



**Plainfield Public Schools
Mathematics
Unit Planning Organizer**

Grade/Course	Geometry
Unit of Study	Unit 1 Congruence, Proof, and Construction
Pacing	9 week

Standards for Mathematical Practices

- MP1. Make sense of problems and persevere in solving them.
- MP2. Reason abstractly and quantitatively.
- MP3. Construct viable arguments and critique the reasoning of others.
- MP4. Model with mathematics.
- MP5. Use appropriate tools strategically.
- MP6. Attend to precision.
- MP7. Look for and make use of structure.
- MP8. Look for and express regularity in repeated reasoning

UNIT 1 FOCUS STANDARDS

G.CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

G.CO.A.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

G.CO.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

G.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

G.CO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

G.CO.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.

G.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.

G.CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

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“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
FOCUS STANDARD:		
G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.		
Use	geometric descriptions	2
Predict	congruence	4

“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
FOCUS STANDARD:		
G.CO.7 Use the definition of congruence in terms of rigid motions show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent		
Use	congruence	2

“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
FOCUS STANDARD:		
G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.		
Explain	congruence (ASA, SAS, and SSS)	2

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“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD: G.CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.		
Know	Angle Circle Perpendicular line Parallel line Line segment	1

“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD G.CO.A.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).		
Represent	transformation	1

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“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD		
G.CO.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.		
Describe	Rotation reflection	2

“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD		
G.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.		
Develop	Definitions of reflections ,rotation, translations	2

“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD		
G.CO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.		
Draw	transformations	2

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“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD: G.CO.9 Prove theorems about lines and angles. <i>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.</i>		
Prove theorem	Lines Angles Transversal Parallel Alternate line Perpendicular bisector	3

“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD: HSG.CO.10 Prove theorems about triangles. <i>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.</i>		
Prove	triangles	3

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“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD		
G.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.		
Make Copy	Geometric Construction Segment Copy an angle	2 2

“Unwrapped” Skills (students need to be able to do)	“Unwrapped” Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD		
G.CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.		
Construct	Equilateral triangle Square Regular hexagon	3

II. Mathematical Standards & PracticesExplanations and Examples

Geometry: Congruence (G-CO) Experiment with transformations in the plane.		
Standards <i>Students are expected to:</i>	Mathematical Practices	Explanations and Examples
HS.G-CO.A.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	<i>HS.MP.6.</i> Attend to precision.	
HS.G-CO.A.2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	<i>HS.MP.5.</i> Use appropriate tools strategically.	Students may use geometry software and/or manipulatives to model and compare transformations.
HS.G-CO.A.3. Given a rectangle, parallelogram, trapezoid, or regular polygons, describe the rotations and reflections that	<i>HS.MP.3</i> Construct viable arguments and critique the reasoning of others. <i>HS.MP.5.</i> Use appropriate	Students may use geometry software and/or manipulatives to model transformations.

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carry it onto itself.	tools strategically.	
HS.G-CO.A.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	<p><i>HS.MP.6.</i> Attend to precision.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p>	Students may use geometry software and/or manipulatives to model transformations. Students may observe patterns and develop definitions of rotations, reflections, and translations.
HS.G-CO.A.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	<p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p>	Students may use geometry software and/or manipulatives to model transformations and demonstrate a sequence of transformations that will carry a given figure onto another.

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Geometry: Congruence (G-CO)		
Understand congruence in terms of rigid motions.		
Standards <i>Students are expected to:</i>	Mathematical Practices	Explanations and Examples
HS.G-CO.B.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	<p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p>	<p>A rigid motion is a transformation of points in space consisting of a sequence of one or more translations, reflections, and/or rotations. Rigid motions are assumed to preserve distances and angle measures.</p> <p>Students may use geometric software to explore the effects of rigid motion on a figure(s).</p>
HS.G-CO.B.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	<p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p>	<p>A rigid motion is a transformation of points in space consisting of a sequence of one or more translations, reflections, and/or rotations. Rigid motions are assumed to preserve distances and angle measures.</p> <p><u>Congruence of triangles</u></p> <p>Two triangles are said to be congruent if one can be exactly superimposed on the other by a rigid motion, and the congruence theorems specify the conditions under which this can occur.</p>
HS.G-CO.B.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	<p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p>	

