

*Making conjectures is a fundamental reasoning habit in mathematical inquiry. Geometry offers many opportunities for developing this reasoning habit through an abundance of intriguing and often surprising visual or measurable geometric relationships. Students can make conjectures by analyzing a planar or spatial configuration or by wondering whether a certain configuration can exist. Conjecturing activates their natural inquisitiveness, not only about “what might be happening” (the conjecture) but “why it should be happening” (looking for insight, validation, or refutation.) The process of seeking and making conjectures gives students the opportunity to become immersed in, and deepen their understanding of, the mathematical relationships involved, as well as to sharpen their ability to validate them. By making conjectures about novel situations, students also learn to employ mathematics in new situations, a highly desirable skill in our fast-changing world.*

NCTM, Focus in High School Mathematics: Reasoning and Sense Making

**Our goal is to use varying teaching/learning strategies in order to meet the needs of all the students and the demands of the content. These strategies include, but are not limited to, the following:**

Give students a new type of problem and have students arrive at solutions individually or in groups. Then share with group to collect all the different ways to solve a problem.

Present a new problem and think, pair, share.

Give students a new type of problem together with a worked out solution and have students discover and explain, in writing and verbally, how and why the solution works.

Direct instruction – Typically direct instruction will follow some exploratory time for students to play around with a new type of problem/situation/scenario. Students’ brainstorming will be the start of direct instruction, with notes and examples and information that help students make sense of the new problem and place it in the context of prior knowledge.

Have students analyze a new problem: what about it looks familiar, what about it looks new, how could they start the problem or, if they can’t start, what might be involved while attacking the problem. Students share ideas in writing and verbally.

Have students use technology (graphing calculators, Geometer’s Sketchpad, Graphmatica, etc) to explore functions and mathematical concepts.

Have students reflect on their learning in writing and verbally. A regular class wrap up will include asking students to write what they learned in the day’s work, what questions they still have, what it reminds them of from past work, and other associations they have with the new material.

Expose students to complex problems that involve many concepts and lend themselves to a variety of solutions and strategies. These could be problems that take anywhere from 15 minutes to an hour to multiple days to solve.

### **Instructional goals**

Nurture an appreciation for the distinct nature of mathematics as an abstract language system that is internally consistent and understood through rigorous analytical thinking skills.

Nurture an appreciation for how the analytical thinking and problem solving skills honed in mathematics is essential for students' current and future lives regardless of whether they choose a mathematical or scientific field.

Wherever possible, tie the mathematical content to other fields such as economics, literature, all the sciences, psychology, politics, etc., so that students can see the relevance and use of mathematics in other contexts.

Nurture numeracy and statistical savvy so that students may be critical consumers of statistical information in their current and future lives.

A constant goal is to achieve depth of understanding and connection, despite a much too full list of topics prescribed by the State of New York.

Nurture mathematical reasoning and analytical skills and the ways to express one's reasoning, both verbally and in writing. We want to encourage students to look for and recognize patterns, internal structure, regularities or irregularities both in "real-world" problems and in the symbolic language of mathematics. We want students to see when patterns are meaningful as opposed to when they are by chance or accidental. We want students to justify their solutions and to see why those solutions make sense.

### **Assessment**

We plan to use both formal and informal assessments to ascertain understanding. Assessments will also be both formative and summative.

Projects – research and writing projects, statistics projects that involve gathering and analyzing data, solving and explaining solutions to complex, multi-faceted problems

Tests and quizzes

Group work – group work allows the teacher to circulate and listen in, thus giving the teacher an idea of student understanding and misconceptions.

Written descriptions of solutions to problems – students will be asked to describe their process for solving a particular problem in writing, which will give the teacher an insight into student understanding of the method being assessed.

### **Homework**

We hope to train students to make homework a productive, reflective process. Homework is a time to practice problem solving skills and thinking processes. By providing solutions, we hope to encourage students to check their own work and work independently to find their own mistakes and identify any misunderstandings or gaps in knowledge.

**New Paltz Central School District  
Geometry A**

**Geometry A Curriculum**

- Unit 1: Reasoning**
- Unit 2: Essential Skills: Algebraic**
- Unit 3: Triangle Properties**
- Unit 4: Polygon Properties**
- Unit 5: Coordinate Geometry**
- Unit 6: Constructions**
- Unit 7: Locus**
- Unit 8: Euclidean Foundations: Triangle Congruence**
- Unit 9: 3-D Solids**

**Geometry B Curriculum  
(year 2)**

- Unit 10: Transformational Geometry**
- Unit 11: Triangle Congruence (Formal Proofs)**
- Unit 12: Triangle Congruence/ Inequalities (Formal Proofs)**
- Unit 13: Essential Skills (Quadrilateral Properties/Analytical Proofs)**
- Unit 14: Quadrilateral Proofs**
- Unit 15: Similarity**
- Unit 16: Circles**
- Unit 17: Indirect Proofs**

