

CORRELATION
of
the Understanding Numeration PLUS & Understanding Math PLUS programs
with
Atlantic Canada
Grade Nine Math Outcomes
November 2006

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

GCO A Students will demonstrate number sense and apply number theory concepts.

Expectation or Standard	Understanding Math PLUS Lessons
<p>A1 investigate problems involving square root and principal square root</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 5. Square Root Squaring Numbers Square Roots Radical Signs Square Roots of Negative Numbers Example Questions 1. Radicals First 2. The Four Equations 3. Lawn Question 4. Make a Square Practice Questions Topic Test</p>
<p>A2 graph and write in symbols and in words the solution set for equations and in equations involving integers and other real numbers</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 4. Solving Multi-Step Equations Our Problem Concepts – Examples with Tiles Concepts – Examples without Tiles Examples 1, 2, 3, 4, 5 Summary Literal Equations What Are They? How do you solve them? Why Solve the Literal Equations? A Perimeter Example A Temperature Example Practice Questions</p> <p>Topic 5. Problem Solving Words and Symbols The Translation Machine Examples 1, 2, 3, 4 The Trick Machine Instructions The Machine</p>

		Explanation with Pictures Explanation with Symbols Area of Walls Chemistry Pool 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
A3	demonstrate an understanding of the meaning and uses of irrational numbers	
A4	interrelate subsets of the set of real numbers	
A5	compare and order real numbers	
A6	represent problem situations using matrices	

GCO B Students will demonstrate operation sense and apply operation principles and procedures in both numeric and algebraic situations.

Expectation or Standard		Understanding Math PLUS Lessons
B1	model, solve, and create problems involving real numbers	
B2	add, subtract, multiply, and divide rational numbers in fractional and decimal forms using the most appropriate methods	<u>Understanding Math PLUS</u> <u>Understanding Fractions</u> Topic 8. Adding Fractions Adding Fractions on a Number Line Examples 1, 2, 3 The Lowest Common Denominator Examples 1, 2 Word Problems Alexander’s Friends Eating Candy Goal Scoring Taking a Walk Fraction Card Game Topic 9. Subtracting Fractions Subtracting Fractions on a Number Line Examples 1, 2, 3 The Lowest Common Denominator Examples 1, 2

Topic 9. Subtracting Fractions

The Clock

Examples 1, 2

Fraction Strips

Concepts 1, 2

Percent Strips

Examples 1, 2

Decimal Strips

Examples 1, 2

Subtracting Fractions on a Number Line

Examples 1, 2, 3

The Lowest Common Denominator

Examples 1, 2

Topic 10. Multiplying Fractions

Order in Multiplying

Examples 1, 2

Multiplying Fractions with Large Numbers

Examples 1, 2

Practice Questions

Topic Test

Topic 11. Dividing Fractions

Patterns from Examples

Another Explanation

Examples 1, 2

Examples without Diagrams

Numerical Examples 1, 2

Central High School

Practice Questions

Topic 11. Dividing Fractions

Examples with Diagrams

Soda Pop

Ice Cream

Shape 1

Shape 2

Patterns from Examples

Another Explanation

Examples 1, 2

Examples without Diagrams

Numerical Examples 1, 2

Central High School

Practice Questions

	<p>Topic 14. Addition and Subtraction of Decimals Decimals Around Us Length in Metric Units The Tools Examples 1, 2, 3, 4, 5 Pencils Examples 1, 2, 3, 4, 5 Money Examples 1, 2, 3, 4, 5 Track Meet Examples 1, 2, 3, 4, 5 School Supplies Practice Questions</p> <p>Topic 15. Multiplication and Division of Decimals Recall the Basics Special Case: Multiply a Decimal by a Whole Number Distributive Method Examples 1,2 Questions 1,2,3 Standard Method Examples 1,2,3 Questions 1,2,3 Decimals Around Us-Word Problems Oranges Bananas Cycling Baseball Cards Cookies Running Apples</p>
<p>B3 apply the order of operations in rational number computations</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Fractions</u> Topic 12. Order of Operations Why Use Order of Operations? BEDMAS Example Questions Examples 1, 2, 3</p>
<p>B4 demonstrate an understanding of and apply the exponent laws for integral exponents</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 3. The Exponent Rules Summary of Exponent Rules</p>

