

**CORRELATION
of
the Understanding Numeration PLUS & Understanding Math PLUS programs
with
Michigan Department of Education
ALGEBRA 1
June 2007**

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

The 10 programs are:

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| 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

HSCE Code	Expectation	Understanding Math PLUS Lessons
L1	Reasoning About Numbers, Systems, and Quantitative Literacy	
L1.1	Number Systems and Number Sense	
	<p>L1.1.1 Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers.</p> <p>L1.1.2 Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse has the opposite sign.</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Whole Numbers and Integers</u> <u>Topic 7. Multiplying Integers</u> Order in Multiplication The Multiplication Table Examples 1, 2, 3 Summary #1... Signs Negative X Negative... Note Patterns Patterns 1, 2 Summary #2... Signs Example Questions Examples 1, 2, 3, 4, 5 Word Problems Washing Cars The Helicopter Construction Practice Questions Topic Test</p> <p><u>Topic 8. Dividing Integers</u> The Inverse of Multiplication Examples 1, 2 Summary #1... Signs Summary #2... Signs Example Questions Examples 1, 2, 3, 4 Word Problems Casino Plant Graham's Walk Practice Questions Topic Test Topic Test</p>

L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.	<p><u>Understanding Math PLUS</u> <u>Understanding Algebra</u> 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, 3, 4 Difference of Squares Examples 1, 2, 3, 4 Factoring by Grouping – Concept Examples 1, 2, 3, 4, 5 Summary Examples 1, 2, 3, 4 Practice Questions Topic Test</p>
L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number less than 0, a number between 0 and 1, and a number greater than 1.	<p><u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 3. Exponent Rules A Power with Exponent 0 Explanation with b; Explanation with a Summary A Power with a NEGATIVE Exponent Method 1: Explanation with b Method 2: Explanation with k Method 3: Bacteria Doubling Summary Summary of Exponent Rules 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>

		<p>Understanding Whole Numbers and Integers</p> <p><u>Topic 7. Multiplying Integers</u></p> <p>Order in Multiplication The Multiplication Table Examples 1, 2, 3 Summary #1... Signs Negative X Negative... Note Patterns Patterns 1, 2 Summary #2... Signs Example Questions Examples 1, 2, 3, 4, 5 Word Problems Washing Cars The Helicopter Construction Practice Questions Topic Test</p>
L1.1.5	Justify numerical relationships (e.g., show that the sum of even integers is even; that every integer can be written as $3m + k$, where k is 0, 1, or 2, and m is an integer; or that the sum of the first n positive integers is $n(n+ 1)/2$).	

HSCE Code	Expectation	Understanding Math PLUS Lessons
L1.2	Representations and Relationships	
L1.2.2	Interpret representations that reflect absolute value relationships (e.g., $ x-a < b$, or $a \pm b$) in such contexts as error tolerance.	<p><u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 7. Solving Inequalities 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 Solving Compound Inequalities Examples 1, 2 Graphing Linear Inequalities in Two Variables Concepts 1, 2 Examples 1, 2, 3</p>
L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 2. Statistics Examples of Data Example 1... Fast Food Earnings Example 2... Infant's Walk Example 3... Canada and U.S.A. Forecast Example 4... King of the Strike Out Example 5... U.S.A. Stake in India Example 6... Allergy Troubles A Summary: Examples Statistics... What is it? Collecting Data Throw a Die Throw 2 Dice Voting Primary Data - Gathering Methods Secondary Data - Gathering Methods Presenting Data Stem-and-Leaf Diagram Example 1... Ages of Fans Example 2... Heights of Students</p>

		<p>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</p>
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HSCE Code	Expectation	Understanding Math PLUS Lessons
L2	Calculation, Algorithms, and Estimation	
L2.1	Calculation Using Real and Complex Numbers	
L2.1.1	Explain the meaning and uses of weighted averages (e.g., GNP, consumer price index, grade point average).	<p><u>Understanding Math PLUS</u> <u>Understanding Percent</u> Topic 5. Percent of a Number Grades What if? Calculate Pass or Fail? Practice Questions</p> <p><u>Topic 6. Problems Involving Percent</u> Grades Problem: Method 1... Using Proportions Grades Problem: Method 2</p> <p><u>Topic 7. Percent in Business</u> Sales Tax Bicycle Question Coat Question Restaurant Tipping Discount Football Sale What Can I Afford? Which is Cheaper? Competitor's Discount Commission Car Salesman Real Estate Car Dealerships Simple Interest What is it? Complete the Table Bank Interest Credit Card Bill Compound Interest What is it? Complete the Table? Formula Spreadsheet</p>