**New Paltz Central School District  
Geometry A**

**Unit 1: Reasoning**

**Essential Questions:**

1. How does formal logic help you make decisions?
2. Why is it important to justify all the steps in the process of reasoning?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>September - October (4 weeks)</b>	G.G.24	Determine the negation of a statement and establish its truth value.	<b>1: Logic Problem Solving</b> <ul style="list-style-type: none"> <li>• Investigate how logic helps solve problems</li> </ul> <b>2: Statements</b> <ul style="list-style-type: none"> <li>• Conjunctions/Disjunction</li> </ul> <b>3: Compound Statements (how to write)</b> <ul style="list-style-type: none"> <li>• Conditionals</li> <li>• Biconditionals</li> <li>• Inverse</li> <li>• Converse</li> <li>• Contrapositive</li> </ul> <b>4: Compound Statements (Truth value)</b> <ul style="list-style-type: none"> <li>• Conditionals</li> <li>• Biconditionals</li> <li>• Inverse</li> <li>• Converse</li> <li>• Contrapositive</li> <li>• Logical Equivalence</li> </ul> <b>5-6: Applications</b> <ul style="list-style-type: none"> <li>• Solve problems using formal and informal logic</li> </ul> <b>7: Assessment</b>	Statement Conjunction Disjunction
	G.G.25	Know and apply the conditions under which a compound statement (conjunction, disjunction, conditional, biconditional) is true.		Conditional Biconditional Inverse Converse Contrapositive Logical Equivalence
	G.G.26	Identify and write the inverse, converse, and contrapositive of a given conditional statement and note the logical equivalences.		

**New Paltz Central School District  
Geometry A**

**Unit 2: Essential Skills**

**Essential Questions:**

1. Using a variety of applications, how do you distinguish between calculating area and perimeter?
2. Why is it important to differentiate between linear and square units?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>October (3 – 4 weeks)</b>	G.CN.6	Recognize and apply mathematics to situations in the outside world.	<b>1: Apply Perimeter and Area Formulas</b> <ul style="list-style-type: none"> <li>• Identify and calculate using formulas</li> </ul> <b>2: Apply Perimeter and Area Formulas</b> <ul style="list-style-type: none"> <li>• Identify and calculate using formulas</li> </ul> <b>3: Perimeter and Area Applications</b> <ul style="list-style-type: none"> <li>• Identify the appropriate measurement</li> </ul>	Perimeter Area Circumference Radius Diameter
	G.PS.3	Use multiple representations to represent and explain problem situations (e.g., spatial, geometric, verbal, numeric, algebraic, and graphical representations).	<b>4: Reinforce equation solving skills</b> <ul style="list-style-type: none"> <li>• Combine like terms</li> <li>• Variables on both sides</li> </ul>	Variable Coefficient
	G.PS.5	Choose an effective approach to solve a problem from a variety of strategies (numeric, graphic, algebraic).	<b>5: Applications</b>  <b>6: Assessment</b>	

**New Paltz Central School District  
Geometry A**

**Unit 3: Triangle Properties**

**Essential Questions:**

1. How does the classification of each triangle affect its properties?
2. How do civil engineers use knowledge of triangle properties?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>November (3 weeks)</b>	G.G.30	Investigate, justify, and apply theorems about the sum of the measures of the angles of a triangle.	<b>1: Classify Triangles</b> <ul style="list-style-type: none"> <li>• <b>Definitions</b></li> <li>• <b>Geo Sketchpad – Sum of Angles</b></li> </ul> <b>2: Exterior angles</b> <ul style="list-style-type: none"> <li>• <b>Exterior Angle Theorem</b></li> <li>• <b>Algebraic applications</b></li> </ul> <b>3: Triangle Inequality</b> <ul style="list-style-type: none"> <li>• <b>Triangle inequality theorem</b></li> <li>• <b>Side/angle relationship</b></li> </ul> <b>4: Right triangles</b> <ul style="list-style-type: none"> <li>• <b>45,45,90</b></li> <li>• <b>30,60,90</b></li> <li>• <b>Altitude of an equilateral triangle</b></li> </ul> <b>5: Applications</b> <b>6: Assessment</b>	Equilateral Isosceles <ul style="list-style-type: none"> <li>• Vertex Angle</li> <li>• Base Angle</li> </ul> Scalene Acute Obtuse Right <ul style="list-style-type: none"> <li>• Hypotenuse</li> </ul> Exterior angle Remote interior angles
	G.G.31	Investigate, justify, and apply the isosceles triangle theorem and its converse.		
	G.G.32	Investigate, justify, and apply theorems about geometric inequalities, using the exterior angle theorem.		
	G.G.33	Investigate, justify, and apply the triangle inequality theorem.		
	G.G.34	Determine either the longest side of a triangle given the three angle measures or the largest angle given the lengths of three sides of a triangle.		

**New Paltz Central School District  
Geometry A**

**Unit 4: Polygons**

**Essential Questions:**

1. What are the unique properties and characteristics associated with geometric figures?
2. How are the properties of polygons used in art, music, and engineering?

