

**CORRELATION
of
the 10 UNDERSTANDING MATH PLUS PROGRAMS
with
GEORGIA MATHEMATICS PERFORMANCE STANDARDS
EIGHTH Grade**

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

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

NUMBER AND OPERATIONS

Students will understand the numeric and geometric meaning of square root, apply properties of integer exponents and use scientific notation.

Standard

M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.

- a. Find square roots of perfect squares.
- b. Recognize the (positive) square root of a number as a length of a side of a square with a given area.

- c. Recognize square roots as points and as lengths on a number line.
- d. Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign.
- e. Recognize and use the radical symbol to denote the positive square root of a positive number.

- f. Estimate square roots of positive numbers.
- g. Simplify, add, subtract, multiply, and divide expressions containing square roots.

Understanding Math PLUS Program and Lesson

MAT+ Understanding Exponents

Topic 5: Square Root

Squaring Numbers
Square Roots

MAT+ Understanding Exponents

Topic 5: Square Root

Examples Questions

1. Radicals First
2. The Four Equations
3. Lawn Question
4. Make a Square

MAT+ Understanding Exponents

Topic 5: Square Root

Radical Signs
Square Roots of Negative Numbers

MAT+ Understanding Algebra

Topic 5: Adding Expressions

Our Problem
Adding Expressions with X and Y Tiles
Examples 1,2,3
Adding Expressions with X-Squared Tiles
Examples 1,2,3

Topic 6: Subtracting Expressions

Our Problem
Subtracting Expressions with X and Y Tiles
Concept
Examples 1,2
Subtracting Expressions with X-squared Tiles
Examples 1,2

Topic 7: Multiplying Expressions

Our Problem
Recall Tile Concepts
Multiplying Monomials
Like Terms
With Tiles
Without Tiles
Multiplying Monomials and Polynomials
With Tiles... Examples 1,2,3,4
Without Tiles

- h. Distinguish between rational and irrational numbers.
- i. Simplify expressions containing integer exponents.

MAT+ Understanding Algebra

Topic 5: Adding Expressions

- Our Problem
- Adding Expressions with X and Y Tiles
Examples 1,2,3
- Adding Expressions with X-Squared Tiles
Examples 1,2,3

Topic 6: Subtracting Expressions

- Our Problem
- Subtracting Expressions with X and Y Tiles
Concept
Examples 1,2
- Subtracting Expressions with X-squared Tiles
Examples 1,2

Topic 7: Multiplying Expressions

- Our Problem
- Recall Tile Concepts
- Multiplying Monomials
Like Terms
With Tiles
Without Tiles
- Multiplying Monomials and Polynomials
With Tiles...Examples 1,2,3,4
Without Tiles

- j. Express and use numbers in scientific notation.

MAT+ Understanding Exponents

Topic 4: Scientific Notation

- Why Use Scientific Notation?
- Scientific Notation for Large Numbers
Introduction
Chart
The Rule
The Rule
The Steps
- Scientific Notation for Small Numbers
Introduction
Chart
The Steps

- k. Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.

GEOMETRY

Students will use and apply geometric properties of plane figures, including congruence and the Pythagorean theorem.

M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence.

- a. Investigate characteristics of parallel and perpendicular

MAT+ Understanding Measurement and Geometry

lines both algebraically and geometrically.

b. Apply properties of angle pairs formed by parallel lines cut by a transversal.

c. Understand the properties of the ratio of segments of parallel lines cut by one or more transversals.

d. Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent.

M8G2. Students will understand and use the Pythagorean theorem.

a. Apply properties of right triangles, including the Pythagorean theorem.

b. Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.

Topic 6: Angles and Polygons

In This Topic

Parallel Lines

Example with Parallel Lines

Examples 1,2

Angles in Triangles

Exploration

An Explanation

Exterior Angles – Example

Angles in Polygons

Methods 1,2

Exterior Angles in a Polygon

Practice Questions; Topic Test

MAT+ Understanding Exponents

Topic 6: Pythagorean Theorem

In This Topic

The Right Triangle

Math or Magic?

