

**CORRELATION**  
of  
the Understanding Numeration PLUS & Understanding Math PLUS programs  
with  
Maryland School Performance Program  
**GOAL 2 : GEOMETRY, MEASUREMENT, AND REASONING**  
October 2007

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](http://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](http://www.neufeldmath.com)

Neufeld Learning Systems Inc., October 2007

Source: Maryland School Performance Program: High School Core Learning Goals

**GOAL 2: GEOMETRY, MEASUREMENT, AND REASONING**

The student will demonstrate the ability to solve mathematical and real-world problems using measurement and geometric models and will justify solutions and explain process used.

**2.1 Expectation: The student will represent and analyze two-and three-dimensional figures using tools and technology when appropriate.**

INDICATORS	NEUFELD LEARNING SYSTEMS INC. <u>UNDERSTANDING MATH PLUS</u> PROGRAMS & LESSONS
<p>2.1.1 The student will analyze the properties of geometric figures.</p> <p><b>Assessment Limits</b> Essential properties, relationships, and geometric models include the following:</p> <ul style="list-style-type: none"> <li>• Congruence and similarity</li> <li>• line/segment/plane relationships (parallel, perpendicular, intersecting, bisecting, midpoint, median, altitude)</li> <li>• point relationships (collinear, coplanar)</li> <li>• angles and angle relationships (vertical, adjacent, complementary, supplementary, obtuse, acute, right, interior, exterior)</li> <li>• angle relationships with parallel lines</li> <li>• polygons (regular, non-regular, composite, equilateral, equiangular)</li> <li>• geometric solids (cones, cylinders, prisms, pyramids, composite figures)</li> <li>• circle/sphere (tangent, radius, diameter, chord, secant, central/inscribed angle, inscribed, circumscribed).</li> </ul> <p><b>Skill Statement</b> The student describes and analyzes geometric figures</p> <p>2.1.2 The student will identify and/or verify properties of geometric figures using the coordinate plane and concepts from algebra.</p> <p><b>Assessment Limits</b></p> <ul style="list-style-type: none"> <li>• “Verify properties” means to justify solutions using definitions and/or mathematical principles.</li> <li>• Properties, relationships, and geometric models include the following:               <ul style="list-style-type: none"> <li>○ Congruence and similarity</li> <li>○ line/segment relationships (parallel, perpendicular, intersecting, bisecting, midpoint, median, altitude)</li> <li>○ point relationships (collinear)</li> <li>○ angles and angle relationships (obtuse, acute, right)</li> <li>○ polygons (regular, non-regular, equilateral, equiangular)</li> <li>○ circle (tangent, radius, diameter, chord).</li> </ul> </li> </ul>	<p><b>Understanding Measurement and Geometry</b></p> <p><b>Topic 5. Angles and their Measure</b> In This Topic Lines and Rays Angles... An Introduction The Degree Classifying Angles Classifications Memory Game Measuring Angles Practice Questions Topic Test</p> <p><b>Topic 6. Angles and Polygons</b> 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</p> <p><b>Topic 7. Constructions</b> Before You Begin In This Topic Perpendicular Bisector Circumcircle Centroid</p>

<ul style="list-style-type: none"> <li>• Items for this indicator may be set on the coordinate plane or may just have coordinates identified with no grid.</li> <li>• Concepts from algebra include applications of the distance, midpoint, and slope formulas</li> </ul> <p><b>Skill Statement</b> The student uses the coordinate plane and algebra to analyze geometric figures.</p>	<p>Angle Bisector <b>Incircle</b> Perpendicular from Point on Line Perpendicular from Point off the Line Orthocenter</p>
<p>2.1.3 The student will use transformations to move figures, create designs, and/or demonstrate geometric properties</p> <p><b>Assessment Limits</b></p> <ul style="list-style-type: none"> <li>• Transformations include reflections, rotations, translations, and dilations.</li> <li>• Items should go beyond the identification of transformations.</li> <li>• Essential properties and relationships include the following: congruence, similarity, and symmetry.</li> <li>• The student's explanation of a transformation must include the following: <ul style="list-style-type: none"> <li>○ translation – distance and direction</li> <li>○ reflection – line of reflection</li> <li>○ rotation – center of rotation, angle measure, direction (clockwise or counterclockwise)</li> <li>○ dilation – center and scale factor</li> </ul> </li> <li>• Paper folding and the use of Miras™ and mirrors are appropriate methods for performing transformations, and their use must be referenced.</li> </ul> <p><b>Skill Statement</b> Given one or more transformations, the student sketches the result of the transformation(s) and/or explains the geometric effect of the transformation(s) on the figure.</p>	<p><b>Understanding Graphing</b> <b>Topic 4. Transformations</b> Tessellations Introduction Examples Examples 1, 2, 3, 4, 5 Tangrams Introduction Examples 1, 2, 3 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 Dilations Object to Image We Say We Write Dilatation Mapping Rule Examples Examples 1, 2</p>