		<p>Interest Calculator Bank Interest Car Depreciation Mortgage Practice Questions</p>
L2.1.2	<p>Calculate fluently with numerical expressions involving exponents. Use the rules of exponents, and evaluate numerical expressions involving rational and negative exponents, and transition easily between roots and exponents.</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 3. The Exponent Rules In This Topic Multiplication of Powers with the Same Base Expanding the Exponents The Pattern In General Division of Powers with the Same Base Expanding the Exponents The Pattern In General Raising a Power to an Exponent Expanding the Exponents The Pattern In General Raising a Product to an Exponent Expanding the Exponents In General A Power with Exponent 0 Explanation with b; Explanation with a Summary A Power with a NEGATIVE Exponent Method 1: Explanation with b Method 2: Explanation with k Method 3: Bacteria Doubling Summary Summary of Exponent Rules 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 Topic Test</p>

L2.1.3	Explain the exponential relationship between a number and its base 10 logarithm and use it to relate rules of logarithms to those of exponents in expressions involving numbers.	
L2.1.4	Know that the complex number i is one of two solutions to $x^2 = -1$.	
L2.1.5	Add, subtract, and multiply complex numbers. Use conjugates to simplify quotients of complex numbers.	
L2.1.6	Recognize when exact answers aren't always possible or practical. Use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).	<p><u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 5. Square Roots Square Roots Radical Signs Square Roots of Negative Numbers Example Questions</p> <ol style="list-style-type: none"> 1. Radicals First 2. The Four Equations 3. Lawn Question 4. Make a Square <p>Practice Questions Topic Test</p>

HSCE Code	Expectation	Understanding Math PLUS Lessons
L3	Measurement and Precision	
L3.1	Measurement Units, Calculations, and Scales	
L3.1.2	Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements (e.g., explain why a small change in the scale can represent a large change in intensity). Solve applied problems.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
A1	Expressions, Equations, and Inequalities	
A1.1	Construction, Interpretation, and Manipulation of Expressions (linear, quadratic, polynomial, rational, power, exponential, and logarithmic)	
A1.1.1	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables.	<p>Understanding Math PLUS 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 Adding Expressions without Tiles Examples 1, 2 Practice Questions with Tiles Practice Questions without Tiles Topic Test</p> <p>Topic 6. Subtracting Expressions Our Problem Subtracting Expressions with X and Y Tiles Concept</p>

		<p>Examples 1, 2 Subtracting Expressions with X-Squared Tiles Examples 1, 2 Subtracting Expressions without Tiles Practice Questions with Tiles Practice Questions without Tiles Topic Test</p> <p>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 Practice Questions Topic Test</p> <p>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</p>
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		<p>Practice Questions Topic Test</p>
A1.1.2	<p>Know the definitions and properties of exponents and roots and apply them in algebraic expressions.</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 5. Square Roots 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><u>Understanding Algebra</u> 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, 3, 4 Difference of Squares Examples 1, 2, 3, 4 Factoring by Grouping – Concept Examples 1, 2, 3, 4, 5 Summary Examples 1, 2, 3, 4 Practice Questions</p>

A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities (e.g., differences of squares and cubes).	<p><u>Understanding Math PLUS</u> <u>Understanding Algebra</u> 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, 3, 4 Difference of Squares Examples 1, 2, 3, 4 Factoring by Grouping – Concept Examples 1, 2, 3, 4, 5 Summary Examples 1, 2, 3, 4 Practice Questions Topic Test</p>
A1.1.6	Use the properties of exponents and logarithms, including the inverse relationship between exponents and logarithms, to transform exponential and logarithmic expressions into equivalent forms.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
A1.2	Solutions of Equations and Inequalities (linear, exponential, logarithmic, quadratic, power, polynomial, and rational)	
A1.2.1	Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations.	<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 Topic Test</p> <p>Topic 5. Problem Solving Words and Symbols The Translation Machine Examples 1, 2, 3, 4 The Trick Machine Instructions The Machine 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</p>

		<p>Practice Questions Topic Test</p> <p>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 Solving Compound Inequalities Examples 1, 2 Graphing Linear Inequalities in Two Variables Concepts 1, 2 Examples 1, 2, 3 Solving Systems of Linear Inequalities by Graphing Examples 1, 2 Linear Programming What is it?</p>
<p>A1.2.2</p> <p>A1.2.3</p>	<p>Associate a given equation with a function whose zeros are the solutions of the equation.</p> <p>Solve linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns. Justify steps in the solutions, and apply the quadratic formula appropriately.</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 6. Solving Linear Systems In This Topic 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 Solve a Linear System by Substitution Examples 1, 2 – Intersecting Lines Examples 3, 4 – Intersecting Lines Involving Fractions Example 5 – Parallel Lines</p>