Time	Perform Ind	Content	Lessons	Vocabulary	
<b>December (4 weeks)</b>	G.G. 36	Investigate, justify, and apply theorems about the sum of the measures of the interior and exterior angles of polygons.	<b>1: Properties of Polygons</b> <ul style="list-style-type: none"> <li>• Investigate and Identify types of polygons</li> <li>• Sum of measures of interior and exterior angles</li> </ul>	Regular polygons	
	G.G. 37	Investigate, justify, and apply theorems about each interior and exterior angle measure of regular polygons.			
	G.G. 38	Investigate, justify, and apply theorems about parallelograms involving their angles, sides, and diagonals.	<b>2: Parallelograms</b> <ul style="list-style-type: none"> <li>• Reinforce theorems about parallel lines cut by a transversal</li> <li>• Investigate properties of parallelograms</li> <li>• Algebraic applications</li> </ul>		Transversal Alternate exterior angles Alternate interior angles Corresponding Angles Opposite angles Diagonals Parallelogram
	G.G.39	Investigate, justify, and apply theorems about special parallelograms involving their angles, sides, and diagonals.	<b>3: Other parallelograms</b> <ul style="list-style-type: none"> <li>• Investigate properties about rectangle, rhombus, square</li> <li>• Algebraic applications</li> </ul>		Rhombus Rectangles Square
	G.G.40	Investigate, justify, and apply theorems about trapezoids involving their angles, sides, medians, and diagonals.	<b>4: Trapezoid</b> <ul style="list-style-type: none"> <li>• Median</li> <li>• Diagonals</li> <li>• Isosceles Trapezoid</li> <li>• Algebraic applications</li> </ul>		Trapezoid Diagonals Isosceles Median
	G.G.41	Justify that some quadrilaterals are parallelograms, rhombuses, rectangles, squares, or trapezoids.	<b>5: Applications</b>  <b>6: Assessment</b>		

**New Paltz Central School District  
Geometry A**

**Unit 5: Coordinate Geometry**

**Essential Questions:**

1. What is the relationship between cartography and coordinate geometry?
2. How can mathematical formulas be used to validate properties of triangles and quadrilaterals?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>December – January (6 weeks)</b>	G.G.62	Find the slope of a perpendicular line, given the equation of a line.	<b>1: Investigate lines</b> <ul style="list-style-type: none"> <li>• Parallel</li> <li>• Perpendicular</li> <li>• Slope</li> </ul>	Parallel Perpendicular Slope  Line segment Parabola System of equations
	G.G.63	Determine whether two lines are parallel, perpendicular, or neither, given their equations.		
	G.G.64	Find the equation of a line given a point on the line and the equation of a line perpendicular to the given line.	<b>2: Writing Equations (given EQ. of lines)</b> <ul style="list-style-type: none"> <li>• Parallel/Perpendicular</li> </ul>	
	G.G.65	Find the equation of a line, given a point on the line and the equation of a line parallel to the desired line.	<b>3: Writing equations (given points)</b> <ul style="list-style-type: none"> <li>• Parallel/Perpendicular</li> </ul>	
	G.G.68	Find the equation of a line that is the perpendicular bisector of a line segment, given the endpoints of the line segment.	<b>4: Systems of Equations</b> <ul style="list-style-type: none"> <li>• Graphing Solution of Quadratic/Linear System</li> </ul>	
	G.G.70	Solve systems of equations involving one linear equation and one quadratic equation graphically.	<b>Assessment: Mid-Term Exam</b>	
<b>February (4 week)</b>	G.G.67	Find the length of a line segment, given its endpoints.	<b>5: Distance</b> <ul style="list-style-type: none"> <li>• Relate to Pythagorean Theorem</li> <li>• Formula</li> </ul>	Midpoint Distance Ordinate Abscissa
	G.G.66	Find the midpoint of a line segment, given its endpoints.	<b>6: Midpoint</b> <ul style="list-style-type: none"> <li>• Formula</li> </ul>	



	G.G.69	Investigate, justify, and apply the properties of triangles and quadrilaterals in the coordinate plane, using the distance, midpoint, and slope formulas.	<p><b>Analytical proofs</b></p> <p><b>7: Apply appropriate techniques and formulas to determine measurable outcome</b></p> <ul style="list-style-type: none"> <li>• <b>Parallel lines</b></li> <li>• <b>Perpendicular lines</b></li> <li>• <b>Midpoint</b></li> <li>• <b>Median</b></li> <li>• <b>Perpendicular Bisector</b></li> <li>• <b>Altitude</b></li> </ul> <p><b>8: Triangle proofs</b></p> <ul style="list-style-type: none"> <li>• <b>Equilateral</b></li> <li>• <b>Isosceles</b></li> <li>• <b>Scalene</b></li> <li>• <b>Right</b></li> </ul> <p><b>9: Quadrilateral proofs</b></p> <ul style="list-style-type: none"> <li>• <b>Parallelogram</b></li> </ul> <p><b>10-11: Special parallelograms</b></p> <ul style="list-style-type: none"> <li>• <b>Rectangle</b></li> <li>• <b>Rhombus</b></li> <li>• <b>Square</b></li> </ul>	<p>Parallel lines Perpendicular lines Midpoint Median Perpendicular Bisector Altitude</p> <p>Parallelogram Rectangle Rhombus Square</p>
	G.G.40	Investigate, justify, and apply theorems about trapezoids involving their angles, sides, medians, and diagonals.	<p><b>12: Trapezoids</b></p> <p><b>13: Applications</b></p> <p><b>14: Assessment</b></p>	Trapezoid