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<p>HS.G-CO.C.9. Prove theorems about lines and angles. <i>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.</i></p>	<p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p>	<p>Students may use geometric simulations (computer software or graphing calculator) to explore theorems about lines and angles.</p>
<p>HS.G-CO.C.10. Prove theorems about triangles. <i>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</i></p>	<p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p>	<p>Students may use geometric simulations (computer software or graphing calculator) to explore theorems about triangles.</p>

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Geometry: Congruence (G-CO)		
Make geometric constructions.		
<u>Standards</u> <i>Students are expected to:</i>	<u>Mathematical Practices</u>	<u>Explanations and Examples</u>
<p>HS.G-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.). <i>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</i></p>	<p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.6.</i> Attend to precision.</p>	<p>Students may use geometric software to make geometric constructions.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Construct a triangle given the lengths of two sides and the measure of the angle between the two sides. • Construct the circumcenter of a given triangle.
<p>HS.G-CO.D.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</p>	<p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.6.</i> Attend to precision.</p>	<p>Students may use geometric software to make geometric constructions.</p>

III . Essential Question Corresponding Big Ideas

Essential Questions	Corresponding Big Ideas
<p>How may triangles be proven congruent?</p> <p>How are vertical angles used to prove triangles congruent?</p> <p>How do SSS, SAS, ASA, and AAS criteria follow from rigid motion definition of congruence?</p>	<p>a diagram is a sophisticate mathematical device for thinking and communicating.</p> <p>A diagram is a “built” geometric artifact, with both a history- a narrative of successive construction- and a purpose.</p> <p>A diagram is not a picture. It needs to be interpreted: learning how to read a diagram can be like learning a new language.</p> <p>Underlying any geometric theorem is an invariance-something that does not change while something else.</p> <p>Invariance are rare and can be appreciated only when they emerge out of much greater variation.</p> <p>Examining the possible variations of an invariant situation can lead to a new conjectures and theorems.</p> <p>Geometric objects can have different definitions. Some are better than others, and their worth depends both on context and value.</p> <p>Definition in geometry are of two distinct types: definition by genesis (how you can create the object) and definitions by property (how you can characterize the object in terms of certain features).</p>

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	<p>Building definition requires moving back and forth between the verbal and visual.</p> <p>Empirical verification is an important part of the process of proving, but it can never, by itself, constitute a proof</p> <p>Counterexamples are important: individual instances can disprove a conjecture, but they can also lead to modified conjectures</p> <p>Behind every proof is a proof idea.</p> <p>Geometry uses a wide variety of kind of proofs</p> <p><i>Source:</i> <i>Sinclair, N & Pimm, David. (2012). Developing essential understanding of Geometry 9-12. Reston, VA: The National Council of Teachers of Mathematics, Inc.</i></p>
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IV .Student Learning Objectives Instructional Clarifications

Student Learning Objectives	Skills/ Concepts	<u>PARCC Evidence Table .Math Test Specification</u>	Mathematical Practice
Use the undefined notion of a point, line, distance along a line and distance around a circular arc to develop definitions for angles, circles, parallel lines, perpendicular lines and line segments. G.CO.1	<p>Concept(s):</p> <ul style="list-style-type: none"> • Point, line, plane, distance along a line, and distance around a circular arc as indefinable notions <p>Students are able to:</p> <ul style="list-style-type: none"> • use point, line, distance along a line and/or distance around a circular arc to give a precise definition of <ul style="list-style-type: none"> – angle; – circle (the set of points that are the same distance from a single point - the center); – perpendicular line (two lines are perpendicular if an angle formed by the two lines at the point of intersection is a right angle); – parallel lines (distinct lines that have no point in common); – and line segment. 	<ul style="list-style-type: none"> ▪ Definitions are limited to those in the evidence statement. ▪ Plane is also considered an undefined notion. 	MP.6
Apply the definitions of angles, circles, parallel lines, perpendicular lines and line		<ul style="list-style-type: none"> • Definitions are limited to those in the evidence 	MP.6

