CORRELATION
of
the 10 UNDERSTANDING MATH PLUS PROGRAMS
with
GEORGIA MATHEMATICS PERFORMANCE STANDARDS
MATHEMATICS 1

Note: a. The Understanding Math PLUS series of programs consist of 10 programs written for Kindergarten to 10th Grade.

The 10 programs are:

Understanding Fractions
Understanding Probability
Understanding Exponents
Understanding Algebra
Understanding Numeration
Understanding Measurement and Geometry
Understanding Whole Numbers and Integers
Understanding Percent
Understanding Equations
Understanding Graphing

Note: b. The Understanding Numeration software for K to 3 is set up so that the teacher selects items in the following order:
Concept .. from 5 concepts .. Counting, Comparing & Ordering, Place Value, Operations and Problem Solving.
Skill .. chosen from the list of specific learning expectations
Level .. indicates the levels of development for Kindergarten to 3rd grade.

Level	Upper Range of Number
A	**10**
B	**20**
C	**100**
D	**1000**

Lesson .. 250 lessons are sequenced to build understanding of concepts.
A detailed Lesson Synopsis on the website www.neufeldmath.com to assist the teacher by stating the lesson contents but also by giving lesson suggestions.
Worksheet .. off computer worksheets are selected from the CD by a code.

Note: c. The remaining 9 Understanding Math programs for 4th to 10th grade are set up so that they can be used in a variety of teaching and learning environments ranging from a teacher centered approach with 1 computer to a student centered lab approach. The lessons can also be used in remediation, tutorial, intervention, resource, fast-tracking.
Each topic has:
..an interactive concept introduction, usually with a variety of graphic approaches.
..a number of particular examples
..practice questions with random questions but particular feedback
..a topic test with random questions and tracking
..off computer worksheets selected from the website .. www.neufeldmath.com

ALGEBRA

Students will explore functions and solve simple equations. Students will simplify and operate with radical, polynomial, and rational expressions.

Standard	Understanding Math PLUS Program and Lesson
MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.	
a. Represent functions using function notation.	**Understanding Math PLUS** **Understanding Graphing** **Topic 5: Relations, Equations, and Functions** Functions What is a Function – Examples 1,2,3 Vertical Line Test Examples 1, 2, 3 Function Notation Examples 1,2
b. Graph the basic functions $f(x) = x$, where $n = 1$ to 3, $f(x) = \sqrt{x}$, $f(x) = \|x\|$, and $f(x) = 1/x$.	
c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the x- and y-axes.	**Understanding Math PLUS** **Understanding Graphing** **Topic 4: Transformations** Reflections Object to Image We Say, We Write Reflection Mapping Rule Examples
d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.	**Understanding Math PLUS** **Understanding Graphing** **Topic 5: Relations, Equations, and Functions** Function Notation Examples 1,2 Patterns to Words to Equations Examples 1,2,3,4 Practice Questions; Topic Test
e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior. f. Recognize sequences as functions with domains that are whole numbers. g. Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare root, and other function families. h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither. i. Understand that any equation in x can be interpreted as the equation $f(x) = g(x)$, and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$	
MM1A2. Students will simplify and operate with radical expressions, polynomials, and rational expressions.	
a. Simplify algebraic and numeric expressions involving square root. b. . Perform operations with square roots.	**Understanding Math PLUS** **Understanding Exponents** **Topic 5: Square Root** Examples Questions 1. Radicals First 2. The Four Equations 3. Lawn Question

Make a Square
Practice Questions; Topic Test

c. Add, subtract, multiply, and divide polynomials.

Understanding Math PLUS
Understanding Algebra
Topic 5: Adding Expressions
Adding Expressions without Tiles
Examples 1,2
Practice Questions with Tiles
Practice Questions without Tiles
Topic Test

Topic 6: Subtracting Expressions
Subtracting Expressions without Tiles
Practice Questions; Topic Test

Topic 7: Multiplying Expressions
Multiplying Monomials and Polynomials
With Tiles…Examples 1,2,3,4
Without Tiles
Multiplying Binomials
With Tiles…Examples 1,2
Without Tiles
Pattern
Examples…True or False
Examples 1,2,3
Practice Questions; Topic Test

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

Understanding Math PLUS
Understanding Fractions
Topic 8: Adding Fractions
Word Problems
Alexander's Friends
Eating Candy
Goal Scoring
Taking a Walk
Fraction Card Game
Magic Square
Practice Questions; Topic Test

Topic 9: Subtracting Fractions
Word Problems
Pedro and Alex Race
Washing the Cars
Planting a Garden
Practice Questions; Topic Test

Topic 10: Multiplying Fractions
Word Problems
Boris' Money
Maria's Trip
A Summary
The Meaning of "OF"
Order in Multiplying
Examples 1,2
Multiplying Fractions with Large Numbers
Examples 1,2
Practice Questions; Topic Test

