Plane Geometry POR Curriculum

Content Area: **Mathematics**
Course(s): **Plane Geometry POr**
Time Period: **One Academic Year**
Status: **Not Published**

Statement Of Purpose

The enclosed Plane Geometry curriculum is intended for Special Education students in high school enrolled in a Pull Out Resource classroom setting. The standards in high school geometry are meant to formalize and extend what was learned in middle school geometry. Students will begin the curriculum by learning basic geometry vocabulary. The nature of deductive proof and logical reasoning will be explored and applied. Transformations are presented to help build and reinforce conceptual understanding of geometric concepts. Students will also study congruence, similarity, proportional reasoning, right triangle trigonometry, and polygons. Technological tools assist in illustrating the connections between geometry and other areas of mathematics and demonstrate the power of mathematics. The intent of this course is to enable students to move towards independent learning within the context of a review and extension of these skills and an introduction to topics essential for further study of mathematics. Mastery of new concepts is achieved over a period of time when the new ideas are seen repeatedly and in different situations.

In order to demonstrate a cohesive and complete implementation plan the following general suggestions are provided:

- The use of various formative assessments are encouraged in order to provide an ongoing method of determining the current level of understanding the students have of the material presented.
- Homework, when assigned should be relevant and reflective of the current teaching taking place in the classroom.
- Organizational strategies should be in place that allow the students the ability to take the information gained in the classroom and put in in terms that are relevant to them.
- Instruction should be differentiated to allow students the best opportunity to learn.
- Assessments should be varied and assess topics of instruction delivered in class.
- Modifications to the curriculum should be included that address students with Individualized Educational Plans (IEP), English Language Learners (ELL), and those requiring other modifications (504 plans).

Table Of Contents

Unit 1 POR Plane Geometry: Geometry Terms & Addition Postulates

Content Area: **Mathematics**
Course(s): **Plane Geometry**
Time Period: **1st Semester**
Length: **24 - 35 days**
Status: **Published**

Unit 1 Summary of the Unit

A review of the algebraic reasoning and concepts needed for the Plane Geometry course.

Introduce Geometry vocabulary, basic concepts, and the beginning of establishing definitions, undefined terms, and postulates.

Students will name and sketch geometric figures, use postulates to identify congruent segments, find lengths of segments in the coordinate plane, and find the midpoint of a segment.

Students will also name, measure and classify angles, identify linear pairs of angles, vertical angles, complementary and supplementary angles.

Unit 1: Enduring Understandings

- To name and sketch points, lines, planes, segments, and rays.
- To find segment lengths using the Ruler Postulate, the Segment Addition Postulate, midpoints, segment bisectors, and the Distance Formula.
- To classify angles and identify angle relationships.
- To find angle measures using the Protractor Postulate, the Angle Addition Postulate, angle bisector and angle relationships.

Unit 1 Essential Questions

- How do you name geometric figures?
- How do you find the distance and the midpoint between two points in the coordinate plane?
- How do you identify whether an angle is acute, right, obtuse or straight?
- How do you identify complementary and supplementary angles?

Summative Assessment and/or Summative Criteria

- Homework: To be given on each introduced topic/content area
- Class discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
- Do Nows, Exit tickets, writing prompts, communicating answers to questions
- Teacher Observation: To be done on each introduced topic/content area
- Student will demonstrate mastery through various assessment criteria within the unit per teacher discretion (graded assignments, quizzes, projects, quarterly exam, etc.)

Unit 1 Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Algebra Review 8 – 10 days	SWBAT solve multistep equations using algebraic reasoning, simplify radical expressions, and absolute value	Review algebraic properties and summer packet review Writing algebraic proofs to identify steps to solve multi-step equations (BIMG 2.4) Notes Classwork Homework	Observation Class discussion Homework Formal assessment	MA.A.CED.1 A.SSE.1 A.SSE.2 A.REI.1 N.Q.1 N.Q.2 N.Q.3
Undefined terms (points, lines, planes) 4 – 5 days	SWBAT correctly draw, label, identify and name points, lines, and planes	Guided notes to explain, define, and model undefined terms and basic	Observation Class discussion Homework Project Formal assessment	MA.G.CO.A.1

