

**Groton Public Schools  
Curriculum Map**

INTRODUCTION

Course Title: **Specialized Mathematics 11-12**

Curriculum Area and Grade: **Mathematics ( 11th and 12th Grade)**

Course Purpose:

Specialized Math is designed to meet the needs of students, due to cognitive impairments who are unable to perform in regular math curriculum without appropriate support (Resource, SRBI, and modifications/accommodations). This math class is designed as an intensive math support system to continue the overall growth of the students' core math skills.

Major Learning Goals and Understandings:

FHS Student Learning Expectation(s):

- SE 1 Apply effective analysis, synthesis, and evaluative processes that enable productive problem solving.
- SE 2 Communicate information clearly and effectively using a variety of tools/media in varied contexts and for a variety of purposes.
- SE 3 Work independently and collaboratively to solve problems and accomplish goals.
- SE 4 Use real - world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks.
- SE 5 Demonstrate innovation, flexibility and adaptability in thinking patterns, work habits, and working / learning conditions.
- SE 6 Value and demonstrate personal responsibility, character, cultural understanding, and ethical behavior.

Course Specific Learning Expectations:

- Use geometric characteristics and properties to analyze and solve problems.
- ● Describe geometric models by equations for geometric understanding, modeling, and proof.
- ● Create, justify and defend geometric arguments and communicate mathematical ideas using visual and verbal models.

*Note: Units below are designed to be implemented over the two year span that students are enrolled in the course (grades 11 & 12 (Math)).*

<b>Units/Theme/Concept and # of Weeks</b>	
Quarter = 9 weeks, Semester=18 weeks, Trimester= 12 weeks, Year=36 weeks --- usually spread over 40 weeks	
1. Equations - 10 weeks	2. Lines and Angles - 14 weeks
3. Triangles - 14 weeks	4. Graphing - 14 weeks
5. Circles - 14 weeks	6. 2-D and 3-D shapes - 14 weeks

**Mappers/Authors: Stacey Noreika**

Date Approved:

<b>Part 1 - Unit 1: Solving Equations (Skills Review)</b>			
<b>Grade:</b> 11-12	<b>Subject:</b> Math	<b>Course:</b> Specialized Math 11-12	<b>Length of Unit:</b> 10 weeks

Common Core State Standards

<http://www.corestandards.org/Math/Content/HSA/CED/A/1/> : Create equations and inequalities in one variable and use them to solve problems

<http://www.corestandards.org/Math/Content/HSA/SSE/A/1/> : Interpret expressions that represent a quantity in terms of its context

<http://www.corestandards.org/Math/Content/HSA/REI/A/1/> : Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Supporting Standards

<http://www.corestandards.org/Math/Content/HSA/SSE/A/1/a/> : Interpret parts of an expression, such as terms, factors, and coefficients.

<http://www.corestandards.org/Math/Content/HSN/Q/A/3/>: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Connecticut State Standards

**Part 2 – Standards**

**Key (GLE) Content Knowledge and Concepts/Skills**

**Bloom’s Taxonomy Levels**  
Creating, Evaluating,  
Analyzing, Applying,  
Understanding and  
Remembering

<p>The students will know:</p> <ol style="list-style-type: none"> <li>1. Finding a solution to an equation always involves the process of undoing operations.</li> <li>2. Equations may have one solution, no solution, or infinite solutions.</li> <li>3. Strategies for solving two-step equations.</li> </ol>	<p>The students will be able to:</p> <ol style="list-style-type: none"> <li>1. Solve one and two step equations in one variable.</li> <li>2. Model real-world situations using equations</li> </ol>	<ol style="list-style-type: none"> <li>1. During this unit of study, all levels will be used for multiple learning experiences.</li> </ol>
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### **Big Idea and Essential Questions**

- **Big Ideas**

1. The solution to an equation is the value that satisfies the equation ( makes it true).
2. An equation in one variable can have one solution, no solution, or infinite solutions.
3. Inverse operations are used to solve for a variable.

- **Essential Questions**

1. What are the characteristics of an equation?

2. What does equality mean?
3. How do we determine if a relationship is equivalent?
4. To what extent can equations be used to model all relationships?
5. How can we use linear equations to solve real world problems?

### **Part 3 – Common Unit Assessments**

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit.

- 1) Portfolio of class work / notes
- 2) Unit Test

### **Part 4 – Common/Assured Learning Experiences**

- Students will practice solving a variety of one-variable equations that contain the distributive property.
- Students will practice modeling a variety of real-world situations by solving word problems.