**New Paltz Central School District  
Geometry A**

**Unit 6: Constructions**

**Essential Questions:**

1. What geometric conclusions can be drawn from using constructions as your hypotheses?
2. What occupations may use the geometric principles of constructions?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>March (2 weeks)</b>	G.G.17	Construct a bisector of a given angle using a straightedge and compass, and justify the construction.	<b>1: Basic Skills</b> <ul style="list-style-type: none"> <li>• Segments</li> <li>• Angles</li> <li>• Triangles</li> </ul>	Construction Straightedge Compass Point Arc Isosceles Scalene Equilateral Bisector Equivalent Perpendicular  Parallel Centroid Circumcenter Incenter Orthocenter
	G.G.18	Construct the perpendicular bisector of a given segment, using a straightedge and compass, and justify the construction.		
	G.G.21	Investigate and apply the concurrence of medians, altitudes, angle bisectors, and perpendicular bisectors of triangles.		
	G.G.19	Construct lines parallel (or perpendicular) to a given line through a given point, using a straightedge and compass, and justify the construction.	<b>3-4: Applications</b> <ul style="list-style-type: none"> <li>• Parallel Lines</li> <li>• Concurrences in Triangles</li> </ul>	
	G.G.20	Construct an equilateral triangle, using a straightedge and compass, and justify the construction.		

**New Paltz Central School District  
Geometry A**

**Unit 7: Locus**

**Essential Questions:**

1. How are locus and constructions related?
2. How does locus lead to improving your ability to follow or give directions?

Time	Perform Ind	Content	Lessons	Vocabulary
<b>March - April (3 weeks)</b>	G.G.22	Solve problems using compound loci.	<b>1: 5 Basic Theorems</b> <ul style="list-style-type: none"> <li>• Investigation software</li> <li>• Single Locus</li> </ul>	Locus Loci Radius Compound loci
	G.G.23	Graph and solve compound loci in the coordinate plane.	<b>2: Compound Locus</b> <ul style="list-style-type: none"> <li>• Investigation software</li> <li>• Real-life situations</li> </ul> <b>3: Compound Locus</b> <ul style="list-style-type: none"> <li>• Write Equations</li> <li>• Coordinate plane</li> </ul>	Angle Bisectors Perpendicular Bisector
	G.G.71	Write the equation of a circle, given its center and radius or given the endpoints of a diameter.	<b>4: Compound Locus</b> <ul style="list-style-type: none"> <li>• Circle Equations</li> <li>• Relate to other locus</li> </ul>	Median Altitude
	G.G.72	Write the equation of a circle given its graph (center is an ordered pair of integers and the radius is an integer).		
	G.G.73	Find the center and radius of a circle, given the equation of the circle in center-radius form.		
	G.G.74	Graph circles of the form $(x - h)^2 + (j - k)^2 = r^2$ .		
			<b>5: Applications of constructions</b> <ul style="list-style-type: none"> <li>• Word problems (Locus and Construction)</li> </ul> <b>6: Assessment (Locus and Construction)</b>	

**New Paltz Central School District  
Geometry A**

**Unit 8: Triangle Congruence - Foundations Theorem Writing**

**Essential Questions:**

1. How are the properties, postulates and theorems used in proofs and mathematics?
2. What role does deductive reasoning play in solving real-life problems?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>April - May (4 weeks)</b>	G.G.27	Write a proof arguing from a given hypothesis to a given conclusion.	<b>1: Proof Argument</b> <ul style="list-style-type: none"> <li>• Hypothesis</li> <li>• Conclusion</li> </ul> <b>(Non-Geometric)</b> <b>2: Apply reasoning to determine appropriate conclusions</b> <ul style="list-style-type: none"> <li>• Parallel lines</li> <li>• Perpendicular lines</li> <li>• Midpoint</li> <li>• Median</li> <li>• Perpendicular Bisector</li> <li>• Altitude</li> </ul> <u>Triangle congruence</u> <b>3: Investigate &amp; Identify Theorems (Geometers Sketchpad)</b> <ul style="list-style-type: none"> <li>• SSS</li> <li>• ASA</li> <li>• AAS</li> <li>• SAS</li> </ul> <b>4 - 5 Given a Situation Determine Whether Triangles are Congruent</b> <ul style="list-style-type: none"> <li>• Write and Explain (from teacher resources in Discovering Geometry)</li> </ul> <b>6-7: Fill-in the blank proofs</b> <ul style="list-style-type: none"> <li>• Flowchart proof</li> </ul> <b>8: Applications</b> <b>9: Assessment</b>	Angles Hypothesis Postulates Conclusion Premise
	G.G.35	Determine if two lines cut by a transversal are parallel, based on the measure of given pairs of angles formed by the transversal and the lines.		
	G.G.28	Determine the congruence of two triangles by using one of the five congruence techniques (SSS, SAS, ASA, AAS, HL) given sufficient information about the sides and/or angles of two congruent angles.		

**New Paltz Central School District  
Geometry A**

**Unit 9: 3-D Solids**

**Essential Questions:**

1. How does the volume and surface area of a 3-D solid become a critical factor in business (marketing)?
2. How is volume derived from area?
3. When and why have these shapes been used in ancient history?