	SWBAT correctly name and identify colinear, non-collinear, coplanar, and non-coplanar points and lines	geometry terms. Classwork Homework worksheets Big Ideas online Drawing and labeling pictures		
Measuring and Constructing Segments 3 – 5 days	SWBAT measure segments using a ruler and various other devices SWBAT apply the Segment Addition Postulate to determine the length of a given segment	Guided notes to explain and model measuring segments and using the Segment Addition Postulate to calculate the length of a segment Classwork Homework worksheets Big Ideas online Drawing and labeling pictures	Observation Class discussion Homework Project Formal assessment Application of real-life problems	MA.G.CO.A.1 MA.G.CO.D.12
Midpoint and Distance Formula 3 – 5 days	SWBAT apply the midpoint formula to locate the midpoint of a segment on a number line and on the coordinate plane	Guided notes to explain and model using the midpoint and distance formulas. Classwork Homework worksheets	Observation Class discussion Homework Project Formal assessment Application of real-life problems	MA.G.CO.D.12 MA.G.GPE.B.7

	SWBAT use the distance formula to calculate the length of a segment in the coordinate plane	Big Ideas online Drawing and labeling pictures		
Measuring and Constructing Angles 3 – 5 days	SWBAT classify acute, right, obtuse, and straight angles and measure the angles using a protractor SWBAT use the Angle Addition Postulate to calculate the measure of a given angle	Guided notes to explain and model measuring angles and using the Angle Addition Postulate to calculate the measure of an angle Classwork Homework worksheets Big Ideas online Drawing and labeling pictures	Observation Class discussion Homework Project Formal assessment	MA.G.CO.A.1 MA.G.CO.D12
Describing Pairs of Angles 3 – 5 days	SWBAT identify complementary and supplementary angle pairs and apply the definitions to calculate the measure of a given angle SWBAT identify and apply the definitions of linear pairs	Guided notes to explain and model complementary and supplementary angles, linear pairs and vertical angles to calculate the measure of an angle Classwork	Observation Class discussion Homework Project Formal assessment	MA.G.CO.A.1

	and vertical angles to calculate the measure of a given angle	Homework worksheets Big Ideas online Drawing and labeling pictures		

MA.N-Q.A	Reason quantitatively and use units to solve problems.
MA.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.
MA.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.).
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.G-GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Technology Resources

- Big Ideas Math
- Khan Academy
- Desmos
- EdPuzzle
- Formative
- Quizizz/Blooket/Kahoot
- GeoGebra

Suggested Modifications

**Consistent with individual plans, when appropriate.*

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.

- Below-level learners can be provided with graphic organizers, vocabulary cards, study guides, printed notes, and leveled readers. Projects can be leveled or modified as needed.
- Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA); Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques - auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide ELL students with multiple literacy strategies including websites with various language options (translators, etc.) or partnering up with a student who is fluent in their native language.

21st Century / Cross Curricular Connections

- 9.1: 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem- solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
- 9.4: 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Unit 2 POR Plane Geometry: Parallel, Perpendicular, & Transversals

Content Area: **Mathematics**
Course(s): **Plane Geometry**
Time Period: **1st Semester**
Length: **17 - 29 days**
Status: **Published**

Summary of Unit

- Students will identify line relationships: parallel, perpendicular, and skew.
- Students will identify angle relationships when coplanar lines are cut by a transversal: corresponding, alternate interior, alternate exterior, and consecutive interior.
- Students will use statements about parallel lines cut by a transversal and the relationships between the pairs of angles and their converses.
- Students will connect skills from algebra, allowing for a coordinate approach, using slope, to justify that two lines are parallel or two lines are perpendicular and to write equations of parallel and perpendicular lines.
- Students will use logical reasoning based on known information, or information that can be deduced from given information, to draw conclusions.

Essential Questions

- What does it mean when two lines are parallel, intersecting, coincident, or skew?
- When two parallel lines are cut by a transversal, which of the resulting pairs of angles are congruent?
- For which of the theorems involving parallel lines and transversals is the converse true?
- What conjectures can you make about perpendicular lines?
- How can you write an equation of a line that is parallel or perpendicular to a given line and passes through a given point?