Introduction

Omar's Rope Trick #1, #2

Our Rope Trick

Squares on a Grid

Examples 1-4

Squares on the Sides of a Right Triangle

Triangles 1,2,3

The Pythagorean Theorem

The Pattern

In General

Theorem

Example Questions

Example 1 – Pole Example

Example 2 – Tower Example

Example 3 – Walking Example

Example 4 – Lake Example

Example 5 – Geometric Example

Practice Questions; Topic Test

ALGEBRA

Students will use linear algebra to represent, analyze and solve problems. They will use equations, tables, and graphs to investigate linear relations and functions, paying particular attention to slope as a rate of change.

M8A1. Students will use algebra to represent, analyze, and solve problems.

a. Represent a given situation using algebraic expressions or equations in one variable.

MAT+ Understanding Equations

Topic 4: Solving Multi-Step Equations

Our Problem

- b. Simplify and evaluate algebraic expressions.
- c. Solve algebraic equations in one variable, including equations involving absolute values.
- d. Interpret solutions in problem contexts.

M8A2. Students will understand and graph inequalities in one variable.

- a. Represent a given situation using an inequality in one variable.

- b. Use the properties of inequality to solve inequalities.
- c. Graph the solution of an inequality on a number line.
- d. Interpret solutions in problem contexts.

M8A3. Students will understand relations and linear functions.

- a. Recognize a relation as a correspondence between varying quantities.

- b. Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique.
- c. Distinguish between relations that are functions and those that are not functions.
- d. Recognize functions in a variety of representations and a variety of contexts.

Concepts – Examples with/without Tiles
Examples 1,2,3,4,5

Summary

Literal Equations

What are They?

How do you solve them?

Why Solve Literal Equations?

A Perimeter Example

A Temperature Example

Practice Questions; Topic Test

MAT+ Understanding Equations

Topic 7: Solving Inequalities

Comparing Integers

The Integer Line

Example 1 ...Great Than; Example

2...Less Than

Explanation

Example 3...Greater Than; Example

4...Less Than

Greater Than or Less Than

Inequalities

What are They?

Inequality vs. Equation

Summary of Relationships

MAT+ Understanding Equations

Topic 7: Solving Inequalities

Inequality on the Number Line

Examples 1-4

Solving Inequalities

Examples 1-6

MAT+ Understanding Graphing

Topic 5: Relations, Equations, and Functions

In this topic

Relations

What is a Relation?

Domain and Range

Example 1 – Triangles

Example 2 – Tiles, Part 1

Example 3 – Tiles, Part 2

Example 4 – Running

Example 5 – Hit the Ball

MAT+ 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

Patterns to Words to Equations

Examples 1,2,3,4

e. Use tables to describe sequences recursively and with a formula in closed form.

f. Understand and recognize arithmetic sequences as linear functions with whole- number input values.

g. Interpret the constant difference in an arithmetic sequence as the slope of the associated linear function.

h. Identify relations and functions as linear or nonlinear.

i. Translate among verbal, tabular, graphic, and algebraic representations of functions.

M8A4. Students will graph and analyze graphs of linear equations.

a. Interpret slope as a rate of change.

b. Determine the meaning of the slope and y-intercept in a given situation.

c. Graph equations of the form $y = mx + b$.

MAT+ Understanding Graphing

Topic 6: Linear Relations

In This Topic

What is a Linear Relation?