Time	Perform Ind	Content	Lessons	Vocabulary
<b>May-June (4 weeks)</b>	G.G.1	Know and apply that if a line is perpendicular to each of two intersecting lines at their point of intersection, then the line is perpendicular to the plane determined by them.	<b>1: Investigate planes</b> <ul style="list-style-type: none"> <li>• <b>Parallel lines/Planes</b></li> <li>• <b>Perpendicular lines/Planes</b></li> <li>• <b>Make paper models</b></li> </ul>	3-D solids Lateral edges Lateral faces
	G.G.2	Know and apply that through a given point there passes one and only one plane perpendicular to a given line.	<b>2: Prisms</b> <ul style="list-style-type: none"> <li>• <b>Parallel Edges (Properties)</b></li> <li>• <b>Volume/Altitude relations</b></li> </ul>	Planes Volume Altitude Prism Cube
	G.G.3	Know and apply that through a given point there passes one and only one line perpendicular to a given plane.	<b>3: Pyramids</b> <ul style="list-style-type: none"> <li>• <b>Properties/Theorems</b></li> <li>• <b>Volume</b></li> <li>• <b>Find slant height</b></li> </ul>	Pyramid
	G.G.4	Know and apply that two lines perpendicular to the same plane are coplanar.	<b>4: Cylinder</b> <ul style="list-style-type: none"> <li>• <b>Properties</b></li> <li>• <b>Theorems</b></li> <li>• <b>Volume</b></li> </ul>	Cylinder
	G.G.5	Know and apply that two planes are perpendicular to each other if and only if one plane contains a line perpendicular to the second plane.	<b>5: Right Circular Cones</b> <ul style="list-style-type: none"> <li>• <b>Properties</b></li> <li>• <b>Find slant height</b></li> <li>• <b>Theorems</b></li> <li>• <b>Volume</b></li> </ul>	Right circular cone
	G.G.6	Know and apply that if a line is perpendicular to a plane, then any line perpendicular to the given line at its point of intersection with the given plane is in the given plane.	<b>6: Sphere</b> <ul style="list-style-type: none"> <li>• <b>Properties</b></li> <li>• <b>Theorems</b></li> <li>• <b>S.A. Volume</b></li> <li>• <b>Mixed Practice</b></li> </ul>	Sphere Surface area
	G.G.7	Know and apply that if a line is perpendicular to a plane, then every plane containing the line is perpendicular to the given plane.	<b>7: Cereal Project</b>  <b>8: Applications</b>	Marketing
	G.G.8	Know and apply that if a plane intersects two parallel planes, then the intersection is two parallel lines.	<b>9: Assessment</b>  <b>Final Exam</b>	

	G.G.9	Know and apply that two planes perpendicular to the same line are parallel.		
	G.G.10	Know and apply that the lateral edges of a prism are congruent and parallel.		
	G.G.11	Know and apply that two prisms have equal volumes if their bases have equal areas and their altitudes are equal.		
	G.G.12	Know and apply that the volume of a prism is the product of the area of the base and the altitude.		
	G.G.13	Apply the properties of a regular pyramid, including: <ul style="list-style-type: none"> <li>○ Lateral edges are congruent</li> <li>○ Lateral faces are congruent isosceles triangles</li> <li>○ Volume of a pyramid equals one-third the product of the area of the base and the altitude.</li> </ul>		
	G.G.14	Apply the properties of a cylinder, including: <ul style="list-style-type: none"> <li>○ Bases are congruent</li> <li>○ Volume equals the product of the area of the base and the altitude</li> <li>○ Lateral area of a right circular cylinder equals the product of an altitude and the circumference of the base.</li> </ul>		
	G.G.15	Apply the properties of a right circular cone, including: <ul style="list-style-type: none"> <li>○ Lateral area equals one-half the product of the slant height and the circumference of its base</li> <li>○ Volume is one-third the product of the area of its base and its altitude.</li> </ul>		

**Geometry A Final**

**New Paltz Central School District  
Geometry B**

**Geometry B Curriculum**

- Unit 10: Transformational Geometry**
- Unit 11: Triangle Congruence (Formal Proofs)**
- Unit 12: Triangle Congruence/ Inequalities (Formal Proofs)**
- Unit 13: Essential Skills (Quadrilateral Properties/Analytical Proofs)**
- Unit 14: Quadrilateral Proofs**
- Unit 15: Similarity**
- Unit 16: Circles**
- Unit 17: Indirect Proofs**

**New Paltz Central School District  
Geometry B**

**Unit 10: Transformational Geometry**

**Essential Questions:**

1. What are the similarities and differences among transformations?
2. How are the principles of transformational geometry used in art, architecture and fashion?
3. What are the applications of transformations?
4. How are algebraic and geometric transformations related?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>September-October (5 weeks)</b>	G.G.54	Define, investigate, justify, and apply isometries in the plane.	<b>1: Symmetry</b> <ul style="list-style-type: none"> <li>• Investigating with on-line notes</li> <li>• Vertical, horizontal line and point</li> <li>• Paper-folding</li> </ul>	Image Pre-image Symmetry Reflection
	G.G.55	Investigate, justify, and apply the properties that remain invariant under translations, rotations, reflections, and glide reflections.	<b>2: Reflection</b> <ul style="list-style-type: none"> <li>• Symbolic Notation</li> <li>• <math>x=0</math>, <math>y=0</math>, <math>y=x</math>, <math>y=-x</math></li> <li>• Intro. Isometries               <ul style="list-style-type: none"> <li>○ Direct</li> <li>○ Opposite</li> </ul> </li> </ul>	Rotation Clockwise Counter-clockwise
	G.G.56	Identify specific isometries by observing orientation, numbers of invariant points, and/or parallelism.	<b>3: Rotation</b> <ul style="list-style-type: none"> <li>• Symbol Notation</li> <li>• Rotational symmetry</li> <li>• Reflect in origin</li> <li>• 90 degree, 180 degree</li> <li>• Isometry</li> </ul>	Translation
	G.G.57	Justify geometric relationships using transformational techniques.	<b>4: Translations</b> <ul style="list-style-type: none"> <li>• Symbolic Notations</li> <li>• Isometry</li> </ul>	Dilation Similarity
	G.G.58	Define, investigate, justify and apply similarities.	<b>5: Compositions</b> <ul style="list-style-type: none"> <li>• Without Notation</li> <li>• Multi-step</li> <li>• Isometry</li> </ul> <b>6: Dilation/Similarities</b> <ul style="list-style-type: none"> <li>• Symbolic Notations</li> <li>• Origin</li> <li>• Assessment</li> <li>• Isometry</li> </ul>	