Example 6 – Coincidental Lines
 Solve a Linear System by Elimination
 Examples 1, 2 – Intersecting Lines
 Examples 3, 4 – Intersecting Lines Involving Fractions
 Example 5 – Parallel Lines
 Example 6 – Coincidental Lines
 Solve a Linear System by Comparison
 Examples 1, 2 – Intersecting Lines
 Examples 3, 4 – Intersecting Lines Involving Fractions
 Example 5 – Parallel Lines
 Example 6 – Coincidental Lines
 Solve Problems Using Linear Systems
 Examples 1, 2: Beginning of Question, Draw Graph
 Practice Questions
 Topic Test

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: $a = 1, 2, 3$
 $a = -1, -2, -3$
 Parabolas with the Same Width
 Summary
 The Role of c
 The Plan: Increase c
 Summary
 The Role of b
 Examples 1, 2, 3, 4
 Summary and Pattern
 In General
 Intercepts of a Quadratic Function
 Method 1: Graphing... Examples 1, 2
 Method 2: Factoring (If Possible)... Examples 1, 2
 Method 3: Using the Quadratic Formula... Examples 1, 2
 Maximize Cage Area
 Trial and Error
 Use Quadratic Function

		<p>Graph Conclusions Summary Maximize Potato Income Trial and Error Quadratic Function Graph Summary Bob's Beach ball Find Maximum Height Graph Equation Summary Practice Questions</p>
A1.2.4	Solve absolute value equations and inequalities (e.g., solve $ x - 3 \leq 6$) and justify.	<p><u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 8. Solving Absolute Value Equations Absolute Value... What is it? Concept Examples 1, 2 Summary Absolute Value Equations in 1 Variable Examples 1, 2 Absolute Value Inequalities in 1 Variable Examples 1, 2 Absolute Value Equations in 2 Variables Examples 1, 2 Practice Questions Topic Test</p>
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise.	
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.	<p><u>Understanding Math PLUS</u> <u>Understanding Equations</u> Topic 4. Solving Multi-Step Equations Our Problem</p>

		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 Topic Test
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HSCE Code	Expectation	Understanding Math PLUS Lessons
A2	Functions	
A2.1	Definitions, Representations, and Attributes of Functions	
A2.1.1 A2.1.2 A2.1.3	<p>A2.1.1 Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p> <p>A2.1.2 Read, interpret, and use function notation and evaluate a function at a value in its domain.</p> <p>A2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.</p>	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u> 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 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 Practice Questions Topic Test</p>
A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains. Such functions are piecewise-defined (e.g., absolute value and greatest integer functions).	<p><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</p>
A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions (e.g., $f(0) = 5$, and $f(n) = f(n-1) + 2$).	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 8. Equation of a Straight Line Graph $y = mx + b$</p>

A2.1.6	Identify the zeros of a function and the intervals where the values of a function are positive or negative. Describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations.	<p>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 Word Problems/ Applications The Taxi Cases 1, 2 Find Equation Graph Equation Interpret Equation Summary The Walker Basketball Food Point of Intersection of Two Lines Examples 1, 2 Practice Questions Topic Test</p>
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).	<p>Topic 9. Quadratic Functions Intercepts of a Quadratic Function Method 1: Graphing... Examples 1, 2 Method 2: Factoring (If Possible)... Examples 1, 2 Method 3: Using the Quadratic Formula... Examples 1, 2 Maximize Cage Area Trial and Error Use Quadratic Function Graph Conclusions Summary Maximize Potato Income</p>

		Trial and Error Quadratic Function Graph Summary Bob's Beach ball Find Maximum Height Graph Equation Summary
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HSCE Code	Expectation	Understanding Math PLUS Lessons
A2.2	Operations and Transformations	
A2.2.1	Combine functions by addition, subtraction, multiplication, and division.	
A2.2.2	Apply given transformations (e.g., vertical or horizontal shifts, stretching or shrinking, or reflections about the x- and y-axes) to basic functions and represent symbolically.	
A2.2.3	Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs (e.g., $f(x) = x^3$ and $g(x) = x^{1/3}$).	
A2.3	Families of Functions (linear, quadratic, polynomial, power, exponential, and logarithmic)	
A2.3.1	Identify a function as a member of a family of functions based on its symbolic or graphical representation. Recognize that different families of functions have different asymptotic behavior at infinity and describe these behaviors.	
A2.3.2	Describe the tabular pattern associated with functions having constant rate of change (linear) or variable rates of change.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
A2.4	Lines and Linear Functions	
A2.4.1	Write the symbolic forms of linear functions (standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.	<p><u>Understanding Math PLUS</u> <u>Understanding Graphing</u> 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 Word Problems/ Applications The Taxi Cases 1, 2 Find Equation Graph Equation Interpret Equation Summary The Walker Basketball Food Point of Intersection of Two Lines Examples 1, 2 Practice Questions Topic Test</p>
A2.4.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.	
A2.4.3	Relate the coefficients in a linear function to the slope and x - and y -intercepts of its graph.	
A2.4.4	Find an equation of the line parallel or perpendicular to given line through a given point. Understand and use the facts that nonvertical parallel lines have equal slopes and that nonvertical perpendicular lines have slopes that multiply to give -1 .	