		<p>Powers with Rational Bases Examples 1, 2, 3 In General Example Questions Examples 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 Practice Questions</p>
B5	model, solve, and create problems involving numbers expressed in scientific notation	<p><u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 4. Scientific Notation Scientific Notation for Large Numbers Introduction Chart The Rule The Steps Scientific Notation for Small Numbers Introduction Chart The Steps Examples 1. Number Question 2. Park Question 3. Sun Question 4. Kitchen Question Practice Questions</p>
B6	judge the reasonableness of results in problem situations involving square roots, rational numbers, and numbers written in scientific notation	<p><u>Understanding Math PLUS</u> <u>Understanding Fractions</u> Topic 8. Adding Fractions Word Problems Pedro and Alex Race Washing the Cars Planting a Garden Practice Questions</p> <p>Topic 9. Subtracting Fractions Word Problems Pedro and Alex Race Washing the Cars Planting a Garden</p> <p>Topic 10. Multiplying Fractions</p>

	<p>Examples without Diagrams Numerical Examples 1, 2 Central High School Practice Questions</p> <p>Topic 11. Dividing Fractions Examples without Diagrams Numerical Examples 1, 2 Central High School Practice Questions</p> <p><u>Understanding Exponents</u> Topic 4. Scientific Notation Examples 1. Number Question 2. Park Question 3. Sun Question 4. Kitchen Question Practice Questions</p>
B7	<p>model, solve, and create problems involving the matrix operations of addition, subtraction, and scalar multiplication</p>
B8	<p>add and subtract polynomial expressions symbolically to solve problems</p> <p><u>Understanding Math PLUS</u> <u>Understanding Algebra</u> 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 Adding Expressions without Tiles Examples 1, 2 Practice Questions with Tiles Practice Questions without Tiles</p> <p>Topic 6. Subtracting Expressions Our Problem Subtracting Expressions with X and Y Tiles Concept Examples 1, 2 Subtracting Expressions with X-Squared Tiles</p>

		Examples 1, 2 Subtracting Expressions without Tiles Practice Questions with Tiles
B9	find products of two monomials, a monomial and a polynomial, and two binomials concretely, pictorially, and symbolically	<u>Understanding Math PLUS</u> <u>Understanding Algebra</u> 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 Multiplying Binomials With Tiles... Examples 1, 2 Without Tiles Pattern Examples... True or False Examples 1, 2, 3
B10	find quotients of polynomials with monomial divisors	<u>Understanding Math PLUS</u> <u>Understanding Algebra</u> Topic 9. Dividing Expressions Dividing a Monomial by a Monomial Examples 1, 2, 3, 4 Dividing a Polynomial by a Monomial Concept Examples 1, 2, 3 Summary Dividing a Polynomial by a Binomial Examples 1... Methods 1 Examples 1... Methods 2... Long Division Examples 2 Examples 3... Methods 1 Examples 3... Methods 2... Long Division Examples 4... Methods 1 Examples 4... Methods 2... Long Division Combination Questions Examples 1, 2, 3, 4
B11	evaluate polynomial expressions	
B12	factor algebraic expressions with common	<u>Understanding Math PLUS</u>

<p>monomial factors concretely, pictorially, and symbolically</p>	<p><u>Understanding Algebra</u> Topic 8. Factoring Expressions 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, 3, 4 Difference of Squares Examples 1, 2, 3,</p>
<p>B13 demonstrate an understanding of the applicability of commutative, associative, distributive, identity, and inverse properties to operations involving algebraic expressions</p>	
<p>B14 select and use appropriate strategies in problem situations</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Algebra</u> Topic 5. Adding Expressions Practice Questions with Tiles Practice Questions without Tiles Topic Test</p> <p>Topic 6. Subtracting Expressions Practice Questions without Tiles Topic Test</p> <p>Topic 7. Multiplying Expressions Examples... True or False Examples 1, 2, 3 Practice Questions</p> <p>Topic 8. Factoring Expressions Summary Examples 1, 2, 3, 4 Practice Questions</p> <p>Topic 9. Dividing Expressions Combination Questions Examples 1, 2, 3, 4 Practice Questions</p>

GCO C Students will explore, recognize, represent, and apply patterns and relationships, both informally and formally.