	G.G.59	Investigate, justify, and apply the properties that remain invariant under similarities.	<b>7: Glide Reflections</b> <ul style="list-style-type: none"> <li>• Symbolic Notations</li> <li>• Isometry</li> </ul> <b>8: Compositions</b> <ul style="list-style-type: none"> <li>• Notation</li> <li>• Investigate all Transformations</li> </ul> <b>9: Applications</b>  <b>10: Assessment</b>  <u>Note: Investigate software used throughout lessons</u>	Glide Reflection
	G.G.60	Identify specific similarities by observing orientation, numbers of invariant points, and/or parallelism.		
	G.G.61	Investigate, justify, and apply the analytical representations for translations, rotations about the origin of $90^\circ$ and $180^\circ$ , reflections over the lines $x = 0$ , $y = 0$ , and $y = x$ , and dilations centered at the origin.		

**New Paltz Central School District  
Geometry B**

**Unit 11: Euclidean Proofs: Informal/Formal  
Triangle Congruence**

**Essential Questions:**

1. How are the properties, postulates and theorems used in proofs and mathematics?
2. How do civil engineers use knowledge of triangle properties?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>October- November ( 5 weeks)</b>	G.G.30	Investigate, justify, and apply theorems about the sum of the measures of the angles of a triangle.	<b>1: Properties of Triangles</b> <ul style="list-style-type: none"> <li>• <b>Sum of angles</b></li> <li>• <b>Side/angle relationship</b></li> <li>• <b>Exterior angles</b></li> <li>• <b>Triangle inequalities</b></li> </ul>	Angles Hypothesis Postulates Conclusion Inverse Converse Exterior angle
	G.G.33	Investigate, justify, and apply the triangle inequality theorem.	<b>2: Theorem Decisions</b> <ul style="list-style-type: none"> <li>• <b>Definitions</b></li> <li>• <b>Fill-in the blank proofs</b></li> </ul>	
	G.G.34	Determine either the longest side of a triangle given the three angle measures or the largest angle given the lengths of three sides of a triangle.	<b>3: Theorem Decisions</b> <ul style="list-style-type: none"> <li>• <b>Postulates</b></li> <li>• <b>Fill-in the blank proofs</b></li> </ul>	
	G.G.28	Determine the congruence of two triangles by using one of the five congruence techniques (SSS, SAS, ASA, AAS, HL) given sufficient information about the sides and/or angles of two congruent angles.	<b>4: Triangle congruence Theorems (Identify)</b> <ul style="list-style-type: none"> <li>• <b>SSS</b></li> <li>• <b>ASA</b></li> <li>• <b>AAS</b></li> <li>• <b>SAS</b></li> </ul>	Postulate Reflexive
	G.G.35	Determine if two lines cut by a transversal are parallel, based on the measure of given pairs of angles formed by the transversal and the lines.	<b>5-6: Triangle Congruence Proofs</b> <ul style="list-style-type: none"> <li>• <b>Hypothesis to Conclusion</b></li> <li>• <b>Flow Chart proofs</b></li> </ul>	
	G.G.48	Investigate, justify, and apply the Pythagorean theorem and its converse.	<b>7: Triangle Congruence Proofs</b> <ul style="list-style-type: none"> <li>• <b>Transition to 2-column proofs</b></li> </ul> <b>8: Triangle Congruence Proofs</b> <ul style="list-style-type: none"> <li>• <b>2-column proofs</b></li> </ul> <b>9: Triangle Congruence Proofs</b> <ul style="list-style-type: none"> <li>• <b>2-column proofs</b></li> </ul>	

			<b>10-11: Applications</b> <ul style="list-style-type: none"><li>• More triangle proofs</li></ul> <b>12: Assessment:</b>	
--	--	--	--	--

**New Paltz Central School District  
Geometry B**

**Unit 12: Euclidean Proofs: Informal/Formal  
Triangle Congruence and Inequality**

**Essential Questions:**

1. What is the relationship between congruence and inequality?
2. How do proofs train your mind to evaluate real-life problems?