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<p>segments to describe rotations, reflections, and translations. G.CO.1, G.CO.4</p>		<p>statement.</p> <ul style="list-style-type: none"> Plane is also considered an undefined notion. 	
<p>Represent transformations in the plane using transparencies, describe and explain transformations as functions, and compare rigid transformations to dilations, horizontal stretches and vertical stretchesG.CO.2</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Transformations as functions (e.g. $F(P)$ is the image of point P created by transformation F). <p>Students are able to:</p> <ul style="list-style-type: none"> Represent transformations with transparencies and geometry software. Describe transformations as functions (points defining the pre-image as the input and the points defining the image as the output). Describe a transformation F of the plane as a rule that assigns to each point P in the plane a point $F(P)$ of the plane. Compare rotations, reflections, and translations to a horizontal stretch, vertical stretch and to dilations, distinguishing preserved distances and angles from those that are not preserved 		<p>MP.5 MP.6 MP.7</p>
<p>Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the</p>	<p>Concept(s): No new concept(s) introduced Students are able to:</p>		<p>MP.3 MP.6</p>

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<p>rotations and reflections that carry it onto itself, and identify lines of symmetry. G.CO.A.3</p>	<ul style="list-style-type: none"> • Identify lines of symmetry when performing rotations and/or reflections on rectangles, parallelograms, trapezoids and regular polygons. • Describe the rotations and reflections that carry rectangles, parallelograms, trapezoids and regular polygons onto itself 		
<p>Develop formal definitions of rotations, reflections, and translations. G.CO.B.4</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> • Impact of transformations on figures in the plane. <p>Students are able to:</p> <ul style="list-style-type: none"> • Develop formal mathematical definitions of a rotation, reflection, and translation. 		<p>MP.6</p>
<p>Draw transformed figures using graph paper, tracing paper, and/or geometry software and identify a sequence of transformations required in order to map one figure onto another. G.CO.B.5</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> • Draw the transformed figure using, graph paper, tracing paper, and/or geometry software given a geometric figure and a rotation, reflection, or translation. • Identify the sequence of transformations required to carry 		<p>MP.5 MP.6 MP.7</p>

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	one figure onto another.		
Use rigid transformations to determine and explain congruence of geometric figures. G.CO.B.6	<p>Concept(s):</p> <ul style="list-style-type: none"> • Congruence in terms of rigid motion <p>Students are able to:</p> <ul style="list-style-type: none"> • Predict the outcome of a transformation on a figure. • Given a description of the rigid motions, transform figures. • Given two figures, decide if they are congruent by applying rigid motions. 		MP.3
Show and explain that two triangles are congruent by using corresponding pairs of sides and corresponding pairs of angles, and by using rigid motions (transformations). G.CO.B.7	<p>Concept(s):</p> <ul style="list-style-type: none"> • Triangle congruence in terms of rigid motion <p>Students are able to:</p> <ul style="list-style-type: none"> • Given that two triangles are congruent based on rigid motion, show that corresponding pairs of sides and angles are congruent. • Given that corresponding pairs of sides and angles of two triangles are congruent, show, using rigid motion (transformations) that they are congruent. 		MP.2 MP.6 MP.7

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<p>Show and explain how the criteria for triangle congruence extend from the definition of congruence in terms of rigid motion. G.CO.B.8</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Criteria for triangle congruence <p>Students are able to:</p> <ul style="list-style-type: none"> Show and explain the criteria for Angle-Side-Angle triangle congruence. Show and explain the criteria for Side-Angle-Side triangle congruence. Show and explain the criteria for Side-Side-Side triangle congruence. Explain the relation of the criteria for triangle congruence to congruence in terms of rigid motion. 		<p>MP.2 MP.6 MP.7</p>
<p>Construct and explain formal proofs of theorems involving lines, angles, triangles, and parallelograms (Please note G.CO.10 will be addressed again in unit 2G.CO.9, G.CO.10, G.CO.11 :</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> A formal proof may be represented with a paragraph proof or a two-column proof. <p>Students are able to:</p> <ul style="list-style-type: none"> Construct and explain proofs of theorems about lines and angles including: <ul style="list-style-type: none"> vertical angles are congruent; congruence of alternate interior angles; 	<ul style="list-style-type: none"> Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. About 75% of tasks align to G.CO.9 or G.CO.10. Theorems include but are not limited to the examples listed in standards G-CO.9,10,11. 	<p>MP.3 MP.6</p>

