CORRELATION
of
the 10 UNDERSTANDING MATH PLUS PROGRAMS & UNDERSTANDING NUMERATION PLUS PROGRAMS
with
Ontario MATHEMATICS CURRICULUM STANDARDS

GRADE 8

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 teacl 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

Grade 8: Number Sense and Numeration

Specific Expectations
Quantity Relationships
By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– express repeated multiplication using exponential notation (e.g., 2 x 2 x 2 x 2 = 24);	**MAT+ <u>Understanding Whole Numbers and Integers</u>** **Topic 3. Multiplying and Dividing Whole Numbers** Multiply by a Single Digit Multiplier Repeated Addition Repeated Addition - Example 1 - With Blocks Repeated Addition - Example 2 - With Blocks Repeated Addition - Example 3 - Without Blocks Repeated Addition - Example 4 - Without Blocks **<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 Exponents, Powers, Bases Powerful Explosions Introductory Examples Examples 1, 2, 3, 4, 5 Examples – Substitution Examples 1, 2, 3, 4 Examples – Order of Operation Examples 1, 2, 3
– represent whole numbers in expanded form using powers of ten (e.g., 347 = 3 x 102 + 4 x 101 + 7);	**MAT+ <u>Understanding Whole Numbers and Integers</u>** **Topic 1. The Meaning of Whole Numbers CAN/US** Expanded Notation To 999 Examples 1, 2 To 9999 Examples 1, 2 Write as Numerals Examples 1, 2

– represent, compare, and order rational numbers (i.e., positive and negative fractions and decimals to thousandths);	**MAT+ <u>Understanding Fractions</u>** **Topic 1. The Meaning of Fractions** Comparison of Fractions The Symbol Greater Than - Ex. 1, Ex. 2 Less Than - Ex. 1, Ex. 2 Greater and Less Than - Ex. 1, Ex. 2 Concept 1 - Fraction Strips Concept 2 - Circles Examples 1, 2, 3, 4 **Topic 5. Introduction to Decimals** Comparing Decimals Examples 1, 2, 3, 4 Ordering Decimals Introduction Examples 1, 2, 3, 4
– translate between equivalent forms of a number (i.e., decimals, fractions, percents) (e.g. ¾ - 0.75)	**MAT+ <u>Understanding Fractions</u>** **Topic 6. Percents…Fractions…Decimals** Expressing a Percent as a Fraction Introduction without Graphics Introduction with Graphics Expressing a Fraction in Simplest Form Greatest Common Factor Examples 1, 2 Simplifying Fractions Method 1, 2 Examples Examples 1, 2, 3, 4 The Watering Can Expressing a Percent as a Decimal Introduction Examples 1, 2, 3 Number Line #1 Decimal Strips Concepts 1, 2, 3 Expressing a Decimal as a Percent Examples 1, 2, 3 Summary and Pattern % Nitrogen in the Air Batting Averages

	Expressing a Fraction as a Percent An Example Method 1 Examples 1, 2 Method 2 Examples 1, 2 Lightning Example
– determine common factors and common multiples using the prime factorization of numbers (e.g., the prime factorization of 12 is 2 x 2 x 3; the prime factorization of 18 is 2 x 3 x 3; the greatest common factor of 12 and 18 is 2 x 3 or 6; the least common multiple of 12 and 18 is 2 x 2 x 3 x 3 or 36).	**MAT+ <u>Understanding Algebra</u>** **Topic 3. Patterns, Pattern, Patterns** Factor Pairs in Arrays Factors of 8, 12, 16, 20, 5, 15, 18 Prime and Composite Prime Numbers Composite Numbers Common Factors/GCF Examples 1, 2