### **Part 1 - Unit 2: Lines and Angles**

<b>Grade:</b> 11-12	<b>Subject:</b> Math	<b>Course:</b> Specialized Math 11-12	<b>Length of Unit:</b> 14 weeks
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Common Core State Standards

<http://www.corestandards.org/Math/Content/4/G/A/1/>: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

<http://www.corestandards.org/Math/Content/HSG/CO/C/9/>: Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*

Supporting Standards

<http://www.corestandards.org/Math/Content/4/G/A/2/>: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

<http://www.corestandards.org/Math/Content/4/G/A/3/>: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

<http://www.corestandards.org/Math/Content/HSG/CO/D/12/>:

Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle;*

*constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*

<http://www.corestandards.org/Math/Content/7/G/B/5/>: Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Connecticut State Standards

**Part 2 – Standards**

**Key (GLE) Content Knowledge and Concepts/Skills**

**Bloom’s Taxonomy Levels**  
 Creating, Evaluating,  
 Analyzing, Applying,  
 Understanding and  
 Remembering

The students will know:

1. The definitions of angles, rays, perpendicular lines, parallel lines, and line segments.
2. How to identify and measure different types of angles and understand how they help us identify different shapes.
3. The relationship between pairs of angles when two parallel lines

The students will be able to:

1. Identify and create examples of angles, perpendicular and parallel lines, rays and line segments.
2. Apply properties of vertical angles and linear pairs to prove that two angles are congruent, complementary, or supplementary.
3. Understand properties of 2-D shapes based on their lines and angles.
4. Identify angle relationships formed when two lines are crossed by a transversal.

1. During this unit of study, all levels will be used for multiple learning experiences.

<p>are intersected by a transversal.</p> <p>3. How to identify and justify if two lines are parallel or perpendicular.</p>		
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### Big Idea and Essential Questions

- **Big Ideas**

1. When two parallel lines are cut by a transversal, there exist special angle pairs.
2. Angle theorems and relationships can be applied to gain better understanding.

- **Essential Questions**

1. How do types of angles relate to each other?
2. What is the relationship between parallel and perpendicular lines?
3. What are the different components that aid in making lines and angles?
4. What are the different types of angles and how do we identify them?

### Part 3 – Common Unit Assessments

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit.



- 3) Portfolio of class work / notes
- 4) Unit Test

**Part 4 – Common/Assured Learning Experiences**

- Students will explore the relationships between the types of angles created when parallel lines are cut by a transversal.
- Students will learn the different components of lines and angles.
- Students will identify different angles by learning about their attributes.
- Students will recognize the differences between parallel and perpendicular lines.

**Part 1 - Unit 3: Triangles**

<b>Grade:</b> 11-12	<b>Subject:</b> Math	<b>Course:</b> Specialized Math 11-12	<b>Length of Unit:</b> 14 weeks
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<http://www.corestandards.org/Math/Content/HSG/CO/C/10/>: Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*

<b>Part 2 – Standards</b>		
<b>Key (GLE) Content Knowledge and Concepts/Skills</b>		<b>Bloom’s Taxonomy Levels</b> Creating, Evaluating, Analyzing, Applying, Understanding and Remembering
<p>The students will know:</p> <ol style="list-style-type: none"> <li>1. How to apply the Pythagorean Theorem to a right triangle.</li> <li>2. Triangles can be identified by both characteristics of their sides and their angles.</li> <li>3. Essential characteristics of a triangle.</li> </ol>	<p>The students will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify triangles based on their specific characteristics (related to their angles or their sides).</li> <li>2. Create triangles based on their specific characteristics ( related to their angles or their sides).</li> <li>3. Use the Pythagorean theorem to solve for a given side of a right triangle.</li> </ol>	<ol style="list-style-type: none"> <li>1. During this unit of study, all levels will be used for multiple learning experiences.</li> </ol>

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### Big Idea and Essential Questions

- **Big Ideas**

1. Angle relationships determine properties about triangles.
2. Side lengths also determine properties about triangles.
3. Pythagorean theorem can be used to determine unknown side of a right triangle

- **Essential Questions**

1. What criteria must be met in order for a shape to be a triangle?
2. What are the properties of each different type of triangle?
3. What is the Pythagorean theory and how is it applied?

### Part 3 – Common Unit Assessments

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit.

