Washington Township School District

Course Title:	Honors Geometry

Grade Level(s):	9-12

Duration:	*Full Year:*	x	*Semester:*		*Marking Period:*	

Course Description:	In this course, students will formalize their geometry experiences from elementary and middle school, using more precise definitions and developing careful proofs. This course will deepen student understanding of geometric concepts leading to the ability to prove geometric theorems. Topics for this course include: Congruence, Proofs, Constructions, Transformations, Similarity, Right Triangles and Trigonometry, Circles, Expressing Geometric Properties with Equations, Geometric Measurement and Dimension, and Geometric Modeling. The course is designed to promote inquiry learning in which students have the ability to discover geometric concepts. Students will study plane Euclidean geometry, both synthetically (without coordinates) and analytically (with coordinates).
Grading Procedures:	Each semester will be a composite of quiz scores, test scores, homework, classwork, and participation reflecting a student's mastery of the areas outlined above. The student can pass the course with an overall average of 70%. The individual teacher will explain the grading system to the student.
Primary Resources:	**Geometry Big Ideas Learning Textbook** **NJ Student Learning Standards**

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

Designed by:	Kaitlyn Kuhn & William Faust

Under the Direction of:	Dr. Carole English

Written: _____

Revised: _____ July 2023 _____

Unit Title: Chapter 1 Basics of Geometry

Unit Description: In this chapter, students will learn precise definitions of line, segment, and angle, which are based on the undefined notions of point and line. Students will also use geometric shapes, their measures, and their properties to describe objects.

Unit Duration: 11 Days

Desired Results

Standard(s):
G-CO.A: Experiment with transformation in the plane.
G-CO.D: Make geometric constructions.
G-GPE.B: Use coordinates to prove simple geometric theorems algebraically.
G-MG.A: Apply geometric concepts in modeling situations.
G.GPE: Use coordinates to prove simple geometric theorems algebraically

Indicators:
HSG-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.
HSG-CO.D.12: Make formal geometric constructions with a variety of tools and methods.
HSG-MG.A.1: Use geometric shapes, their measures, and their properties to describe objects.
HSG.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Understandings:	**Essential Questions:**
Students will understand that… • Geometry is a mathematical system built on accepted facts, basic terms, and definitions. • Number operations can be used to find and compare the lengths of segments and the measures of angles. • Formulas can be used to find the midpoint and length of any segment in the coordinate plane. • Special angle pairs can be used to identify geometric relationships and to find angle measures.	• What are the tools of geometry? • How can you measure and construct a line segment? • How can you find the midpoint and length of a line segment in a coordinate plane? • How can you measure and classify an angle? • How can you describe angle pair relationships and use these descriptions to find angle measures?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes • Test • Benchmark Assessment: Common Assessment	• Use of digital platforms (Quizizz, Formative, Quizlet live, Kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e., stations, group work, independent practice, card sorts, task cards, etc. • Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

1.1 Points, Lines, and Planes (2 days)
- Naming Points, Lines, and Planes
- Naming Segments, Rays, and Opposite Rays
- Sketching Intersections of Lines and Planes
- Sketching an Intersection of Planes
- Modeling Real Life

1.2 Measuring and Constructing Segments (1 day)
- Using the Ruler Postulate
- Comparing Segments for Congruence
- Using the Segment Addition Postulate
- Modeling Real Life

1.3 Using Midpoint and Distance Formulas (1 days)
- Finding Segment Lengths
- Using Algebra with Segment Lengths
- Using the Midpoint Formula
- Using the Distance Formula

1.4 Perimeter and Area in the Coordinate Plane (1 Day)
- Classifying Polygons
- Finding Perimeter in the Coordinate Plane
- Finding Area in Coordinate Plane
- Modeling Real Life

1.5 Measuring and Constructing Angles (1 days)
- Naming Angles
- Measuring and Classifying Angles
- Identifying Congruent Angles
- Finding Angle Measures
- Using a Bisector to Find Angle Measures

1.6 Describing Pairs of Angles (2 days)
- Identifying Pairs of Angles
- Finding Angle Measures
- Modeling Real Life
- Identifying Angle Pairs
- Finding Angle Measures in a Linear Pair

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students

Advanced Learners	
	• Invite students to explore different points of view on a topic of study and compare the two.
	• Assign a leadership role in classroom learning
	• Determine where student's interests lie and capitalize on their inquisitiveness.

	• Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org

Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
RST.9-10.5: Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

New Jersey Student Learning Standards for Technology Education
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Collaboration
Critical Thinking
Creativity

Unit Title: Chapter 2 Reasoning and Proofs
Unit Description: In this chapter, students will use precise definitions and prove geometric theorems.
Unit Duration: 13 Days

Desired Results

Standard(s):
G-CO.A: Experiment with transformation in the plane.
G-CO.C: Prove geometric theorems.

Indicators:
HSG-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.
HSG-CO.C.9: Prove theorems about lines and angles.

Understandings:	**Essential Questions:**
Students will understand that…	• When is a conditional statement true or false?
• Some mathematical relationships can be described using a variety of if-then statements.	• How can you use reasoning to solve problems?
• Algebraic properties of equality are used in geometry to solve problems and justify reasoning.	• In diagrams what can be assumed and what needs to be labeled?
• Given information, definitions, properties, postulates, and previously proven theorems can be used as reasons in proof.	• How can algebraic properties help you solve an equation?
	• How can you prove a mathematical statement?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.)	• Use of digital platforms (Quizizz, Formative, Quizlet live, Kahoot, Schoology, Big Ideas Platform, etc.)
• Homework Assignments (Worksheets, online assignments, etc.)	• Conferences
• Class Participation and Preparation	• Student Performance during group activities
• Class Discussion	• Activities i.e., stations, group work, independent practice, card sorts, task cards, etc.
• Quizzes	• Project Based Assessment (optional)
• Test	
Benchmark Assessment: Common Assessment	***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

2.1 Conditional Statements (2 days)
- Rewriting a Statement in If-Then Form
- Writing a Negation (Optional)
- Writing Related Conditional Statements
- Using Definitions
- Writing a Biconditional Statement
- Writing Truth Tables (Optional)

2.2 Inductive and Deductive Reasoning (1 day)
- Describing a Visual Pattern
- Making and Testing Conjecture
- Finding a Counterexample
- Using the Law of Detachment (Optional)

- Using the Law of Syllogism (Optional)
- Using Inductive and Deductive Reasoning
- Comparing Inductive and Deductive Reasoning

2.3 Postulates and Diagrams (1 Day)
- Identifying a Postulate Using a Diagram
- Identifying Postulates from a Diagram
- Sketching a Diagram
- Interpreting a Diagram

2.4 Algebraic Reasoning (2 Days)
- Justifying Steps
- Modeling Real Life

2.5 Proving Statements about Segments and Angles (2 Days)
- Writing a Two-Column Proof
- Naming Properties of Congruence
- Proving a Symmetric Property of Congruence

2.6 Proving Geometric Relationships (2 Days)
- Proving the Right Angles Congruence Theorem
- Proving a Case of the Congruent Supplements Theorem
- Proving the Vertical Angles Congruence Theorem
- Using Angle Relationships
- Using the Vertical Angles Congruence Theorem

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	- Invite students to explore different points of view on a topic of study and compare the two. - Assign a leadership role in classroom learning - Determine where student's interests lie and capitalize on their inquisitiveness. - Expose students to a selection and use of specialized resources
Struggling Learners	- Be flexible with time frames and deadlines - Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers - Group students - Intentional scheduling/grouping with student/teacher of alternative background - Provide support as at-risk students move through all levels of knowledge acquisition - Tap prior knowledge
English Language Learners	- Accommodate with completed study guides to assist with preparation on tests - Allow students to give responses in a form (oral or written) that's easier for him/her - Be flexible with time frames, deadlines, or modify assessments

	• Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing. • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction. • Variation of size: adapting the number of items the student is expected to complete. • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.5: Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
WHST.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

New Jersey Student Learning Standards for Computer Science and Design Thinking
8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

New Jersey Student Learning Standards for Technology Education
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Collaboration
Critical Thinking

Unit Title: Chapter 3 Parallel and Perpendicular Lines
Unit Description: In this chapter students will learn the precise definition of parallel lines. They will prove theorems about lines and angles and make formal geometric constructions. Students will also partition directed line segments and use the slope criteria for parallel and perpendicular lines.
Unit Duration: 8 Days

Desired Results

Standard(s):
G-CO.A: Experiment with transformations in the plane.
G-CO.C: Prove geometric theorems.
G-CO.D: Make geometric constructions.
G-GPE.B: Use coordinates to prove simple geometric theorems algebraically.