Operational Sense

By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– solve multi-step problems arising from real-life contexts and involving whole numbers and decimals, using a variety of tools (e.g., graphs, calculators) and strategies (e.g., estimation, algorithms);	**MAT+ <u>Understanding Whole Numbers and Integers</u>** **Topic 2. Adding and Subtracting Whole Numbers** Whole Numbers Around Us Example 1 - kilometers Example 2 - quarters Example 3 - baseball cards Example 4 - dollars Example 5 - pennies Example 6 - water in a jug Example 7 - coins Example 8 - jelly beans Example 9 - photographs Example 10 - minutes walking Example 11 - cost of a car Practice Questions **Topic 3. Multiplying and Dividing Whole Numbers** Whole Numbers Around Us Example 1 - Orange Example 2 - Bananas Example 3 - Cycling Example 4 - Baseball Cards Example 5 - Cookies Example 6 - Running Example 7 - Apples Example 8 - Saving Example 9 - Sit-ups Example 10 - Taxi Example 11 - Skipping Practice Questions
– solve problems involving percents expressed to one decimal place (e.g., 12.5%) and whole-number percents greater than 100 (e.g., 115%) (***Sample problem:*** The total cost of an item with tax included [115%] is $23.00. Use base ten materials to determine the price before tax.);	**MAT+ <u>Understanding Percent</u>** **Topic 1. The Meaning of Percent** Making Sense of Percent 1. Weather 2. Squares 3. Election 4. Photocopier 5. Car Trip **Topic 5. Percent of a Number** The Concept

	Examples 1. Money Example 2. Service Charge 3. Bird Example 4. Marathon Race 5. Freezing 6. Pie Chart The Bouncing Ball Grades What if? Calculate Pass or Fail? **Topic 6. Problems Involving Percent** Finding the Percent Theatre Problem Car Problem Percent of a Number Earnings Problem Nickel Ore Percents Greater than 100% Number Problem Order Problem Percents Less than 1% Number Problem Pencil Problem
– use estimation when solving problems involving operations with whole numbers, decimals, percents, integers, and fractions, to help judge the reasonableness of a solution;	**MAT+ <u>Understanding Percent</u>** **Topic 1. The Meaning of Percent** Estimating Percent Practice Questions
– represent the multiplication and division of fractions, using a variety of tools and strategies (e.g., use an area model to represent ¼ by 1/3);	**MAT+ <u>Understanding Fractions</u>** **Topic 10. Multiplying Fractions** Pattern Blocks Hexagons 1, 2, 3 Fraction Strips Concepts 1, 2 Word Problems Boris' Money Maria's Trip Developing the Rule Example 1

	Example 2 A Summary The Meaning of "OF" Order in Multiplying Examples 1, 2 Multiplying Fractions with Large Numbers Examples 1, 2 **Topic 11. Dividing Fractions** Understanding Division Recall from Whole Numbers Introduction 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
– solve problems involving addition, subtraction, multiplication, and division with simple fractions;	**MAT+ <u>Understanding Fractions</u>** **Topic 8. Adding Fractions** Word Problems Alexander's Friends Eating Candy Goal Scoring Taking a Walk **Topic 9. Subtracting Fractions** Word Problems Pedro and Alex Race Washing the Cars Planting a Garden **Topic 10. Multiplying Fractions** Word Problems Boris' Money Maria's Trip **Topic 11. Dividing Fractions**

	Examples without Diagrams Numerical Examples 1, 2 Central High School Practice Questions
– represent the multiplication and division of integers, using a variety of tools [e.g., if black counters represent positive amounts and red counters represent negative amounts, you can model 3 x (–2) as three groups of two red counters];	**MAT+ <u>Understanding Whole Numbers and Integers</u>** **Topic 7. Multiplying Integers** Multiplication Is... Examples 1, 2 The Multiplication Table Instructions Patterns Practice 1, 2 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 **Topic 8. Dividing Integers** Division to Multiplication The Division Table Instructions Patterns Practice The Inverse of Multiplication Examples 1, 2 Summary #1... Signs Summary #2... Signs Example Questions Examples 1, 2, 3, 4