Expectation or Standard	Understanding Math PLUS Lessons
C1 represent patterns and relationships in a variety of formats and use these representations to predict and justify unknown values	
C2 interpret graphs that represent linear and non-linear data	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 6. Linear Relations In This Topic What is a Linear Relation? Graphs of Linear Relations Concept Examples 1, 2, 3, 4, 5, 6 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</p>
C3 construct and analyse tables and graphs to describe how changes in one quantity affect a related quantity	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 5. Relations, Equations, and Functions 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 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</p>
C4 determine the equations of lines by obtaining their slopes and y-intercepts from graphs and	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u></p>

<p>sketch graphs of equations using y-intercepts and slopes</p>	<p>Topic 8. Equation of a Straight Line Graph $y = mx + b$ Examples 1, 2, 3, 4 Patterns to Summary Examples 5, 6, 7 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: Solutions 1, 2, 3, 4 Special Cases Example 1 – Zero Slope Example 2 – Undefined Example to Summarize</p>
<p>C5 explain the connections among different representations of patterns and relationships</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Algebra</u> Topic 3. Patterns, Patterns, Patterns Introduction... Math is Patterns Geometric Patterns Examples 1, 2, 3, 4, 5, 6, 7, 8 Number Patterns Examples 1, 2, 3, 4, 5, 6 Number and Geometric Patterns Examples 1, 2 Patterns to Formulas Examples 1, 2, 3</p>
<p>C6 solve single-variable equations algebraically and verify the solutions</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 4. Solving Multi-Step Equations Our Problem Concepts – Examples with Tiles Concepts – Examples without Tiles Examples 1, 2, 3, 4, 5 Summary Literal Equations What Are They? How do you solve them? Why Solve the Literal Equations?</p>

		A Perimeter Example A Temperature Example
C7	solve first-degree single-variable inequalities algebraically, verify the solutions, and display them on number lines	<u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 7. Solving Inequalities Comparing Integers The Integer Line Example 1... Greater 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 Inequality on the Number Line Examples 1, 2, 3, 4 Solving Inequalities Examples 1, 2, 3, 4, 5, 6
C8	solve and create problems involving linear equations and inequalities	<u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 6. Solving Linear Systems The Meaning of a Linear System The Meaning of Solving a Linear System Solve a Linear System by Graphing Examples 1, 2 – Intersecting Lines Examples 3, 4 – Intersecting Lines Involving Fractions Example 5 – Parallel Lines Example 6 – Coincidental Lines

GCO D Students will demonstrate an understanding of and apply concepts and skills associated with measurement.

Expectation or Standard	Understanding Math PLUS Lessons
<p>D1 apply rates, other ratios, and proportions in indirect measurement problems with particular focus on slopes</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Percent</u> Topic 4. Ratios and Proportions Writing Ratios Concept Examples 1, 2, 3, 4 What is a Proportion? Proportions Example 1 Example 2 – Lemonade Example 3 – Marbles Example 4 – Trout Example 5 – Tree Height</p> <p><u>Understanding Graphing</u> 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 Special Slopes Examples 1, 2, 3, 4 Pattern</p>
<p>D2 solve measurement problems involving conversion among SI units</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Measurement and Geometry</u> Topic 1. An Introduction to Measurement Metric and U.S.A Standard Measurement Systems Searching for the Standard Unit Related Units from Metric Prefixes Metric Prefixes at Work Converting Between Metric Units</p>
<p>D3 relate the volumes of pyramids and cones to the volumes of corresponding prisms and cylinders</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Measurement and Geometry</u> Topic 4. Solids...Volume and Surface Area Volume of a Solid The Concept</p>

	<p>Volume of a Prism: Examples 1, 2 Volume of a Cylinder Volume of a Pyramid Volume of a Cone Summary Practice Questions</p>
D4	<p>estimate, measure, and calculate volumes and surface areas of pyramids, cones, and spheres and apply these measures</p> <p><u>Understanding Math PLUS</u> <u>Understanding Measurement and Geometry</u> Topic 4. Solids...Volume and Surface Area Surface Area of a Solid The Concept Surface Area of a Pyramid Surface Area of a Cylinder Surface Area of a Sphere Volume of a Solid The Concept Volume of a Prism: Examples 1, 2 Volume of a Cylinder Volume of a Pyramid Volume of a Cone Volume of a Sphere</p>
D5	<p>demonstrate understanding of and apply ratios within similar triangles</p> <p><u>Understanding Math PLUS</u> <u>Understanding Measurement and Geometry</u> Topic 6. Angles and Polygons Angles in Triangles Exploration An Explanation Exterior Angles – Example</p>