Parallel, Perpendicular, & Transversals - Enduring Understandings

- Identify parallel, skew, and perpendicular lines
- Identify planes, pairs of angles formed by transversals, parallel lines and perpendicular lines.
- Relate the measures of angles formed by parallel lines and a transversal
- Solve problems about parallel or perpendicular lines and transversals
- Use slope to identify parallel and perpendicular lines in a coordinate plane
- Explain the significance of positive, negative, zero or undefined slope
- Find the equation of the line when given the graph or two points

Summative Assessment and/or Summative Criteria

- Homework: To be given on each introduced topic/content area
- Class discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
- Do Nows, Exit tickets, writing prompts, communicating answers to questions
- Teacher Observation: To be done on each introduced topic/content area
- Student will demonstrate mastery through various assessment criteria within the unit per teacher discretion (graded assignments, quizzes, projects, quarterly exam, etc.)

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standard
Pairs of Lines and Angles 3 – 5 days	SWBAT Identify pairs of angles formed by transversals.	Guided notes to explain and model parallel, perpendicular, and skew lines. Guided notes to explain and model parallel lines cut by a transversal, including the angle relationships created: corresponding, alternate interior, alternate exterior, consecutive interior.	Observation Class discussion Homework Project Formal assessment	MA.G-CO.A.1

		Classwork Homework worksheets Big Ideas online Drawing and labeling diagrams		
Parallel Lines and Transversals 5 – 8 days	SWBAT Construct parallel and perpendicular lines. SWBAT Identify pairs of angles formed by transversals of parallel lines.	Guided notes to explain and model theorems of corresponding, alternate interior, alternate exterior, consecutive interior when parallel lines are cut by a transversal. Classwork Homework worksheets Big Ideas online Drawing and labeling diagrams	Observation Class discussion Homework Project Formal assessment	MA.G-CO.C.9
Proofs with Parallel Lines 2 – 4 days	SWBAT Prove lines parallel using converse theorems	Guided notes to model and explain proving lines parallel using the converses of the theorems when parallel lines are cut by a transversal.	Observation Class discussion Homework Project Formal assessment Application of real-life problems	MA.G-CO.C.9, MA.G-CO.D.12

		Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams		
Proofs with Perpendicular Lines 2 – 4 days	SWBAT Prove lines parallel and perpendicular using slope	Guided notes to recall Slope Formula and finding slope between two points on a coordinate plane. Guided notes to model and explain proving lines parallel, perpendicular, or neither. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams	Observation Class discussion Homework Project Formal assessment	MA.G-CO.C.9, MA.G-CO.D.12
Equations of Parallel and Perpendicular Lines 5 – 8 days	SWBAT Write equations of parallel and perpendicular lines	Guided notes to model and explain writing equations of parallel and perpendicular lines. Classwork	Observation Class discussion Homework Project Formal assessment	MA.G-GPE.B.5

		Homework worksheets Big Ideas Online Drawing and labeling diagrams		

MA.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.
MA.G-CO.C.9	Prove theorems about lines and angles.
MA.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.).
MA.G-GPE.B.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Resources/Technology

- Big Ideas Math
- Khan Academy
- Desmos
- EdPuzzle
- Formative
- Quizizz/Blooket/Kahoot
- GeoGebra

Suggested Modifications

*Consistent with individual plans, when appropriate.

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.
- Below-level learners can be provided with graphic organizers, vocabulary cards, study guides, printed notes, and leveled readers. Projects can be leveled or modified as needed.
- Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA); Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.

- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques - auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide ELL students with multiple literacy strategies including websites with various language options (translators, etc.) or partnering up with a student who is fluent in their native language.

21st Century /Cross-Curricular Connections

- 9.1: 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem- solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
- 9.4: 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Unit 3 POR Plane Geometry Triangle Congruence

Content Area: **Mathematics**
Course(s): **Plane Geometry**
Time Period: **1st Semester**
Length: **20 - 31 days**
Status: **Published**

Summary of the Unit

Students will learn theorems and postulates of congruent triangles and apply them to write proofs to show two triangles are congruent.

Enduring Understandings

- To classify triangles by sides and angles.
- To find interior and exterior angle measures of triangles.
- To use the Triangle Sum Theorem to find missing angles.
- To identify and use corresponding congruent parts.
- To use the congruence postulates and theorems (SSS, SAS, AAS, ASA, HL) to prove triangle congruence.

Essential Questions

- How are the angle measures of a triangle related?
- Given two congruent triangles, how can you use rigid motions to map one triangle to the other triangle?
- What can you conclude about two triangles when you know that two pairs of corresponding sides and the corresponding included angles are congruent?
- What conjectures can you make about the side lengths and angle measures of an isosceles triangle?
- What can you conclude about two triangles when you know the corresponding sides are congruent?
- What information is sufficient to determine whether two triangles are congruent?
- How can you use congruent triangles to make an indirect measurement?
- How can you use a coordinate plane to write a proof?