Topic 14: Dividing Fractions

Examples without Diagrams
Numerical Examples 1,2
Central High School
Practice Questions; Topic Test

e. Factor expressions by greatest common factor, grouping, trial and error, and
special products limited to the formulas below.
$(x + y)^2 = x^2 + 2xy + y^2$
$(x - y)^2 = x^2 - 2xy + y^2$
$(x + y)(x - y) = x^2 - y^2$
$(x + a)(x + b) = x^2 + (a + b)x + ab$
$(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$
$(x - y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$

Understanding Math PLUS
Understanding Algebra
Topic 8: Factoring Expressions
Our Problem
Common Factoring
With Tiles
Examples 1,2 – Methods 1,2
Without Tiles
GCF
Examples 1,2
Factoring Trinomials
With Tiles – Examples 1,2
The Pattern
Without Tiles – Examples 1,2
Difference of Squares
Examples 1,2,3,4
Factoring by Grouping – Concept
Examples 1,2,3,4,5
Summary
Examples 1,2,3,4

f. Use area and volume models for polynomial arithmetic.

Understanding Math PLUS
Understanding Measurement and Geometry
Topic 9: Ratios for Areas and Volumes
In This Topic
Ratios for Areas and Volumes
Introduction
Area Ratios
Volume Ratios

MM1A3. Students will solve simple equations.
a. Solve quadratic equations in the form $ax + bx + c = 0$, where $a = 1$, by using factorization and finding square roots where applicable.

Understanding Math PLUS
Understanding Graphing
Topic 9: Quadratic Functions
Introductory Examples
Examples 1,2
Summary Examples 1,2
Definitions
Parabolas
Quadratic Functions
The Role of *a*
The Plan: $a = 1,2,3$; $a = -1, -2, -3$
The Role of *b*
Examples 1,2,3,4
Summary and Pattern
In General
Intercepts of a Quadratic Function
Method 1: Graphing; Method 2: Factoring (if possible);
Method 3: Using the Quadratic Formula

b. Solve equations involving radicals such as $\sqrt{x} + b = c$, using algebraic techniques.
c. Use a variety of techniques, including technology, tables, and graphs to solve equations resulting from the investigation of $x2 + bx + c = 0$.

Understanding Math PLUS
Understanding Graphing

Topic 9: Quadratic Functions
Maximize Cage Area
Trial and Error
Use Quadratic Function
Graph
Conclusions
Summary
Maximize Potato Income
Trial and Error
Use Quadratic Function
Graph
Summary
Bob's Beach Ball
Find Maximum Height
Graph Equation
Summary

d. Solve simple rational equations that result in linear equations or quadratic equations with leading coefficient of 1.

GEOMETRY

Students will explore, understand, and use the formal language of reasoning and justification. Students will apply properties of polygons and determine distances and points of concurrence.

Standard	Understanding Math PLUS Program and Lesson
MM1G1. Students will investigate properties of geometric figures in the coordinate plane.	
a. Determine the distance between two points.	
b. Determine the distance between a point and a line.	
c. Determine the midpoint of a segment.	
d. Understand the distance formula as an application of the Pythagorean theorem.	
e. Use the coordinate plane to investigate properties of and verify conjectures related to triangles and quadrilaterals.	
MM1G2. Students will understand and use the language of mathematical argument and justification.	
a. Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate.	
b. Understand and use the relationships among a statement and its converse, inverse, and contrapositive.	
MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.	
a. Determine the sum of interior and exterior angles in a polygon.	**Understanding Math PLUS** **Understanding Measurement and Geometry** **Topic 6: Angles and Polygons** Angles in Polygons Methods 1,2 Exterior Angles in a Polygon Practice Questions; Topic Test
b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.	

c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).
d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.
e. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.

Understanding Math PLUS
Understanding Measurement and Geometry
Topic 7: Constructions
Circumcircle
Centroid
Angle Bisector
Incircle
Perpendicular from Point on Line
Perpendicular from Point off Line
Orthocentre

DATA ANALYSIS AND PROBABILITY

Students will use counting techniques and determine probability. Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data.

Standard	Understanding Math PLUS Program and Lesson
MM1D1. Students will determine the number of outcomes related to a given event.	
a. Apply the addition and multiplication principles of counting.	
b. Calculate and use simple permutations and combinations.	
MM1D2. Students will use the basic laws of probability.	
a. Find the probabilities of mutually exclusive events.	
b. Find the probabilities of dependent events.	**Understanding Math PLUS** **Understanding Probability** **Topic 8: Dependent Events** In This Topic What Are They? Independent Events Dependent Events Examples 1,2 Probability – Examples 1,2,3 Patterns and Summary – Examples 1,2,3,4 Practice Questions; Topic Test
c. Calculate conditional probabilities.	
d. Use expected value to predict outcomes.	
MM1D3. Students will relate samples to a population.	
a. Compare summary statistics (mean, median, quartiles, and interquartile range) from one sample data distribution to another sample data distribution in describing center and variability of the data distributions.	
b. Compare the averages of the summary statistics from a large number of samples to the corresponding population parameters.	
c. Understand that a random sample is used to improve the chance of selecting a representative sample.	
MM1D4. Students will explore variability of data by determining the mean absolute deviation (the average of the absolute values of the deviations).	