Time	Perform Ind	Content	Lessons	Vocabulary
<b>November-December (6 weeks)</b>	G.G.30	Investigate, justify, and apply theorems about the sum of the measures of the angles of a triangle.	<p><b><u>Triangle congruence</u></b></p> <p><b>1: CPCTC Proofs</b></p> <p><b>2: Other Triangle Theorems</b></p> <ul style="list-style-type: none"> <li>• HL Theorem</li> </ul> <p><b>3: Other Triangle Theorems</b></p> <ul style="list-style-type: none"> <li>• Isosceles/Converse</li> </ul>	Corresponding parts Hypotenuse Leg Isosceles Converse Base angles
	G.G.31	Investigate, justify, and apply the isosceles triangle theorem and its converse.	<p><b>4-5: Overlapping Triangles</b></p> <ul style="list-style-type: none"> <li>• Apply theorems</li> </ul>	
	G.G.32	Investigate, justify, and apply theorems about geometric inequalities, using the exterior angle theorem.	<p><b><u>Triangle inequalities</u></b></p> <p><b>6-7: Inequality postulates</b></p> <ul style="list-style-type: none"> <li>• Proofs</li> </ul>	Altitude Median Adjacent Complementary
	G.G.29	Identify corresponding parts of congruent triangles.	<p><b>8: Exterior angle theorem</b></p> <ul style="list-style-type: none"> <li>• Proofs</li> </ul> <p><b>9-10: Applications</b></p> <p><b>11: Assessment</b></p>	Supplementary Exterior angle

**New Paltz Central School District  
Geometry B**

**Unit 13: Essential Skills: Quadrilateral Properties/Analytical Proofs**

**Essential Questions:**

1. What are the quadrilaterals we see around us and how does knowing their properties help us?

Time	Perform Ind	Content	Lessons	Vocabulary
<b>December - January (3 weeks)</b>	G.G.63	Determine whether two lines are parallel, perpendicular, or neither, given their equations.	<b>1: Quadrilateral Properties</b> <ul style="list-style-type: none"> <li>○ Parallelogram</li> <li>○ Rectangle</li> <li>○ Rhombus</li> <li>○ Square</li> <li>○ Trapezoid</li> </ul> <b>• Algebra Applications</b>	Parallel Perpendicular
	G.G.69	Investigate, justify, and apply the properties of triangles and quadrilaterals in the coordinate plane, using the distance, midpoint, and slope formulas.	<b>2: Practice Calculations</b> <ul style="list-style-type: none"> <li>• Distance</li> <li>• Midpoint</li> <li>• Slope</li> </ul> <ul style="list-style-type: none"> <li>• How to prove congruence, medians, altitudes, parallel, perpendicular, etc.</li> </ul>	Line segment Midpoint Distance  Ordinate Abscissa
	G.G.64	Find the equation of a line given a point on the line and the equation of a line perpendicular to the given line.	<b>3-4: Informal proofs</b> <ul style="list-style-type: none"> <li>• Quadrilaterals</li> </ul>	Isosceles Equilateral Scalene Right
	G.G.40	Investigate, justify, and apply theorems about trapezoids involving their angles, sides, medians, and diagonals.	<b>5: Applications</b>  <b>6: Assessment</b>  <b>Midterm Exam</b>	Parallelogram Rectangle Rhombus Square Trapezoid
	G.G.66	Find the midpoint of a line segment, given its endpoints.		
	G.G.67	Find the length of a line segment, given its endpoints.		

**New Paltz Central School District  
Geometry B**

**Unit 14: Euclidean Proofs: Informal/Formal  
Polygons**

**Essential Questions:**

1. What are the unique properties and characteristics associated with geometric figures?
2. How are the properties of polygons used in art, music, and engineering?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>February (3 weeks)</b>	G.G.41	Justify that some quadrilaterals are parallelograms, rhombuses, rectangles, squares, or trapezoids.	<b>1: Parallelogram proofs</b> • <b>Given a parallelogram prove congruent triangles</b>	Regular polygons Transversal Alternate exterior angles Alternate interior angles Corresponding angles Rhombus Rectangles Parallelogram Square  Trapezoid Diagonals Isosceles
	G.G.35	Determine if two lines cut by a transversal are parallel, based on the measure of given pairs of angles formed by the transversal and the lines.	<b>2: Parallelogram Proof</b> • <b>Prove quadrilateral is a parallelogram</b>  <b>3: Parallelogram Proof</b> • <b>Mixed parallelogram proofs</b>	
	G.G.39	Investigate, justify, and apply theorems about special parallelograms involving their angles, sides, and diagonals.	<b>4: Other parallelogram Proofs</b>	
	G.G.40	Investigate, justify, and apply theorems about trapezoids involving their angles, sides, medians, and diagonals.	<b>5: Trapezoid Proofs</b> • <b>Median</b> • <b>Diagonals</b> • <b>Isosceles Trapezoid</b>  <b>6: Applications</b>  <b>7: Assessment</b>	