– solve problems involving operations with integers, using a variety of tools (e.g., two-colour counters, virtual manipulatives, number lines);	**MAT+ <u>Understanding Whole Numbers and Integers</u>** **Topic 7. Multiplying Integers** Word Problems Washing Cars The Helicopter Construction **Topic 8. Dividing Integers** Word Problems Casino Plant Graham's Walk
– evaluate expressions that involve integers, including expressions that contain bracket and exponents, using order of operations;	**MAT+ <u>Understanding Whole Numbers and Integers</u>** **Topic 9. Order of Operations** Order in Addition Trials 1, 2 Conclusion Examples 1, 2 Order in Multiplication Trials 1, 2 Conclusion Examples 1, 2 Why use Order of Operations? BEDMAS Example Questions Examples 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
– multiply and divide decimal numbers by various powers of ten (e.g.,"To convert 230 000 cm3 to cubic metres, I calculated in my head 230 000 ÷ 106 to get 0.23 m3.") (***Sample problem:*** Use a calculator to help you generalize a rule for dividing numbers by 1 000 000.);	**MAT+ <u>Understanding Fractions</u>** **Topic 15. Multiplication and Division of Decimals** Multiply by Partial Products – Area Example 1 with Blocks Example 2 with Blocks Example 4 without Blocks Example 5 without Blocks Example 6 without Blocks Question 1 Question 2 Question 3 Distributive Method Example 1 Example 2 Example 3 Question 1

	Question 2 Question 3 Standard Method Example 1 Example 2 Example 3 Question 1 Question 2 Question 3 Preliminaries to Division Graphic Example Multiplication Table Summary of Decimals Partial Quotients Example 1 Example 2 Example 3 Example 4 Fair Sharing – Long Division Example 1 Example 2 Question 1 Question 2 Question 3 **Question 4**
– estimate, and verify using a calculator, the positive square roots of whole numbers, and distinguish between whole numbers that have whole-number square roots (i.e., perfect square numbers) and those that do not (***Sample problem:*** Explain why a square with an area of 20 cm2 does not have a whole-number side length.).	**MAT+ <u>Understanding Exponents</u>** **Topic 5. Square Roots** Squaring Numbers Square Roots

Proportional Relationships

By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– identify and describe real-life situations involving two quantities that are directly proportional (e.g., the number of servings and the quantities in a recipe, mass and volume of a substance, circumference and diameter of a circle); – solve problems involving proportions, using concrete materials, drawings, and variables (***Sample problem:*** The ratio of stone to sand in HardFast Concrete is 2 to 3. How much stone is needed if 15 bags of sand are used?);	**MAT+ Understanding Percent** **Topic 4. Ratios and Proportions** What is a Proportion? Proportions Example 1 Example 2 – Lemonade Example 3 – Marbles Example 4 – Trout Example 5 – Tree Height Example 6 – Map Example 7 – Scale Drawing
– solve problems involving percent that arise from real-life contexts (e.g., discount, sales tax, simple interest) (***Sample problem:*** In Ontario, people often pay a provincial sales tax [PST] of 8% and a federal sales tax [GST] of 7% when they make a purchase. Does it matter which tax is calculated first? Explain your reasoning.);	**MAT+ Understanding Percent** **Topic 7. Percent in Business** Sales Tax Bicycle Question Coat Question Restaurant Tipping
– solve problems involving rates (***Sample problem:*** A pack of 24 CDs costs $7.99. A pack of 50 CDs costs $10.45. What is the most economical way to purchase 130 CDs?).	

Grade 8: Measurement

Specific Expectations
Attributes, Units, and Measurement Sense
By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– research, describe, and report on applications of volume and capacity measurement (e.g., cooking, closet space, aquarium size) (***Sample problem:*** Describe situations where volume and capacity are used in your home.).	**MAT+ Understanding Measurement and Geometry** **Topic 4. Solids…Volume and Surface Area** Volume of a Solid The Concept Volume of a Prism: Examples 1, 2

Measurement Relationships
By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– solve problems that require conversions involving metric units of area, volume, and capacity (i.e., square centimetres and square metres; cubic centimetres and cubic metres; millilitres and cubic centimetres) (***Sample problem:*** What is the capacity of a cylindrical beaker with a radius of 5 cm and a height of 15 cm?);	**MAT+ Understanding Measurement and Geometry** **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 The Ruler
– measure the circumference, radius, and diameter of circular objects, using concrete materials (***Sample Problem:*** Use string to measure the circumferences of different circular objects.);	**MAT+ Understanding Measurement and Geometry** **Topic 3. The Circle** Circles All Around Us! Radius, Circumference, Diameter PI... A Special Number Introduction How do we Measure Circumference? Measuring Circles Summary Circumference of a Circle Circumference Example 1 – Egg Example 2 – The Well Example 3 – The Rolling Coin Example 4 – The Semi-Circle