Summative Assessment and/or Summative Criteria

- Homework: To be given on each introduced topic/content area

- Class discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
- Do Nows, Exit tickets, writing prompts, communicating answers to questions
- Teacher Observation: To be done on each introduced topic/content area
- Student will demonstrate mastery through various assessment criteria within the unit per teacher discretion (graded assignments, quizzes, projects, quarterly exam, etc.)

Resources

Big Ideas Math Geometry (2015)
https://nj.mypearsonsupport.com/practice-tests/math/
https://nj.mypearsonsupport.com/practice-tests/njgpa-math/
https://achievethecore.org/category/854/mathematics-lessons

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Angles of Triangles 3 – 5 days	SWBAT classify triangles by sides and angles. SWBAT find interior and exterior angles in a triangle	Guided notes to model and explain classifying triangles by their sides and angles. Guided notes to model and explain finding interior and exterior angles in a triangle. Classwork Homework worksheets	Observation Class discussion Homework Project Formal assessment	MA.G-CO.C.10, MA.G-MG.A.1

		Big Ideas Online Drawing and labeling diagrams Climate Change Example: Students may use triangles, their measures, and their properties to describe the cross section of a forested area and compare changes in variations of tree quantities and heights when considering changes in seasonal weather patterns over time.		
Congruent Polygons 2 – 3 days	SWBAT identify and use corresponding parts of congruent figures SWBAT use the Third Angles Theorem	Guided notes to model and explain using correspondin g parts of congruent figures and the Third Angles Theorem. Classwork Homework worksheets Big Ideas Online	Observation Class discussion Homework Project Formal assessment	MA.G-CO.B.7

		Drawing and labeling diagrams		
Proving Triangle Congruence by SSS, SAS, AAS, ASA, HL 8 – 13 days	SWBAT use the congruence theorems and postulates to prove triangles congruent.	Guided notes to model and explain proving triangles congruent using the congruence theorems and postulates. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams Climate Change Example: Students may apply geometric methods to solve design problems such as increasing access to green spaces in cities given physical and cost constraints.	Observation Class discussion Homework Project Formal assessment	MA.G-CO.B.8, MA.G-MG.A.1, MA.G-MG.A.3
Equilateral and Isosceles Triangles 8 – 13 days	SWBAT find missing sides and angles through applying properties of equilateral and isosceles triangles and the Base Angles Theorem.	Guided notes to model and explain using properties of equilateral and isosceles triangles to find missing parts. Classwork	Observation Class discussion Homework Project Formal assessment	MA.G-CO.C.10, MA.G-CO.D.13 MA.G-MG.A.1

		Homework worksheets Big Ideas Online Drawing and labeling diagrams Climate Change Example: Students may use equilateral and isosceles triangles, their measures, and their properties to solve design problems such as increasing access to green spaces in cities given physical and cost constraints.		

MA.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.
MA.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.
MA.G-CO.C.10	Prove theorems about triangles.
MA.G-CO.D.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
MA.G-MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

Suggested Modifications for Special Education, ELL and Gifted Students

**Consistent with individual plans, when appropriate.*

- Students will be allowed to submit assignments using additional time per IEP modifications.

- Students will be encouraged to use different size and type of font in order to avoid print confusion.
- Below-level learners can be provided with graphic organizers, vocabulary cards, study guides, printed notes, and leveled readers. Projects can be leveled or modified as needed.
- Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA); Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques - auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide ELL students with multiple literacy strategies including websites with various language options (translators, etc.) or partnering up with a student who is fluent in their native language.

Suggested Technological Innovations/Use

- Big Ideas Math
- Khan Academy
- Desmos
- EdPuzzle
- Formative
- Quizizz/Blooket/Kahoot
- GeoGebra

Cross Curricular/21st Century Connections

- 9.1: 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem- solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
- 9.4: 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Unit 4 POR Plane Geometry Transformations

Content Area: **Mathematics**
Course(s): **Plane Geometry**
Time Period: **2nd Semester**
Length: **12 - 20 days**
Status: **Published**

Summary of the Unit

Rigid Transformations: Translations, Reflections, Rotations

Draw the transformed figure using, e.g., graph paper, tracing paper or geometry software

Define congruence in terms of rigid transformations

Identify types of symmetries of figures

Enduring Understandings

- To perform translations, reflections, glide reflections, rotations, dilations, and compositions of transformations.
- To solve real-life problems involving scale factors and dilations.
- To identify lines of symmetry and rotational symmetry.