Indicators:
HSG-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.
HSG-CO.C.9: Prove theorems about lines and angles.
HSG-CO.D.12: Make formal geometric constructions with a variety of tools and methods.
HSG-GPE.B.5: Prove slope criteria for parallel and perpendicular lines and use them to solve geometric problems.
HSG-GPE.B.6: Find the point on a directed line segment between two given points that partitions the segment into a given ratio.

Understandings:	Essential Questions:
Students will understand that… - Angle relationships between parallel and perpendicular lines are used in the constructions and design of buildings, roads, machines, and many other real-world problems. - Slope is important in solving many mathematical problems and is used in geometry and algebra. - The precise definition of parallel lines and investigate the relationship between these lines and the angles that they form. - You can determine whether two lines are parallel or perpendicular by comparing their slopes.	- What does it mean when two lines are parallel, intersecting, or skew? - When two 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 the equation of a line that is parallel or perpendicular to a given line and passes through a given point?

Assessment Evidence

Performance Tasks:	Other Evidence:
- Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) - Homework Assignments (Worksheets, online assignments, etc.) - Class Participation and Preparation - Class Discussion - Quizzes - Test Benchmark Assessment: Common Assessment	- Use of digital platforms (Quizizz, Formative, Quizlet live, Kahoot, Schoology, Big Ideas Platform, etc.) - Conferences - Student Performance during group activities - Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. - Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**
Benchmarks: Four common assessments will be given throughout the year	

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

3.1 Pairs of Lines and Angles (1 Day)
- Identifying Lines and Planes
- Identifying Parallel and Perpendicular Lines
- Identifying Pairs of Angles

3.2 Parallel Lines and Transversals (2 Days)
- Identifying Angles
- Using Properties of Parallel Lines
- Proving the Alternate Exterior Angles Theorem (Optional)
- Modeling Real Life

3.3 Proofs with Parallel Lines (1 Day)
- Using the Corresponding Angles Converse Theorem
- Proving the Alternate Interior Angles Converse (Optional)
- Determining Whether Lines are Parallel
- Using the Transitive Property of Parallel Lines

3.4 Proofs with Perpendicular Lines (Optional)
- Finding the Distance from a Point to a Line
- Proving the Perpendicular Transversal Theorem
- Modeling Real Life

3.5 Equations of Parallel and Perpendicular Lines (1 Day)
- Partitioning a Directed Line Segment
- Identifying Parallel and Perpendicular Lines
- Writing and Equation of a Parallel Line
- Writing an Equation of a Perpendicular Line
- Finding the Distance from a Point to a Line

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students

Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge

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WHST.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

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9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
9.4.12.O.(1).7: Use mathematics, science and technology concepts and process to solve problems in projects involving design and/or production.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Critical Thinking
Creativity

Unit Title: Chapter 4 Transformations

Unit Description: In this chapter, students will understand congruence and similarity in terms of transformations, Students will learn that rigid motions preserve distance and angle measure, whereas nonrigid transformations may change the shape of size of a figure. This chapter also establishes the approach of using rigid motions to identify congruent figures.

Unit Duration: 9 Days

Desired Results

Standard(s):
G-CO.A: Experiment with transformations in the plane.
G-CO.B: Understand congruence in terms of rigid motions.
G-SRT.A: Understand similarity in terms of similarity transformations.