- 5) Portfolio of class work / notes
- 6) Unit Test

**Part 4 – Common/Assured Learning Experiences**

- Students will model the Pythagorean Theorem in a variety of real - world situations.
- Students will identify and model different types of triangles in both real world situations and simulated worksheets.

**Part 1 - Unit 4: Graphing**

<b>Grade:</b> 11-12	<b>Subject:</b> Math	<b>Course:</b> Specialized Math 11-12	<b>Length of Unit:</b> 14 weeks
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Common Core State Standards

<http://www.corestandards.org/Math/Content/5/G/A/1/>: Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g.,  $x$ -axis and  $x$ -coordinate,  $y$ -axis and  $y$ -coordinate).

Supporting Standards

<http://www.corestandards.org/Math/Content/HSS/ID/A/1/>: Represent data with plots on the real number line (dot plots, histograms, and box plots).

<http://www.corestandards.org/Math/Content/HSS/ID/A/2/>: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

<b>Part 2 – Standards</b>		
<b>Key (GLE) Content Knowledge and Concepts/Skills</b>		<b>Bloom’s Taxonomy Levels</b> Creating, Evaluating, Analyzing, Applying, Understanding and Remembering
<p>The students will know:</p> <p>1. One-variable data can be modeled using coordinate plane graphing, dot plots, histograms, and box and whisker plots.</p> <p>2. Scatter plots are a visual way to show the relationship between</p>	<p>The students will be able to:</p> <ol style="list-style-type: none"> <li>1. Construct coordinate plane graphs, histograms, and box and whisker plots to represent a one-variable data set.</li> <li>2. Calculate measures of center and determine which measure of central tendency (mean, median, or mode) is most appropriate for a data set.</li> <li>3. Identify outliers in one-variable data sets.</li> <li>4. Construct scatter plots.</li> </ol>	<p>1. During this unit of study, all levels will be used for multiple learning experiences.</p>

<p>two quantitative variables.</p> <p>3. Outliers can make it more difficult to make predictions based on a data set.</p>		
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### **Big Idea and Essential Questions**

- **Big Ideas**

1. There are multiple ways to represent a data set by showing its frequency (dot plots and histograms) and its spread.

- **Essential Questions**

1. How do we make informed decisions based on current numerical information?
2. What are the advantages of analyzing data?

### Part 3 – Common Unit Assessments

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit.

- 7) Portfolio of class work / notes
- 8) Unit Test

### Part 4 – Common/Assured Learning Experiences

- Students will create graphs by hand.
- Students will compare and contrast data sets.

### Part 1 - Unit 4: 2-D shapes

<b>Grade:</b> 11-12	<b>Subject:</b> Math	<b>Course:</b> Specialized Math 11-12	<b>Length of Unit:</b> 14 weeks
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### Common Core State Standards

<http://www.corestandards.org/Math/Content/5/G/B/3/>: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

### Supporting Standards

<http://www.corestandards.org/Math/Content/HSG/CO/C/11/>: Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*

<http://www.corestandards.org/Math/Content/7/G/A/1/>: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

<http://www.corestandards.org/Math/Content/6/G/A/3/>: Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

<http://www.corestandards.org/Math/Content/6/G/A/1/>: Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.



Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

<http://www.corestandards.org/Math/Content/4/G/A/2/>: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

<b>Part 2 – Standards</b>		
<b>Key (GLE) Content Knowledge and Concepts/Skills</b>		<b>Bloom’s Taxonomy Levels</b> Creating, Evaluating, Analyzing, Applying, Understanding and Remembering
<p>The students will know:</p> <ol style="list-style-type: none"> <li>1. The different types of quadrilaterals and their individual properties.</li> <li>2. The relationship between different quadrilaterals.</li> </ol>	<p>The students will be able to:</p> <ol style="list-style-type: none"> <li>5. Investigate the relationship between the diagonals of a quadrilateral and its other characteristics.</li> <li>6. Prove that a quadrilateral is a parallelogram.</li> <li>7. Apply properties of different quadrilaterals to solve problems.</li> </ol>	<ol style="list-style-type: none"> <li>1. During this unit of study, all levels will be used for multiple learning experiences.</li> </ol>

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### **Big Idea and Essential Questions**

- **Big Ideas**

1. Polygons are classified in several ways.
2. Quadrilaterals all share common qualities but each have special attributes that differentiate them from each other.
3. We can use coordinates to prove a geometric relationship.

- **Essential Questions**

3. What is the importance of classifying polygons?
4. How do different quadrilaterals relate to each other?
5. Given a set of coordinates, can we prove a geometric relationship?

