5 – 3(x – y)^2$ as *5* minus a positive number times a square and use that to realize that its value cannot be more than *5* for any real numbers x and y.
MACC.K12.MP.8 (back to top) Look for and express regularity in repeated reasoning.	Mathematically proficient students will be able to: • Notice if calculations are repeated, and look both for general methods and for shortcuts. Example: Noticing the regularity in the way terms cancel when expanding (x-1)(x+1),(x-1)(x2+x+1),and(x-1)(x3 +x2+x+1)might lead them to the general formula for the sum of a geometric series. • Maintain oversight of the process, while attending to the details as they work to solve a problem. • Continually evaluate the reasonableness of their intermediate results.

NEXT GENERATION SUNSHINE STATE STANDARDS

Standard 4: Linear Polynomials: Students solve linear equations and inequalities. Perform operations on polynomials. Find factors of polynomials, learning special techniques for factoring quadratics.

BENCHMARK CODE	BENCHMARK DESCRIPTION
MA.912.A.4.1 (back to top) **MC/FR**	Simplify monomials and monomial expressions using the laws of integral exponents. ***Remarks/Examples*** **Example 1:** Simplify $(3a^3)(12a^2)$ **Example 2:** Simplify: $\frac{15x^7}{3x^5},\ x \neq 0$ **Example 3:** Simplify: $(3z^4)^3$ **Example 4:** Simplify: $(a^0),\ a \neq 0$ **Example 5:** Simplify: $(3xy)^3$ **Example 6:** Simplify: $\frac{10}{x^{-4}}$ **Example 7:** Simplify: $\left(\frac{a^2b^5}{ab^2}\right),\ a \neq 0,\ b \neq 0$ ***Cognitive Complexity:*** Low ***Clarification (EOC):*** Students will apply the laws of exponents to simplify monomials and monomial expressions with integral exponents. ***Content Limits (EOC):*** • Exponents should adhere to the general content limits. • Items must have a variable base and may include a numerical base. • Monomials may have no more than three variables. • Items may use negative exponents.
MA.912.A.4.2 (back to top) **MC/FR**	Add, subtract, and multiply polynomials ***Remarks/Examples*** Example 1: $(4x^2 - 7x + 2) - (x^2 + 4x - 5) = ?$ Example 2: $(n + 2)(4n - 5) = ?$ ***Cognitive Complexity:*** Low ***Clarification (EOC):*** Students will simplify (add, subtract, and multiply) polynomial expressions. ***Content Limits (EOC):*** • Items requiring multiplication of polynomials are limited to a product of: two monomials, a monomial and a binomial, a monomial and a trinomial, or two binomials. • Items requiring addition and subtraction are limited to combining monomials, binomials, and/or trinomials. The simplified sum or difference should contain no more than five terms.

Standard 4: Linear Polynomials: Students solve linear equations and inequalities. Perform operations on polynomials. Find factors of polynomials, learning special techniques for factoring quadratics.

BENCHMARK CODE	BENCHMARK DESCRIPTION
MA.912.A.4.3 (back to top) **MC**	Factor polynomial expressions. ***Remarks/Examples:*** Example 1: Factor $36xy^2 + 18xy^4 - 12x^2y^4$ Example 2: Factor $2x^2 - 7x + 3$ ***Cognitive Complexity:*** Moderate ***Clarification (EOC):*** Students will completely factor polynomial expressions, which may include a greatest common factor, difference of two squares, and trinomials. Students will use factoring methods to simplify rational expressions. (Also assesses **MA.912.A.5.1**) ***Content Limits (EOC):*** • All monomials in items will have, at most, two variables. • Coefficients must be integers. • In items requiring first factoring the greatest common factor and then factoring the remaining polynomial, the remaining polynomial must have a maximum degree of two.
MA.912.A.4.4 (back to top) **MC**	Divide polynomials by monomials. ***Remarks/Examples:*** Example 1: Simplify $\frac{4x^3y^2 + 8xy^4 - 6x^2y^5}{2xy^2}$ ***Cognitive Complexity:*** Moderate ***Clarification (EOC):*** Students will divide polynomials by monomials. ***Content Limits (EOC):*** • Items will be limited to dividing a polynomial by a monomial. • Synthetic division will not be assessed.

Algebra I **Course Code: 120031001**

TECHNOLOGY TOOLS

FLORIDA FOCUS http://focus.florida-achieves.com
Sign-in and Password: First 4 letters of Last Name and Last 4 Digits Employee Number. Example: abcd1234
MA.912.A.4.1 **MA.912.A.4.2** **MA.912.A.4.3** **MA.912.A.4.4**

GRAPHING CALCULATOR ACTIVITIES		
CONTENT FOCUS	**TITLE**	**SITE**
Polynomials	Factored Polynomials	http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=6168
	Multiplying Binomials	http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=6036

GIZMO CORRELATION
GIZMO TITLE
Modeling the Factorization of ax^2+bx+c
Modeling the Factorization of x^2+bx+c
Factoring Special Products

TOPIC IX	NBC LEARN K-12
VIDEO TITLE	
Scientists Issue Dire Warning About Global Warming	
European Weather Forecasts Superior to U.S. Models	
IMAGE	

TOPIC IX	DISCOVERY EDUCATION CORRELATION
VIDEO TITLE	
Reviewing Polynomials: Multiplying Negative & Positive Signs	
Illustrating Rules with Example Problems	
Another Method of Multiplying: Lining Up the Expressions	
From Factoring Numbers to Factoring Polynomials	
Applying the Distributive Law to Factoring	

Algebra I **Course Code: 120031001**

TOPIC IX	DISCOVERY EDUCATION CORRELATION
Factoring with the Coefficients of Terms	
Factoring by Inspection	
Introduction: Radical Hiking Shortcut	
SKILL BUILDER	
Tile Trials: Modeling and Adding Polynomials	
MODEL LESSON	
Powerful Polynomials: Session 2: Polynomial Interpretation	
Powerful Polynomials: Session 3: Functional Factors	
Polynomials Are Everywhere!: Session 2: Quadratic Flight	
MATH OVERVIEW	
Algebra I: Adding and Subtracting Polynomials	
Algebra I: Modeling Polynomial Multiplication	

MIAMI-DADE COUNTY PUBLIC SCHOOLS
District Pacing Guide

Algebra I **Course Code: 120031001**

Date	Pacing Guide Standards	Data Driven Standard(s)	Activities	Assessment(s)	Strategies
Traditional 21 days Blocks 10 days 01/29/14-02/28/14	**MA.912.A.4.1 (EOC)** **MA.912.A.4.2 (FI, EOC)** **MA.912.A.4.3 (EOC)** **MA.912.A.4.4 (EOC)**				