Essential Questions

- How can you translate a figure in a coordinate plane?
- How can you reflect a figure in a coordinate plane?
- How can you rotate a figure in a coordinate plane?
- What conjectures can you make about a figure reflected in two lines?
- What does it mean to dilate a figure?
- When a figure is translated, reflected, rotated, or dilated in the plane, is the image always similar to the original figure? Click on the lists tab and enter each question individually

Summative Assessment and/or Summative Criteria

- Homework: To be given on each introduced topic/content area
- Class discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
- Do Nows, Exit tickets, writing prompts, communicating answers to questions
- Teacher Observation: To be done on each introduced topic/content area
- Student will demonstrate mastery through various assessment criteria within the unit per teacher discretion (graded assignments, quizzes, projects, quarterly exam, etc.)

Resources

- Big Ideas Math Geometry (2015)
- https://nj.mypearsonsupport.com/practice-tests/math/
- https://nj.mypearsonsupport.com/practice-tests/njgpa-math/
- https://achievethecore.org/category/854/mathematics-lessons

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Translations 2 – 4 days	SWBAT perform translations. SWBAT perform composition of translations.	Guided notes to model and explain performing translations in a coordinate plane, including compositions of translations. Classwork Homework worksheets	Observation Class discussion Homework Project Formal assessment	MA.G-CO.A.2, MA.G-CO.A.4, MA.G-CO.A.5, MA.G-CO.B.6

		Big Ideas Online Drawing and labeling diagrams in a coordinate plane		
Reflections 2 – 4 days	SWBAT perform reflections on a coordinate pl. SWBAT perform glide reflections (composition of translation and reflection).	Guided notes to model and explain performing reflections in a coordinate plane, including glide reflections. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams in a coordinate plane Students may apply geometric methods to solve design problems such as increasing access to green spaces in cities given physical and cost constraints.	Observation Class discussion Homework Project Formal assessment	MA.G-CO.A.2, MA.G-CO.A.3, MA.G-CO.A.4, MA.G-CO.A.5, MA.G-CO.B.6, MA.G-MG.A.3
Rotations 2 – 4 days	SWBAT perform rotations on a coordinate plane.	Guided notes to model and explain performing rotations in a coordinate	Observation Class discussion Homework Project Formal assessment	MA.G-CO.A.2, MA.G-CO.A.3, MA.G-CO.A.4,

		plane, including compositions of transformations. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams on a coordinate plane		MA.G-CO.A.5, MA.G-CO.B.6
Dilations 2 – 4 days	SWBAT perform dilations on a coordinate plane, identify reductions vs. enlargements, find scale factor.	Guided notes to model and explain performing dilations in a coordinate plane, including compositions of transformations. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams on a coordinate plane.	Observation Class discussion Homework Project Formal assessment Application of real-life problems	MA.G-CO.A.2, MA.G-SRT.A.1a, MA.G-SRT.A.1b

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

MA.G-CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MA.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.
MA.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.
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
MA.G-SRT.A.1	Verify experimentally the properties of dilations given by a center and a scale factor:

Suggested Modifications for Special Education, ELL and Gifted Students

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- Students will be encouraged to use different size and type of font in order to avoid print confusion.
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Suggested Technological Innovations/Use

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Cross Curricular/21st Century Connections

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Unit 5 POR Plane Geometry Similarity

Content Area: **Mathematics**
Course(s): **Plane Geometry**
Time Period: **2nd Semester**
Length: **10 - 17 days**
Status: **Published**

Summary of the Unit

Using dilation transformation similarity will be introduced. Students will learn similarity theorems and apply those theorems to prove two triangles are similar.

Enduring Understandings

- To use similarity statements to find corresponding parts in similar polygons.
- To Use similarity criteria to solve problems about lengths, perimeters, and areas.
- To prove triangles similar through applying similarity postulates (AA, SSS, SAS).
- To use Triangle Proportionality Theorem and other proportionality theorems to find missing segment lengths.