– determine, through investigation using a variety of tools (e.g., cans and string, dynamic geometry software) and strategies, the relationships for calculating the circumference and the area of a circle, and generalize to develop the formulas [i.e., *Circumference of a circle* = π x *diameter*; *Area of a circle* = π x (*radius*)2] (***Sample problem:*** Use string to measure the circumferences and the diameters of a variety of cylindrical cans, and investigate the ratio of the circumference to the diameter.); – solve problems involving the estimation and calculation of the circumference and the area of a circle;	**MAT+ <u>Understanding Measurement and Geometry</u>** **Topic 3. The Circle** Area of a Circle Recall Area Area Exploration #1 Area Exploration #2 Example 1 – Wheel Example 2 – Pizza Example 3 – The Semi-Circle Example 4 – The Dog's Run Example 5 – The Hockey Rink
– determine, through investigation using a variety of tools and strategies (e.g., generalizing from the volume relationship for right prisms, and verifying using the capacity of thin-walled cylindrical containers), the relationship between the area of the base and height and the volume of a cylinder, and generalize to develop the formula (i.e.,*Volume* = *area of base* x *height*);	**MAT+ <u>Understanding Measurement and Geometry</u>** **Topic 4. Solids…Volume and Surface Area** Volume of a Solid The Concept Volume of a Prism: Examples 1, 2 Volume of a Cylinder
– determine, through investigation using concrete materials, the surface area of a cylinder (***Sample problem:*** Use the label and the plastic lid from a cylindrical container to help determine its surface area.); – solve problems involving the surface area and the volume of cylinders, using a variety of strategies (***Sample problem:*** Compare the volumes of the two cylinders that can be created by taping the top and bottom, or the other two sides, of a standard sheet of paper.).	**MAT+ <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

Grade 8: Geometry and Spatial Sense

Geometric Properties

By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– sort and classify quadrilaterals by geometric properties, including those based on diagonals, through investigation using a variety of tools (e.g., concrete materials, dynamic geometry software) (***Sample problem:*** Which quadrilaterals have diagonals that bisect each other perpendicularly?); – construct a circle, given its centre and radius, or its centre and a point on the circle, or three points on the circle;	**MAT+ Understanding Measurement and Geometry** **Topic 7. Construction** Perpendicular Bisector Circumcircle Centroid Angle Bisector
– investigate and describe applications of geometric properties (e.g., properties of triangles, quadrilaterals, and circles) in the real world.	

Geometric Relationships

By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials, geoboard), relationships among area, perimeter, corresponding side lengths, and corresponding angles of similar shapes (***Sample problem:*** Construct three similar rectangles, using grid paper or a geoboard, and compare the perimeters and areas of the rectangles.);	**MAT+ Understanding Measurement and Geometry** **Topic 2. Perimeter and Area of Polygons** Relationship – Area and Perimeter The Information The Graph Given Area and Perimeter – Create Shape Example 1 Example 2 Example 3 Example 4 Problems Section Length of Fence Area of a Wall The Tablecloth
– determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials, protractor) and strategies (e.g., paper folding), the angle relationships for intersecting lines and for parallel lines and transversals, and the sum of the angles of a triangle; – solve angle-relationship problems involving triangles (e.g., finding interior angles or complementary angles), intersecting lines (e.g., finding	**MAT+ Understanding Measurement and Geometry** **Topic 6. Angles and Polygons** Example with Parallel Lines Examples 1, 2 Angles in Triangles Exploration An Explanation