GCO E Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Expectation or Standard	Understanding Math PLUS Lessons
E1 investigate and demonstrate an understanding of the minimum sufficient conditions to produce unique triangles	
E2 investigate and demonstrate an understanding of the properties of and the minimum sufficient conditions to guarantee congruent triangles	
E3 make informal deductions using congruent triangle and angle properties	<p><u>Understanding Math PLUS</u> <u>Understanding Measurement and Geometry</u> Topic 6. Angles and Polygons Angles in Triangles Exploration An Explanation Exterior Angles – Example</p>
E4 demonstrate an understanding of and apply the properties of similar triangles	
E5 relate congruence and similarity of triangles	
E6 use mapping notation to represent translations, reflections, rotations, and dilatations of geometric figures and interpret such notations	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 4. Transformations Translations Object to Image We Say We Write Reflection Mapping Rule Examples Examples 1, 2, 3 Rotations Object to Image We Say We Write Rotation Mapping Rule Examples Examples 1, 2 Dilatations Object to Image We Say We Write Dilatation Mapping Rule</p>
E7 analyse and represent transformations and combinations of transformations using mapping notation	
E8 investigate, determine, and apply the effects of transformations of geometric figures on congruence, similarity, and orientation	

GCO F **Students will solve problems involving the collection, display, and analysis of data.**

	Expectation or Standard	Understanding Math PLUS Lessons
F1	determine the strength of the relationships in scatter plots	<u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 2. Statistics Presenting Data Scatter Plot Example 1... The T-Shirt Tailor Example 2... Matching
F2	sketch lines of best fit and determine their equations	<u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 6. Linear Relations Line of Best Fit Examples 1, 2
F3	sketch curves of best fit for relationships that appear to be non-linear	
F4	select, defend, and use the most appropriate methods for displaying data	<u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 2. Statistics Presenting Data Stem-and-Leaf Diagram Example 1... Ages of Fans Example 2... Heights of Students Bar Graph Example 1... Energy Example 2... Lengths of Rivers Histogram Example 1... Heights of Students Example 2... Roll a Die Line Graph Example 1... Life Expectancy Example 2... Software Profits Circle or Pie Graphs Example 1... Radio Station Example 2... Health Survey Scatter Plot Example 1... The T-Shirt Tailor Example 2... Matching

F5	draw inferences and make predictions based on data analysis and data displays	<u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 2. Statistics Collecting Data Throw a Die Throw 2 Dice Voting Primary Data - Gathering Methods Secondary Data - Gathering Methods
F6	demonstrate an understanding of the role of data management in society	
F7	evaluate arguments and interpretations that are based on data analysis	

GCO G Students will represent and solve problems involving uncertainty.

Expectation or Standard		Understanding Math PLUS Lessons
G1	make predictions of, and conduct experiments and simulations to determine, probabilities involving dependent and independent events	<u>Understanding Math PLUS</u> <u>Understanding Probability</u> Topic 7. Independent Events In This Topic What Are They? Examples 1. Toss Two Coins 2. Replacing Marbles Probability 1. Coin and Die 2. Balls 3. Letter Tiles Patterns and Summary 1. Summary 2. Spinner 3. Cards Practice Questions Topic 8. Dependent Events In This Topic What Are They? Independent Events

		<p>Dependent Events</p> <p>Examples</p> <ol style="list-style-type: none"> 1. Keep the First Marble 2. Choose the Flowers <p>Probability</p> <ol style="list-style-type: none"> 1. Keep the First Ball 2. Keep the First Tile 3. Plant the First Flower <p>Patterns and Summary</p> <ol style="list-style-type: none"> 1. Summary 2. Money 3. Socks 4. Names <p>Practice Questions</p>
G2	determine theoretical probabilities of compound events	<p><u>Understanding Math PLUS</u></p> <p><u>Understanding Probability</u></p> <p>Topic 6. Pascal's Triangle</p> <p>Pascal's Neighborhood</p> <p>Tasks 1, 2, 3, 4</p> <p>Pascal's Triangle... A Beginning</p> <p>Pascal's Triangle... Row One</p> <p>Experimental</p> <p>Theoretical</p> <p>Pascal's Triangle... Row Two</p> <p>Experimental</p> <p>Theoretical</p> <p>Pascal's Triangle... Row Three</p> <p>Experimental</p> <p>Theoretical</p> <p>Pascal's Triangle... Row Four</p> <p>Experimental</p> <p>Theoretical</p> <p>Patterns</p> <p>Patterns 1, 2, 3</p> <p>Pattern Summary</p>
G3	compare experimental and theoretical probabilities	
G4	recognize and explain why decisions based on probabilities may be combinations of theoretical calculations, experimental results, and subjective judgments	