### **Part 3 – Common Unit Assessments**

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit.

- 9) Portfolio of class work / notes
- 10) Unit Test

#### Part 4 – Common/Assured Learning Experiences

- Students will learn how to properly classify a polygon.
- Students will describe the relationships between different types of quadrilaterals in the structure of a “family tree” explaining the hierarchy principles and shared characteristics.

#### Part 1 - Unit 4: Circles

<b>Grade:</b> 11-12	<b>Subject:</b> Math	<b>Course:</b> Specialized Math 11-12	<b>Length of Unit:</b> 14 weeks
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Common Core State Standards

<http://www.corestandards.org/Math/Content/HSG/C/A/2/>: Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*

Supporting Standards

<http://www.corestandards.org/Math/Content/HSG/C/A/1/>: Prove that all circles are similar.

<http://www.corestandards.org/Math/Content/7/G/B/4/>: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

<b>Part 2 – Standards</b>		
<b>Key (GLE) Content Knowledge and Concepts/Skills</b>		<b>Bloom’s Taxonomy Levels</b> Creating, Evaluating, Analyzing, Applying, Understanding and Remembering
The students will know:	The students will be able to:  8. Understand and apply theorems about circles.	

<p>1. The relationships among angles, radii, segments, lines, arcs and chords as related to circles.</p> <p>2. How to determine circumference and area of circles.</p>	<p>9. Calculate the circumference and area of circles using the correct formulas.</p> <p>10. Apply theorems related to circles to solve real life problems.</p>	<p>1. During this unit of study, all levels will be used for multiple learning experiences.</p>
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### Big Idea and Essential Questions

- **Big Ideas**

1. A circle is uniquely defined in the coordinate plane using its center and radius.

- **Essential Questions**

6. How does geometry apply to circles in the coordinate plane?
7. What is the relationship between angles, lines and segments in circles?
8. How do you determine area and circumference in a circle?

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**Part 3 – Common Unit Assessments**

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit.

- 11) Portfolio of class work / notes
- 12) Unit Test

<p><b>Part 4 – Common/Assured Learning Experiences</b></p> <ul style="list-style-type: none"><li>● Students will learn how to identify the different components of a circle.</li><li>● Students will calculate area and circumference of circles.</li></ul>
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**Part 1 - Unit 4: 2-D and 3-D shapes**

<b>Grade:</b> 11-12	<b>Subject:</b> Math	<b>Course:</b> Specialized Math 11-12	<b>Length of Unit:</b> 14 weeks
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Common Core State Standards

<http://www.corestandards.org/Math/Content/6/G/A/1/> : Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Supporting Standards

<http://www.corestandards.org/Math/Content/8/G/C/9/> : Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

<http://www.corestandards.org/Math/Content/5/G/B/3/> : Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

<http://www.corestandards.org/Math/Content/4/G/A/2/>: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

<http://www.corestandards.org/Math/Content/4/G/A/3/>: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

<b>Part 2 – Standards</b>		
<b>Key (GLE) Content Knowledge and Concepts/Skills</b>		<b>Bloom’s Taxonomy Levels</b> Creating, Evaluating, Analyzing, Applying, Understanding and Remembering
The students will know:  1. The difference between 1-D, 2- D and 3-D objects	The students will be able to:  1. Explain perimeter, area, surface area and volume formulas and use them accurately to solve problems.  2. Calculate area of shaded regions.	1. During this unit of study, all levels will be used for multiple learning experiences.



<p>2. The relationship between area, surface area and volume formulas.</p>	<p>3. Visualize relationships between 2-D and 3-D objects.</p> <p>4. Apply principles of surface area and volume to prisms, pyramids, cylinders, cones and spheres.</p> <p>5. Use geometric shapes and their properties to describe and model a real world situation.</p>	
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### Big Idea and Essential Questions

- **Big Ideas**

1. Physical objects can be described using 1-D, 2-D and 3-D geometric objects.
2. Three dimensional objects are composed of several two-dimensional shapes.

- **Essential Questions**

- 1.. How do two-dimensional and three-dimensional objects relate to each other?
2. How can we use geometric relationships to model the world and solve problems?

### Part 3 – Common Unit Assessments

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit.

13) Portfolio of class work / notes

14) Unit Test

#### **Part 4 – Common/Assured Learning Experiences**

- Students will learn how to determine the various components of different shapes.
- Students will calculate perimeter, area, and volume of various shapes.