**New Paltz Central School District  
Geometry B**

**Unit 15: Euclidean Proofs: Informal/Formal  
Similarity of Triangles and its Applications**

**Essential Questions:**

1. What are the properties and theorems that connect multiple geometry figures (e.g. congruence, similarity, etc) to real world problems?
2. How can similarity foster conclusions about mean proportionality?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>February-March (4 weeks)</b>	G.G. 44	Establish similarity of triangles using the following theorems: AA, SAS, and SSS.	<b>1: Investigate Theorems</b> <ul style="list-style-type: none"> <li>• AA</li> <li>• Basic similar proofs</li> </ul> <b>2-3: Similarities of triangles</b> <ul style="list-style-type: none"> <li>• Sides are in proportion</li> <li>• Proportion definition</li> </ul> <b>4: Triangle Median/Centroid theorems</b> <ul style="list-style-type: none"> <li>• Investigate theorems</li> <li>• Algebraic applications</li> </ul> <b>5: Triangle Median/Centroid theorems</b> <ul style="list-style-type: none"> <li>• Investigate theorems</li> <li>• Proofs</li> </ul> <b>6: Mean proportionality</b> <ul style="list-style-type: none"> <li>• Investigate/special right triangles</li> <li>• Introduce theorem</li> </ul> <b>7: Mean proportionality</b> <ul style="list-style-type: none"> <li>• Algebra applications</li> </ul> <b>8: Applications</b> <b>9: Assessment</b>	Similarity
	G.G.45	Investigate, justify, and apply theorems about similar triangles.		Proportional
	G.G.42	Investigate, justify, and apply theorems about geometric relationships, based on the properties of the line segment joining the midpoints of two sides of the triangle.		Median Centroid
	G.G.43	Investigate, justify, and apply theorems about the centroid of a triangle, dividing each median into segments whose lengths are in the ratio 2:1.		Altitude Hypotenuse
	G.G.46	Investigate, justify, and apply theorems about proportional relationships among the segments of the sides of the triangle, given one or more lines of the sides of the triangle, given one or more lines parallel to one side of a triangle and intersecting the other two sides of the triangle.		
	G.G.47	Investigate, justify, and apply theorems about mean proportionality: <ul style="list-style-type: none"> <li>• altitude to the hypotenuse of a right triangle .</li> </ul>		

**New Paltz Central School District  
Geometry B**

**Unit 16: Euclidean Proofs: Informal/Formal  
Circles**

**Essential Questions:**

1. How can angle and segment theorems of circles be directly applied to real world applications?
2. How are the similarity triangle theorems applied to proofs about circles?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>March-May ( 6 weeks)</b>	G.G. 49	Investigate, justify and apply theorems regarding chords of a circle.	<b>1: Arcs and Angles</b> <ul style="list-style-type: none"> <li>• Basic vocabulary</li> <li>• Central angles</li> <li>• Inscribed angles</li> </ul>	Radius Diameter Angle Vertex Central angles Arc
	G.G.50	Investigate, justify, and apply theorems about tangent lines to a circle.	<b>2: Chord Theorems</b> <ul style="list-style-type: none"> <li>• Investigate arc measures</li> <li>• Parallel chord theorems</li> </ul>	Minor arc Major arc Chord
	G.G.51	Investigate, justify, and apply theorems about the arcs determined by the rays of angles formed by two lines intersecting a circle.	<b>3: Angles formed by Chords</b> <ul style="list-style-type: none"> <li>• Investigate theorems</li> <li>• Algebraic applications</li> </ul> <b>4: Tangents and Secants</b> <ul style="list-style-type: none"> <li>• Investigate theorems</li> <li>• Algebraic applications</li> </ul>	
	G.G.52	Investigate, justify, and apply theorems about arcs of a circle cut by two parallel lines.	<b>5: Practice finding all angle measures</b>  <b>6: Measures of chord segments</b> <ul style="list-style-type: none"> <li>• Investigate theorems</li> <li>• Algebraic applications</li> </ul> <b>7: Measures of Tangents and Secants segments</b> <ul style="list-style-type: none"> <li>• Investigate theorems</li> </ul>	Tangent Secant



	G.G.53	Investigate, justify, and apply theorems regarding segments intersected by a circle.	<p><b>8: Arc length</b></p> <ul style="list-style-type: none"> <li>• Algebraic applications</li> <li>• Word problems</li> </ul> <p><b>9: Area of a sector</b></p> <ul style="list-style-type: none"> <li>• Algebraic applications</li> <li>• Word problems</li> </ul> <p><b>10: Area of a minor segment</b></p> <ul style="list-style-type: none"> <li>• Algebraic applications</li> <li>• Review 30,60,90</li> <li>• Word problems</li> </ul> <p><b>11: Circle proofs</b></p> <p><b>12: Circle proofs</b></p> <p><b>13: Applications</b></p> <p><b>14: Assessment</b></p>	Circumference Sector Minor segment
--	--------	--	--	--

**New Paltz Central School District  
Geometry B**

**Unit 17: Euclidean Proofs: Informal/Formal  
Indirect Proofs**

**Essential Questions:**

- 1: How does understanding indirect reasoning enhance our ability to think critically?
- 2: How is indirect reasoning used in a court of law?

<b>Time</b>	<b>Perform Ind</b>	<b>Content</b>	<b>Lessons</b>	<b>Vocabulary</b>
<b>May (3 weeks)</b>	G.G.27	Write a proof arguing from a given hypothesis to a given conclusion.	<b>1: Indirect Reasoning Introduction</b> <ul style="list-style-type: none"> <li>• Activity to show indirect reasoning</li> <li>• Non-geometric examples</li> </ul>	Angles Hypothesis Postulates Conclusion Inverse Converse
	G.G.33	Investigate, justify, and apply the triangle inequality theorem.	<b>2: Indirect Proofs</b> <ul style="list-style-type: none"> <li>• Fill-in the blank proofs</li> </ul>	Exterior angle
	G.G.34	Determine either the longest side of a triangle given the three angle measures or the largest angle given the lengths of three sides of a triangle.	<b>3-4: Indirect Proofs</b> <ul style="list-style-type: none"> <li>• proofs</li> </ul> <b>5: Applications</b>  <b>6: Assessment</b>  <b>Geometry Regents</b>	
	G.G.31	Investigate, justify, and apply the isosceles triangle theorem and its converse.		