supplementary angles or opposite angles), and parallel lines and transversals (e.g., finding alternate angles or corresponding angles);	Exterior Angles – Example Angles in Polygons Methods 1, 2 Exterior Angles in a Polygon
– determine the Pythagorean relationship, through investigation using a variety of tools (e.g., dynamic geometry software; paper and scissors; geoboard) and strategies; – solve problems involving right triangles geometrically, using the Pythagorean relationship;	**MAT+ <u>Understanding Exponents</u>** **Topic 6. Pythagorean Theorem** The Right Triangle Math or Magic? Introduction Omar's Rope Trick #1, #2 Our Rope Trick Squares on a Grid Examples 1, 2, 3, 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
– determine, through investigation using concrete materials, the relationship between the numbers of faces, edges, and vertices of a polyhedron (i.e., *number of faces + number of vertices = number of edges* + 2) (***Sample problem:*** Use Polydrons and/or paper nets to construct the five Platonic solids [i.e., tetrahedron, cube, octahedron, dodecahedron, icosahedron], and compare the sum of the numbers of faces and vertices to the number of edges for each solid.).	

Location and Movement

By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– graph the image of a point, or set of points, on the Cartesian coordinate plane after applying a transformation to the original point(s) (i.e., translation; reflection in the *x*-axis, the *y*-axis, or the angle bisector of the axes that passes through the first and third quadrants; rotation of 90°, 180°, or 270° about the origin);	**MAT+ Understanding Graphing** **Topic 3. Points on a Grid** Ordered Pairs Axis Quadrants and Cartesian Plane Find a Point Order is Important Examples Shapes Battleship Topic Test
– identify, through investigation, real-world movements that are translations, reflections, and rotations.	**MAT+ Understanding Graphing** **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 Examples Examples 1, 2

Grade 8: Patterning and Algebra

Specific Expectations
Patterns and Relationships
By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– represent, through investigation with concrete materials, the general term of a linear pattern, using one or more algebraic expressions (e.g.,"Using toothpicks, I noticed that 1 square needs 4 toothpicks, 2 connected squares need 7 toothpicks, and 3 connected squares need 10 toothpicks. I think that for n connected squares I will need $4 + 3(n - 1)$ toothpicks, because the number of toothpicks keeps going up by 3 and I started with 4 toothpicks. Or, if I think of starting with 1 toothpick and adding 3 toothpicks at a time, the pattern can be represented as $1 + 3n$.");	
– represent linear patterns graphically (i.e., make a table of values that shows the term number and the term, and plot the coordinates on a graph), using a variety of tools (e.g., graph paper, calculators, dynamic statistical software);	**MAT+ Understanding Graphing** **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 **Topic 8. Equation of a Straight Line** Graph y = mx + b Examples 1, 2, 3, 4 Patterns to Summary Examples 5, 6, 7
– determine a term, given its term number, in a linear pattern that is represented by a graph or an algebraic equation (***Sample problem:*** Given the graph that represents the pattern 1, 3, 5, 7,…, find the 10^{th} term. Given the algebraic equation that represents the pattern, $t = 2n - 1$, find the 100th term.).	**MAT+ Understanding Algebra** **Topic 3. Patterns, Patterns, 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

Variables, Expressions, and Equations

By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– describe different ways in which algebra can be used in real-life situations (e.g., the value of $5 bills and toonies placed in a envelope for fund raising can be represented by the equation $v = 5f + 2t$);	**MAT+ Understanding Algebra** **Topic 4. Patterns, Formulas, Substitution** Expressions, Terms, Variables Definitions Summary Patterns to Formulas Example… Hockey Standings Example… Counting Money Example… Angles in a Polygon
– model linear relationships using tables of values, graphs, and equations (e.g., the sequence 2, 3, 4, 5, 6,… can be represented by the equation $t = n + 1$, where n represents the term number and t represents the term), through investigation using a variety of tools (e.g., algebra tiles, pattern blocks, connecting cubes, base ten materials) (***Sample problem:*** Leah put $350 in a bank certificate that pays 4% simple interest each year. Make a table of values to show how much the bank certificate is worth after five years, using base ten materials to help you. Represent the relationship using an equation.);	**MAT+ Understanding Graphing** **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
– translate statements describing mathematical relationships into algebraic expressions and equations (e.g., for a collection of triangles, the total number of sides is equal to three times the number of triangles or $s = 3n$);	**MAT+ Understanding Algebra** **Topic 4. Patterns, Formulas, Substitution** Expressions, Terms, Variables Definitions Summary Patterns to Formulas Example… Hockey Standings Example… Counting Money Example… Angles in a Polygon Substitution is... Math Scrabble Scrabble 1, 2, 3 Challenge Substitution Examples Examples 1, 2, 3, 4 Practice Questions
– evaluate algebraic expressions with up to three terms, by substituting fractions, decimals, and integers for the variables (e.g., evaluate $3x+4y = 2z$ where $x = ½$, $y = 0.6$, and $z = –1$);	**MAT+ Understanding Algebra** **Topic 4. Patterns, Formulas, Substitution** Substitution Examples Examples 1, 2, 3, 4 Practice Questions