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	<ul style="list-style-type: none">– congruence of corresponding angles;– and points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.• Construct and explain proofs of theorems about triangles including:<ul style="list-style-type: none">– sum of interior angles of a triangle;– congruence of base angles of an isosceles triangle;– the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length;– and the medians of a triangle meet at a point.• Construct and explain proofs of theorems about parallelograms including:<ul style="list-style-type: none">– opposite sides are congruent;– opposite angles are congruent;		
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	<ul style="list-style-type: none"> - the diagonals of a parallelogram bisect each other; - and rectangles are parallelograms with congruent diagonal 		
<p>Generate formal constructions with paper folding, geometric software and geometric tools to include, but not limited to, the construction of regular polygons inscribed in a circle. G.CO.12, G.CO.13</p>		<ul style="list-style-type: none"> • Make and understand geometric constructions • About 75% of tasks align to G.CO.12. • Tasks may include requiring students to justify steps and results of a given construction. 	<p>MP.3 MP.5 MP.6</p>

V.UNIT VOCABULARY

Unit Vocabulary Terms	
Conditional Statement (all forms)	Reflection
Two Column Proof	Dilation
Postulate	Image
Plane	Rigid motion
Point	Line of reflection
Angle	Center of rotation
Line Segment	Angle of rotation
Parallel Line	Line symmetry
Perpendicular Line	Line of symmetry
Auxiliary lines	Conjecture
Transversal	Inductive Reasoning
Interior angle	Counter Example
Exterior angle	Complimentary Angles
Transformations	Supplementary Angles
Sequence of Transformations	Geometric Mean
Pre-image	Proportion
Transformed Figure	Ratio
Translation	Linear Pair
Rotation	Vertical Angles

Differentiations/Modifications Teaching Strategies

Research Based Effective Teaching Strategies	Modifications (how do I differentiate instruction?)	Special Education	Strategies for English Language Learners
<p>Task /Activities that solidifies mathematical concepts Use questioning techniques to facilitate learning</p> <p>Reinforcing Effort, Providing Recognition Practice, reinforce and connect to other ideas within mathematics</p> <p>Promotes linguistic and nonlinguistic representations</p> <p>Cooperative Learning Setting Objectives, Providing Feedback</p> <p>Varied opportunities for students to communicate mathematically</p> <p>Use technological and /or</p>	<p><u>Modifications</u> Before or after school tutorial program Leveled rubrics Increased intervention Small groups Change in pace Calculators Extended time Alternative assessments Tiered activities/products Color coded notes Use of movements Use any form of technology</p> <p>Using a coordinate plan marked on a white board, students construct triangle, then explain characteristic; then classify them</p>	<p>Change in pace Calculators Alternative assessments Accommodations as per IEP Modifications as per IEP Use graphic organizer to clarify mathematical functions for students with processing and organizing difficulties’.</p> <p>Constant review of math concepts to strengthen understanding of prior concepts for difficulties recalling facts.</p> <p>Use self-regulations strategies for student to monitor and assess their thinking and performance for difficulty attending to task</p> <p>Cooperative learning (small group, teaming, peer assisted</p>	<p><u>Whiteboards</u> <u>Small Group / Triads</u> <u>Word Walls</u> <u>Partially Completed Solution</u> <u>Gestures</u> <u>Native Language Supports</u> <u>Pictures / Photos</u> <u>Partner Work</u> <u>Work Banks</u> <u>Teacher Modeling</u> <u>Math Journals</u></p> <p>Students write the names of proof and statements/ definitions on a set of card; then write reasoning’s of proofs on another .Students shuffled decks and matches statement to reasons.</p>