Graphs of Linear Relations

Concept

Examples 1 through 6

The Taxi Example – Setup Equation – Graph Equation

The Elastic Example – Setup Equation – Graph Equation

Lightning Example – Setup Equation – Graph Equation

MAT+ Understanding Graphing

Topic 7: Slope of a Line

Formula

Parallel Lines

Examples 1,2,3

Perpendicular Lines

Examples 1,2,3

Positive and Negative Slopes

Examples 1,2,3,4

Pattern

Sketch Line Given Point and Slope

Examples 1,2,3,4

Slopes of Parallel Lines

Examples 1,2,3

Slopes of Perpendicular Lines

Examples 1,2,3

Pattern

MAT+ Understanding Graphing

Topic 5: Relations, Equations, and Functions

Vertical Line Test

Examples 1, 2, 3

MAT+ Understanding Graphing

Topic 7: Slope of a Line

Sketch Line Given Point and Slope

Examples 1,2,3,4

MAT+ Understanding Graphing

Topic 8: Equation of a Straight Line

Graph $y = mx + b$

Examples 1,2,3,4

Patterns to Summary

- d. Graph equations of the form $ax + by = c$.
- e. Determine the equation of a line given a graph, numerical information that defines the line, or a context involving a linear relationship.

MAT+ Understanding Graphing
Topic 8: Equation of a Straight Line
 Slope y-intercept Equation
 Concept
 Examples 1,2,3,4
 Parallel and Perpendicular Lines
 Concepts 1,2
 Examples 1,2,3,4
 Slope – Point Form of the Equation
 Example 1: Solutions 1,2
 Example 2 : Solution 1,2,3,4
 Special Cases
 Example 1 – Zero Slope
 Example 2 – Undefined
 Example to Summarize

- f. Solve problems involving linear relationships.

MAT+ Understanding Graphing
Topic 6: Linear Relations
 The Taxi Example – Setup Equation – Graph Equation
 The Elastic Example – Setup Equation – Graph Equation
 Lightning Example – Setup Equation – Graph Equation
 Line of Best Fit
 Examples 1, 2
 Practice Questions; Topic Test

M8A5. Students will understand systems of linear equations and use them to solve problems.

- a. Given a problem context, write an appropriate system of linear equations.

MAT+ Understanding Graphing
Topic 8: Equation of a Straight Line
 Word Problems/Applications
 The Taxi
 Cases 1,2
 Find Equation
 Graph Equation
 Interpret Equation
 Summary
 The Walker
 Basketball
 Food

- b. Solve systems of equations graphically and algebraically, using technology as appropriate.

MAT+ Understanding Equations
Topic 5: Word Problems
 Area of Walls
 Chemistry
 Pools Puzzler – The First Problem
 Perimeter Problem with Diagram
 Money Problem with Chart
 Age Problem with Chart
 Buying CDs
 Meat Mixture
 Coffee Mixture
 Rate of Work
 Summary: Problem Solving Using Equations

- c. Interpret solutions in problem contexts.

DATA ANALYSIS AND PROBABILITY

Students will use and understand set theory and simple counting techniques; determine the theoretical probability of simple events; and make inferences from data, particularly data that can be modeled by linear functions.

M8D1. Students will apply basic concepts of set theory.

- a. Demonstrate relationships among sets through use of Venn diagrams.
- b. Determine subsets, complements, intersection, and union of sets.
- c. Use set notation to denote elements of a set.

M8D2. Students will determine the number of outcomes related to a given event.

- a. Use tree diagrams to find the number of outcomes.

MAT+ Understanding Probability

Topic 1 : An Introduction to Probability

Tree Diagrams
Meals
Socks

- b. Apply the addition and multiplication principles of counting.

M8D3. Students will use the basic laws of probability.

- a. Find the probability of simple independent events.
- b. Find the probability of compound independent events.

MAT+ Understanding Probability

Topic 7: Independent Events

In This Topic
What are They?
Examples 1,2
Probability – Examples 1,2,3
Patterns and Summary – Examples 1,2,3
Practice Questions; Topic Test

M8D4. Students will organize, interpret, and make inferences from statistical data

- a. Gather data that can be modeled with a linear function.
- b. Estimate and determine a line of best fit from a scatter plot.

MAT+ Understanding Graphing

Functions
What is a Function – Examples 1,2,3
Vertical Line Test
Examples 1, 2, 3

MAT+ Understanding Graphing

Topic 2 : Statistics

Scatter Plot
Examples 1 & 2