– make connections between solving equations and determining the term number in a pattern, using the general term (e.g., for the pattern with the general term $2n + 1$, solving the equation $2n + 1 = 17$ tells you the term number when the term is 17); – solve and verify linear equations involving a one-variable term and having solutions that are integers, by using inspection, guess and check, and a "balance" model (***Sample problem:*** What is the value of the variable in the equation $30x – 5 = 10$?).	**MAT+ <u>Understanding Equations</u>** **Topic 3. Solving Two-Step Equations** Our Problem Concepts – Examples with Tiles Examples 1, 2, 3, 4 Concepts – Examples without Tiles Examples 1, 2, 3, 4, 5, 6 Practice Questions **MAT+ <u>Understanding Graphing</u>** **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: Solutions 1, 2, 3, 4

Grade 8: Data Management and Probability

Specific Expectations
Collection and Organization of Data
By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations or measurements; – organize into intervals a set of data that is spread over a broad range (e.g., the age of respondents to a survey may range over 80 years and may be organized into ten-year intervals);	**MAT+ Understanding Graphing** **Topic 2. Statistics** Data... What is it? 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
– collect and organize categorical, discrete, or continuous primary data and secondary data (e.g., electronic data from websites such as E-Stat or Census At Schools), and display the data in charts, tables, and graphs (including histograms and scatter plots) that have appropriate titles, labels (e.g., appropriate units marked on the axes), and scales (e.g., with appropriate increments) that suit the range and distribution of the data, using a variety of tools (e.g., graph paper, spreadsheets, dynamic statistical software);	**MAT+ Understanding Graphing** **Topic 2. Statistics** An Introduction Tally Chart Pictograph #1 Pictograph #2 Bar Graph #1 Bar Graph #2 Line Graph #1 Line Graph #2 Primary Data - Gathering Methods Secondary Data - Gathering Methods
– select an appropriate type of graph to represent a set of data, graph the data using technology, and justify the choice of graph (i.e., from types of graphs already studied, including histograms and scatter plots);	**MAT+ Understanding Graphing** **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
– explain the relationship between a census, a representative sample, sample size, and a population (e.g.,"I think that in most cases a larger sample size will be more representative of the entire population.").	

Data Relationships

By the end of Grade 8, students will:

Expectations	Understanding Math PLUS lessons
– read, interpret, and draw conclusions from primary data (e.g., survey results, measurements, observations) and from secondary data (e.g., election data or temperature data from the newspaper, data from the Internet about lifestyles), presented in charts, tables, and graphs (including frequency tables with intervals, histograms, and scatter plots); – demonstrate an understanding of the appropriate uses of bar graphs and histograms by comparing their characteristics (***Sample problem:*** How is a histogram similar to and different from a bar graph? Use examples to support your answer.);	**MAT+ Understanding Graphing** **Topic 2. Statistics** Primary Data - Gathering Methods Secondary Data - Gathering Methods 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
– determine, through investigation, the appropriate measure of central tendency (i.e., mean, median, or mode) needed to compare sets of data (e.g., in hockey, compare heights or masses of players on defence with that of forwards);	**MAT+ Understanding Graphing** **Topic 2. Statistics** Measures of Central Tendency Introduction The Mean Average The Median average The Mode Summary Another Example Adding Data Points