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<p>physical tools</p>	<p>Using a coordinate plan students' use various transformations to create a work of art. Students should record each transformation they use in their design <u>Extension:</u> Students create examples of triangle congruency on a poster with theorems and proofs Students create all possible types of triangles:</p>	<p>tutoring) to foster communication and strengthen confidence. Use technology and/or hands on devices to: clarify abstract concepts and process for: 1. Difficulty interpreting pictures and diagram. 2. Difficulties with oral communications 3. Difficulty correctly identifying symbols of numeral 4. Difficulty maintaining attentions Simplify and reduces strategies</p>	
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<p>21st Century Learning Skills :</p> <p>Teamwork and Collaboration</p> <p>Initiative and Leadership</p> <p>Curiosity and Imagination</p> <p>Innovation and Creativity</p> <p>Critical thinking and Problem Solving</p> <p>Flexibility and Adaptability</p> <p>Effective Oral and Written Communication</p> <p>Accessing and Analyzing Information</p>	<p>scalene, isosceles and equilateral using possible angles: acute, right, obtuse, equiangular. Students draw an example of each or an explanation of why it is not possible.</p>	<p>/ Goal structure to enhance motivation, foster independence and self-direction for:</p> <ol style="list-style-type: none"> 1. Difficulty attending to task 2. Difficulty with following a sequence of steps to solution. 3. difficulty processing and organizing <p>Scaffolding math idea/concepts by guided practice and questioning strategies' to clarify and enhance understanding of math big ideas for:</p> <ol style="list-style-type: none"> 1. Difficulty with process and organization 2. difficulty with oral and written communication <p>Teacher models strategies' and think out aloud strategies to specify step by step process for</p> <ol style="list-style-type: none"> 1. Difficulties processing and organization 2. Difficulty attending to tasks. <p>Use bold numbers and/or words to draw students'</p>	
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		<p>attention to important information.</p> <p>Provide students with friendly numbers in order to focus on the mathematical concept rather than operations of the problem.</p> <p>Have students note and explain the differences between the use of the symbol (-) for subtraction sentences and for identifying negative numbers. Help make connections between everyday situations and the use of positive numbers, negative numbers, or zero by making posters depicting different scenarios, example a lemonade stand. Include illustrations and paragraph explaining the situation. Show coins and paper money to illustrate the problem. Represent a loss with (-) and a profit or gain with (+). Then have students solve problems about the scenario.</p>	
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Instructional Resources and Materials

Instructional Resources and Materials	
Formative Assessment	Print
Short constructed responses Extended responses Checks for Understanding Exit tickets Teacher observation Projects Timed Practice Test – Multiple Choice &	Glencoe McGraw-Hill (2014): Geometry <ul style="list-style-type: none">• Chapter 1: Tools of Geometry• Chapter 2: Reasoning and Proof• Chapter 3: Parallel and Perpendicular Lines• Chapter 9: Transformations and Symmetry
	Technology

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<p>Open-Ended Questions</p> <p><u>Performance Tasks:</u></p> <p><u>G.CO.A.5 ILLUSTRATIVE MATHEMATICS PERFORMANCE TASK "Showing a triangle congruence"</u></p> <p><u>G.CO.B.8 ILLUSTRATIVE MATHEMATICS PERFORMANCE TASK "Why does SAS work?"</u></p> <p><u>Performance tasks for class implementation:</u></p> <p><u>G.CO.A.1 Defining Parallel Lines</u></p> <p><u>G.CO.A.1 Defining Perpendicular Lines</u></p> <p><u>G.CO.A.2 Horizontal Stretch of the Plane</u></p> <p><u>G.CO.A.3 Seven Circles II</u></p> <p><u>G.CO.A.3 Symmetries of rectangles</u></p> <p><u>G.CO.A.4 Defining Rotations</u></p> <p><u>G.CO.B.7 Properties of Congruent Triangles</u></p> <p><u>G.CO.B.8 Why does SAS work?</u></p> <p><u>G.CO.B.8 Why does SSS work?</u></p> <p><u>G.CO.B.8 Why does ASA work?</u></p> <p><u>G.CO.D.12 Bisecting an angle</u></p> <p><u>G.CO.D.12 Angle bisection and midpoints of line segments</u></p> <p><u>G.CO.D.13 Inscribing an equilateral triangle in a circle</u></p>	<p><u>Mathematics Assessment Projects</u></p> <p><u>Illustrative Mathematics</u></p> <p><u>Inside Mathematics.org</u></p> <p><u>Asia Pacific Economic Cooperation : :Lesson Study Videos</u></p> <p><u>Genderchip.org</u></p> <p><u>Interactive Geometry</u></p> <p><u>Mathematical Association of America</u></p> <p><u>National Council of Teachers of Mathematics learner.org</u></p> <p><u>Math Forum : Teacher Place</u></p> <p><u>Shmoop /common core math</u></p> <p><u>Geometer's Sketchpad</u></p>	<p>Resources for Students</p> <p><u>Khan Academy</u></p> <p><u>Math world : Wolfram.com</u></p> <p><u>Webmath.com</u></p> <p><u>sosmath.com</u></p> <p><u>Mathplanet.com</u></p> <p><u>Interactive Mathematics.com</u></p> <p><u>Mathexpression.com.algebra</u></p> <p><u>SparksNotes :Geometry Proofs</u></p>
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PPS Mathematics Curriculum Geometry

<p><u>Project (Optional) :</u></p> <p><u><i>TEACH 21 Problem Based Learning Project "A Stitch in Time"</i></u></p>		
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