HSCE Code	Expectation	Understanding Math PLUS Lessons
A2.5	Exponential and Logarithmic Functions	
A2.5.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information (e.g., given an initial value of 4 and a rate of growth of 1.5, write $f(x) = 4(1.5)^x$).	<u>Understanding Math PLUS</u> <u>Understanding Exponents</u> Topic 1. The Meaning of Exponents Introduction... The Money Game Money Grab Game Show Graphs – Game Show Results Graphs – Comparing the Two Results Introduction... Bacteria Doubling Introduction... Paper Folding Experiment Pattern
A2.5.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how base affects the rate of growth or decay.	
A2.5.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
A2.6	Quadratic Functions	
A2.6.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information (e.g., vertex, intercepts, etc.).	<u>Understanding Math PLUS</u> <u>Understanding Graphing</u> Topic 9. Quadratic Functions Definitions Parabolas Quadratic Functions The Role of a The Plan: $a = 1, 2, 3$ $a = -1, -2, -3$ Parabolas with the Same Width Summary The Role of c The Plan: Increase c Summary
A2.6.2	Identify the elements of a parabola (vertex, axis of symmetry, and direction of opening) given its symbolic form or its graph and relate these elements to the coefficient(s) of the symbolic form of the function.	
A2.6.3	Convert quadratic functions from standard to vertex form by completing the square.	
A2.6.4		

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A2.6.5	<p>Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.</p> <p>Express quadratic functions in vertex form to identify their maxima or minima and in factored form to identify their zeros.</p>	<p>The Role of b Examples 1, 2, 3, 4 Summary and Pattern In General Intercepts of a Quadratic Function Method 1: Graphing... Examples 1, 2 Method 2: Factoring (If Possible)... Examples 1, 2 Method 3: Using the Quadratic Formula... Examples 1, 2 Maximize Cage Area Trial and Error Use Quadratic Function Graph Conclusions Summary Maximize Potato Income Trial and Error Quadratic Function Graph Summary Bob's Beach ball Find Maximum Height Graph Equation Summary Practice Questions</p>
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HSCE Code	Expectation	Understanding Math PLUS Lessons
A2.7	Power Functions (including roots, cubics, quartics, etc.)	
A2.7.1	Write the symbolic form and sketch the graph of power functions.	
A2.7.2	Express direct and inverse relationships as functions (e.g., $y = kx^n$ and $y = kx^{-n}$, $n > 0$) and recognize their characteristics (e.g., in $y = x^3$, note that doubling x results in multiplying y by a factor of 8).	
A2.7.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
A2.8	Polynomial Functions	
A2.8.1	Write the symbolic form and sketch the graph of simple polynomial functions.	
A2.8.2	Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial functions of degree greater than 2.	
A2.8.3	Determine the maximum possible number of zeroes of a polynomial function and understand the relationship between the x-intercepts of the graph and the factored form of the function.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
A3	Mathematical Modeling	
A3.1	Models of Real-world Situations Using Families of Functions (linear, quadratic, exponential and power) <i>Example: An initial population of 300 people grows at 2% per year. What will the population be in 10 years?</i>	
A3.1.1	Identify the family of functions best suited for modeling a given real-world situation [e.g., quadratic functions for motion of an object under the force of gravity or exponential functions for compound interest. <i>In the example above, recognize that the appropriate general function is exponential ($P = P_0a^t$)].</i>	
A3.1.2	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. <i>In the example above, substitute the given values $P_0 = 300$ and $a = 1.02$ to obtain $P = 300(1.02)^t$.</i>	
A3.1.3	Using the adapted general symbolic form, draw reasonable conclusions about the	

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	situation being modeled. <i>In the example above, the exact solution is 365.698, but for this problem, an appropriate approximation is 365.</i>	
A3.1.4 *	Use methods of linear programming to represent and solve simple real-life problems.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
S2	Bivariate Data - Examining Relationships	
S2.1	Scatterplots and Correlation	
S2.1.1 S2.1.2	Construct a scatterplot for a bivariate data set with appropriate labels and scales. Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and strong correlation.	Understanding Math PLUS Understanding Graphing Topic 2. Statistics Scatter Plot Example 1... The T-Shirt Tailor Example 2... Matching
S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association.	
S2.1.4	Differentiate between correlation and causation. Know that a strong correlation does not imply a cause-and-effect relationship. Recognize the role of lurking variables in correlation.	

HSCE Code	Expectation	Understanding Math PLUS Lessons
S2.2	Linear Regression	
S2.2.1	For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a regression line.	
S2.2.2	Use the equation of the least squares regression line to make appropriate predictions.	