2.1.4 The student will construct and/or draw and/or validate properties of geometric figures using appropriate tools and technology.

**Assessment Limits**

- “Validate properties” in this indicator, means justifying solutions using definitions, mathematical principles and/or measurement.
- Students may use a compass, straightedge, patty paper, a Mira™, and/or a mirror as construction tools. Using a ruler or protractor cannot be part of the strategy.
- Students may use a compass, ruler, patty paper, a Mira™, a mirror and/or a protractor as drawing tools.
- It is acceptable to do a construction when the item asks for a drawing.
- Paper folding and the use of Miras™ and mirrors are appropriate methods for representing, constructing, and/or analyzing figures, and their use must be referenced.
- Constructions and drawings are limited to the two-dimensional relationships listed in 2.1.1.

**Skill Statement**

The student draws and/or constructs geometric figures and/or justifies the solution.

**Understanding Measurement and Geometry**

**Topic 8. Projective Geometry**

An Introduction

Toothpicks on Isometric Dot Paper

Toothpick to Cube

The Views

Using Isometric Grid Paper

Orthographic Projections: Introduction

The Cube Tool

Introduction

Tutorial

Play with Tool

**2.2 Expectation: The student will apply geometric properties and relationships to solve problems using tools and technology when appropriate.**

INDICATORS	NEUFELD LEARNING SYSTEMS INC. <u>UNDERSTANDING MATH PLUS</u> PROGRAMS & LESSONS
<p>2.2.1 The student will identify and/or verify congruent and similar figures and/or apply equality or proportionality of their corresponding parts.</p> <p><b>Assessment Limits</b> Students will demonstrate geometric reasoning and justify conclusions. Although the focus is on geometric theory, answers to some items may include a numeric answer.</p> <ul style="list-style-type: none"> <li>Corresponding measurements include length, angle measure, perimeter, circumference, area, volume, surface area and lateral area.</li> </ul> <p><b>Skill Statement</b></p> <ul style="list-style-type: none"> <li>The student recognizes shape as congruent or similar, calculates corresponding measurements, and/or justifies conclusions.</li> <li>The student uses congruency and similarity statements to identify corresponding parts of figures</li> </ul>	<p><b><u>Understanding Measurement and Geometry</u></b>  <b>Topic 2. Perimeter and Area of Polygons</b>  <b>2. PERIMETER AND AREA OF POLYGONS</b>            Relationship – Area and Perimeter            The Information            The Graph            Given Area and Perimeter – Create Shape            Example 1            Example 2            Example 3            Example 4</p> <p><b>Topic 3. The Circle</b>            In This Topic            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</p> <p><b>Topic 4. Solids...Volume and Surface Area</b>            In This Topic            Classifying Solids            A Solid is...            Recall Polygons            A Polyhedron is...            A Prism is...            Some Special Pyramids            A Cylinder is...            A Cone is...            Platonic Solids</p>