Essential Questions

- How are similar polygons related?
- What can you conclude about two triangles when you know that two pairs of corresponding angles are congruent?
- What are two ways to use corresponding sides of two triangles to determine that the triangles are similar?
- What proportionality relationships exist in a triangle intersected by an angle bisector or by a line parallel to one of the sides?

Summative Assessment and/or Summative Criteria

- Homework: To be given on each introduced topic/content area
- Class discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
- Do Nows, Exit tickets, writing prompts, communicating answers to questions

- Teacher Observation: To be done on each introduced topic/content area
- Student will demonstrate mastery through various assessment criteria within the unit per teacher discretion (graded assignments, quizzes, projects, quarterly exam, etc.)

Resources

- Big Ideas Math Geometry (2015)
- https://nj.mypearsonsupport.com/practice-tests/math/
- https://nj.mypearsonsupport.com/practice-tests/njgpa-math/
- https://achievethecore.org/category/854/mathematics-lessons

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Similar Polygons 3 – 5 days	SWBAT use similarity statements to find corresponding parts in similar figures. SWBAT use scale factor to find segment lengths, areas, and perimeters. SWBAT determine if polygons are similar.	Guided notes to model and explain using similarity statements to find corresponding parts in similar figures. Guided notes to model and explain using scale factor to find segment lengths, areas, and perimeters. Classwork Homework worksheets	Observation Class discussion Homework Project Formal assessment	MA.G-SRT.A.2, MA.G-MG.A.3

		Big Ideas Online Drawing and labeling diagrams Students may apply geometric methods to solve design problems such as increasing access to green spaces in cities given physical and cost constraints.		
Proving Triangle Similarity by AA, SSS, SAS 2 – 4 days	SWBAT determine if triangles are similar through applying the similarity theorems: AA, SSS, SAS.	Guided notes to model and explain using similarity theorems to prove triangles are similar. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams Climate Change Example: Students may use triangles, their measures, and their properties to solve design problems such as increasing access	Observation Class discussion Homework Project Formal assessment	MA.G-SRT.A.3, MA.G-SRT.B.4, MA.G-SRT.B5, MA.G-GPE.B.5, MA.G-MG.A.1

		to green spaces in cities given physical and cost constraints.		
Proportionality Theorems 3 – 5 days	SWBAT use the Triangle Proportionality Theorem and its converse to determine parallel lines and find missing segment lengths.	Guided notes to model and explain using the Triangle Proportionality Theorem and its converse to determine parallel lines and finding missing segment lengths. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams	Observation Class discussion Homework Project Formal assessment	MA.G-SRT.B.4, MA.G-SRT.B.5, MA.G-GPE.B.6

MA.G-MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
MA.G-GPE.B.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
MA.G-GPE.B.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
MA.G-SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MA.G-SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MA.G-SRT.B	Prove theorems involving similarity

Suggested Modifications for Special Education, ELL and Gifted Students

**Consistent with individual plans, when appropriate.*

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.
- Below-level learners can be provided with graphic organizers, vocabulary cards, study guides, printed notes, and leveled readers. Projects can be leveled or modified as needed.
- Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA); Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques - auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide ELL students with multiple literacy strategies including websites with various language options (translators, etc.) or partnering up with a student who is fluent in their native language.

Suggested Technological Innovations/Use

- Big Ideas Math
- Khan Academy
- Desmos
- EdPuzzle
- Formative
- Quizizz/Blooket/Kahoot
- GeoGebra

Cross Curricular/21st Century Connections

- 9.1: 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem- solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
- 9.4: 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Unit 6 POR Plane Geometry Right Triangles & Trigonometry

Content Area: **Mathematics**
Course(s): **Plane Geometry**
Time Period: **2nd Semester**
Length: **13 - 20 days**
Status: **Published**

Summary of the Unit

Pythagorean Theorem will be review as well as simplifying radicals. Students will be exposed to Special Right triangle theorems. Students will learn basic trigonometric functions and their inverses to determine the lengths of the sides of right triangles and the measures of the two acute angles in a right triangle.

Enduring Understandings

- To find the length of missing sides of right triangles through applying the Pythagorean Theorem.
- To identify right triangles and classify triangles as right, acute, or obtuse through applying the Converse of the Pythagorean Theorem.
- To find the sine, cosine, and tangent ratios in a right triangle given 2 or 3 sides.
- To find missing sides and/or angles in a right triangle through applying Right Triangle Trigonometry.
- To solve real-life problems involving right triangles using the Pythagorean Theorem and Right Triangle Trigonometry.