	<p>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>
<p>2.2.2 The student will solve problems using two-dimensional figures and/or right-triangle trigonometry.</p> <p><b>Assessment Limits</b></p> <ul style="list-style-type: none"> <li>• Students will demonstrate geometric reasoning and justify conclusions.</li> <li>• Trigonometric functions may be used to find sides or angles.</li> <li>• Trigonometric functions will be limited to sine, cosine, and tangent and their inverses.</li> </ul> <p><b>Skill Statement</b>  The student solves a problem involving missing parts of two-dimensional figures, which may require the use of right-triangle trigonometry, the Pythagorean theorem, or special right triangle relationships.</p>	
<p>2.2.3. The student will use inductive or deductive reasoning.</p> <p><b>Assessment Limits</b></p> <ul style="list-style-type: none"> <li>• Students are expected to demonstrate their geometric reasoning and justify conclusions. Although the focus is on geometric theory, answers to some questions may include a numeric answer.</li> <li>• Items may include geometric applications, patterns, and logic, including syllogisms.</li> <li>• Narrative, flow chart, or two-column proof may be used as a valid argument.</li> </ul> <p><b>Skill Statement</b>  Given a situation, the student arrives at or justifies a conclusion using inductive or deductive reasoning.</p>	

2.3 **Expectation: The student will apply concepts of measurement using tools and technology when appropriate.**

INDICATORS	NEUFELD LEARNING SYSTEMS INC. <u>UNDERSTANDING MATH PLUS</u> PROGRAMS & LESSONS
<p>2.3.1. The student will use algebraic and/or geometric properties to measure indirectly.</p> <p><b>Assessment Limits</b>                      “Measure indirectly” means to use mathematical concepts such as congruence, similarity, and ratio and proportion to calculate measurements. Similarity and congruence will be directly stated or implied (scale drawings, enlargements).                      Items may require the student to make comparisons.                      This indicator may incorporate measuring.                      This indicator does not include right-triangle trigonometry.</p> <p><b>Skill Statement</b>                      The student calculates measurements indirectly by using mathematical concepts.</p>	
<p>2.3.2 The student will use techniques of measurement and will estimate, calculate, and/or compare perimeter, circumference, area, volume, and/or surface area of two-and three-dimensional figures and their parts.</p> <p><b>Assessment Limits</b></p> <ul style="list-style-type: none"> <li>• Two-dimensional shapes include polygons, circles, and composite figures.</li> <li>• Three-dimensional shapes include cubes, prisms, pyramids, cylinders, cones, spheres, and composite figures.</li> <li>• Formulas will be provided.</li> <li>• No oblique solids will be used.</li> <li>• Items may involve applications of geometric properties and relationships.</li> <li>• Students may be required to make comparisons which do not require calculations.</li> </ul> <p><b>Skill Statement</b>                      The student solves a problem involving perimeter, area, surface area, lateral area, circumference, and/or volume expressing solutions with appropriate units.</p>	<p><b><u>Understanding Measurement and Geometry</u></b>  <b>Topic 2. Perimeter and Area of Polygons</b>                      Problems Section                      Length of Fence                      Area of a Wall                      The Tablecloth                      Practice Questions                      Topic Test</p> <p><b>Topic 3. The Circle</b>                      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                      Practice Questions                      Topic Test</p> <p><b>Topic 4. Solids...Volume and Surface Area</b>                      Summary, Practice Questions</p>

2.3.2 The student will use techniques of measurement and will estimate, calculate, and/or compare perimeter, circumference, area, volume, and/or surface area of two-and three-dimensional figures and their parts.

**Assessment Limits**

- Two-dimensional shapes include polygons, circles, and composite figures.
- Three-dimensional shapes include cubes, prisms, pyramids, cylinders, cones, spheres, and composite figures.
- Formulas will be provided.
- No oblique solids will be used.
- Items may involve applications of geometric properties and relationships.
- Students may be required to make comparisons which do not require calculations.

**Skill Statement**

The student solves a problem involving perimeter, area, surface area, lateral area, circumference, and/or volume expressing solutions with appropriate units.

**Understanding Measurement and Geometry**

**Topic 2. Perimeter and Area of Polygons**

Problems Section  
Length of Fence  
Area of a Wall  
The Tablecloth  
Practice Questions  
Topic Test

**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  
Practice Questions  
Topic Test

**Topic 4. Solids...Volume and Surface Area**

Summary, Practice Questions  
Practice Questions