Essential Questions

- How can you prove the Pythagorean Theorem?
- How is a right triangle used to find the tangent of an acute angle?
- Is there a unique right triangle that could be used?
- How is a right triangle used to find the sine and cosine of an acute angle?
- When you know the lengths of the sides of a right triangle, how can you find the measures of the two acute angles?

Summative Assessment and/or Summative Criteria

- Homework: To be given on each introduced topic/content area

- Class discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
- Do Nows, Exit tickets, writing prompts, communicating answers to questions
- Teacher Observation: To be done on each introduced topic/content area
- Student will demonstrate mastery through various assessment criteria within the unit per teacher discretion (graded assignments, quizzes, projects, quarterly exam, etc.)

Resources

- Big Ideas Math Geometry (2015)
- https://nj.mypearsonsupport.com/practice-tests/math/
- https://nj.mypearsonsupport.com/practice-tests/njgpa-math/
- https://achievethecore.org/category/854/mathematics-lessons

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
The Pythagorean Theorem 3 – 5 days	SWBAT find missing sides of a right triangle through applying the Pythagorean Theorem. SWBAT classify triangles as right, acute, or obtuse through applying the Converse of the Pythagorean Theorem.	Guided notes to model and explain right triangle vocabulary and using the Pythagorean Theorem to find missing sides of a right triangle and classify triangles as right, acute, or obtuse. Classwork Homework worksheets	Observation Class discussion Homework Project Formal assessment Application of real-life problems	MA.G-SRT.B.4, MA.G-SRT.C.8

		Big Ideas Online Drawing and labeling diagrams		
The Sine, Cosine, and Tangent Ratios 5 – 7 days	SWBAT find the sine, cosine, and tangent ratios of a right triangle given two or three sides. SWBAT find missing sides of a right triangle applying the sine, cosine, and tangent ratios.	Guided notes to model and explain right triangle vocabulary and finding the sine, cosine, and tangent ratios. Guided notes to model and explain using the trigonometric ratios to find missing sides in right triangles. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams	Observation Class discussion Homework Project Formal assessment Application of real-life problems	MA.G-SRT.C.6, MA.G-SRT.C.7, MA.G-SRT.C.8,
Solving Right Triangles 5 – 8 days	SWBAT find the missing acute angles in a right triangle through applying Inverse Trigonometry.	Guided notes to model and explain using inverse trigonometry to find missing acute angles in right triangles.	Observation Class discussion Homework Project Formal assessment Application of real-life problems	MA.G-SRT.C.8, MA.G-MG.A.1, MA.G-MG.A.3

SWBAT use the Pythagorean Theorem, Right Triangle Trigonometry and Inverse Trigonometry to solve for all missing sides and angles in right triangles.	Guided notes to model and explain using trigonometry, inverse trigonometry, and the Pythagorean Theorem to find all missing parts of a right triangle. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams Climate Change Example: Students may use trigonometric functions to calculate the area of forested areas and/or glacier sizes.		

MA.G-MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structu to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
MA.G-SRT.B.4	Prove theorems about triangles.
MA.G-SRT.C	Define trigonometric ratios and solve problems involving right triangles

Suggested Modifications for Special Education, ELL and Gifted Students

**Consistent with individual plans, when appropriate.*

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.
- Below-level learners can be provided with graphic organizers, vocabulary cards, study guides, printed notes, and leveled readers. Projects can be leveled or modified as needed.
- Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA); Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques - auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide ELL students with multiple literacy strategies including websites with various language options (translators, etc.) or partnering up with a student who is fluent in their native language.

Suggested Technological Innovations/Use

- Big Ideas Math
- Khan Academy
- Desmos
- EdPuzzle
- Formative
- Quizizz/Blooket/Kahoot
- GeoGebra

Cross Curricular/21st Century Connections

- 9.1: 21st Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem- solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
- 9.4: 21st Century Life and Career Skills: Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Unit 7 Quadrilaterals and Polygons

Content Area: **Mathematics**
Course(s): **Plane Geometry**
Time Period: **2nd Semester**
Length: **15 - 25 days**
Status: **Published**

Summary of the Unit

Students will learn how to calculate the interior and exterior angle measures of polygons. Identify properties of parallelograms and other quadrilaterals. Use distance formula, slope, and midsegment theorems to determine the type of quadrilateral and its segment lengths.

Enduring Understandings

- To find and use the interior and exterior angle measures of polygons.
- To use properties of parallelograms and special parallelograms.
- To prove that a quadrilateral is a parallelogram.
- To identify and use properties of trapezoids.

Essential Questions

- What is the sum of the measures of the interior angles of a polygon?
- What are the properties of parallelograms?
- How can you prove that a quadrilateral is a parallelogram?
- What are the properties of the diagonals of rectangles, rhombuses, and squares?
- What are some properties of trapezoids and isosceles trapezoids?

Summative Assessment and/or Summative Criteria

- Homework: To be given on each introduced topic/content area
- Class discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
- Do Nows, Exit tickets, writing prompts, communicating answers to questions

- Teacher Observation: To be done on each introduced topic/content area
- Student will demonstrate mastery through various assessment criteria within the unit per teacher discretion (graded assignments, quizzes, projects, quarterly exam, etc.)

Resources

- Big Ideas Math Geometry (2015)
- https://nj.mypearsonsupport.com/practice-tests/math/
- https://nj.mypearsonsupport.com/practice-tests/njgpa-math/
- https://achievethecore.org/category/854/mathematics-lessons

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments	Standards
Angles of Polygons 3 – 5 days	SWBAT find the sum of both the interior and exterior angles in a polygon. SWBAT use the sum of either the interior or exterior angles to find the number of sides of a polygon and missing angles.	Guided notes to model and explain how to find the sum of both the interior and exterior angles in a polygon using a formula. Guided notes to model and explain how to use the formula and information for finding the sum of interior and exterior angles to find number of sides of polygons and	Observation Class discussion Homework Project Formal assessment	MA.G-CO-C.11

		missing parts. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams		
Properties of Parallelograms 3 – 5 days	SWBAT apply properties of a parallelogram to find missing side lengths and angles. SWBAT use parallelograms in a coordinate plane.	Guided notes to model and explain properties of a parallelogram and using them to find missing side lengths and angles. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams	Observation Class discussion Homework Project Formal assessment	MA.G-CO.C.11, MA.G-SRT.B.5
Proving that a quadrilateral is a parallelogram 3 – 5 days	SWBAT apply properties of parallelograms to identify and verify parallelograms	Guided notes to model and explain using properties of parallelograms to identify and verify parallelograms. Classwork	Observation Class discussion Homework Project Formal assessment	MA.G-CO.C.11, MA.G-SRT.B.5, MA.G-MG.A.1

		Homework worksheets Big Ideas Online Drawing and labeling diagrams		
Properties of Special Parallelograms 3 – 5 days	SWBAT apply properties of special quadrilaterals to classify (rectangle, rhombus, or square) or find missing parts. SWBAT use coordinate geometry to identify special types of parallelograms.	Guided notes to model and explain properties of special quadrilaterals : rectangle, rhombus, and square, using them to classify quadrilaterals or find missing parts. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams	Observation Class discussion Homework Project Formal assessment	MA.G-CO.C.11, MA.G-SRT.B.5, MA.G-MG.A.1 MA.G-MG.A.3
Properties of Trapezoids 3 – 5 days	SWBAT use properties of trapezoids and isosceles trapezoids to find missing segment lengths and angle measures. SWBAT use the Trapezoid	Guided notes to model and explain the properties of trapezoids and isosceles trapezoids and using them to find missing segment lengths and	Observation Class discussion Homework Project Formal assessment	MA.G-SRT.B.5, MA.G-MG.A.1

	Midsegment Theorem to find missing segment lengths.	angle measures. Guided notes to model and explain The Trapezoid Midsegment Theorem to find missing segment lengths. Classwork Homework worksheets Big Ideas Online Drawing and labeling diagrams		

MA.G-CO.C.11	Prove theorems about parallelograms.
MA.G-MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g modeling a tree trunk or a human torso as a cylinder).
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or str to satisfy physical constraints or minimize cost; working with typographic grid syste based on ratios).
MA.G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Suggested Modifications for Special Education, ELL and Gifted Students

**Consistent with individual plans, when appropriate.*

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.
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relate to students' interests, social/family background and knowledge of their community.

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