Indicators:
HSG-CO.A.2: Represent transformations in the plane using 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.
HSG-CO.A.3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
HSG-CO.A.4: Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
HSG-CO.A.5: Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
HSG-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 definition of congruence in terms of rigid motions to decide if they are congruent.
HSG-SRT.A.1a: Verify experimentally the properties of dilations given by a center and a scale factor: A dilation takes a line not passing through the center of a dilation to a parallel line and leaves a line passing through the center unchanged.
HSG-SRT.A.1b: Verify experimentally the properties of dilations given by a center and scale factor: The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
HSG-SRT.A.2: Given two figures, use definitions 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.

Understandings:	**Essential Questions:**
Students will understand that…	• How can you translate a figure in a coordinate plane?
• Transformations may be described geometrically or by coordinates.	• How can you reflect a figure in a coordinate plane**?**
• Symmetries of figures may be defined and classified by transformations.	• How can you rotate a figure in a coordinate plane?
• You can use compositions of rigid motions to understand congruence.	• What does it mean to dilate a figure?
• When you reflect a figure across a line, each point of the figure maps to another point the same distance from the line but on the other side. The orientation of the figure reverses.	• When a figure is translated, reflected, rotated, or dilated in the plane, is the image always similar to the original figure?
• Rotations preserve distance and angle measures, but not orientation of figures.	
• You can use a scale factor to make a larger or smaller copy of a figure that is also similar to the original figure.	

Assessment Evidence

Performance Tasks:	Other Evidence:
• Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes • Test Benchmark Assessment: Common Assessment	• Use of digital platforms (Quizizz, Formative, Quizlet live, Kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. • Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

4.1 Translations (1 Day)
- Identifying Vector Components (Optional)
- Translating a Figure Using a Vector (Optional)
- Writing a Translation Rule
- Translating a Figure in the Coordinate Plane
- Performing a Composition
- Modeling Real Life

4.2 Reflections (1 Day)
- Reflecting in Horizontal Lines
- Reflecting in the Line $y = x$
- Reflecting in the Line $y = -x$
- Performing a Glide Reflection
- Identifying Line of Symmetry

4.3 Rotations (1 Day)
- Drawing a Rotation (Optional)
- Rotating a Figure in the Coordinate Plane
- Performing a Composition
- Identifying Rotational Symmetry

4.4 Congruence Transformations (1 Day)
- Identifying Congruent Figures
- Describing a Congruence Transformation
- Using the Reflection in Parallel Lines Theorem
- Using the Reflection in Perpendicular Lines Theorem

4.5 Dilations (1 Day)
- Identifying Dilations
- Dilating a Figure in the Coordinate Plane
- Constructing a Dilation
- Using a Negative Scale Factor
- Finding a Scale Factor
- Finding the Length of an Image

4.6 Similarity and Transformations (1 Day)
- Performing a Similarity Transformation
- Describing a Similarity Transformation (Optional)
- Proving the Two Squares are Similar (Optional)

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing

	- Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction - Variation of size: adapting the number of items the student is expected to complete - Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
RST.9-10.5: Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

New Jersey Student Learning Standards for Computer Science and Design Thinking
8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.

New Jersey Student Learning Standards for Technology Education
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Critical Thinking
Creativity

Unit Title: Chapter 5 Congruent Triangles

Unit Description: In this chapter, students will prove theorems about triangles and use the definitions of congruence in terms of rigid motions to show that two triangles are congruent. Students will explain how the criteria for triangle congruence follows from the definition of congruence, and they will use congruence and similarity criteria for triangles to solve problems and prove relationships in geometric figures.

Unit Duration: 13 Days

Desired Results

Standard(s):
G-CO.C: Prove geometric theorems.
G-SRT.B: Prove theorems involving similarity.
G-GPE.B: Use Coordinates to prove simple geometric theorems algebraically.

Indicators:
HSG-CO.C.10: Prove theorems about triangles.
HSG-CO.B.7: Use the definitions of congruence in terms if rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
HSG-CO.B.8: Explain how the criteria for triangle congruence follow from the definition of congruence in terms of rigid motions.
HSG-SRT.B.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
HSG-GPE.B.4: Use coordinates to prove simple geometric theorems algebraically.

Understandings:	**Essential Questions:**
Students will understand that…	• How are the angle measures of a triangle related?
• Objects can be compared by using characteristics such as size, and shape.	• What can you conclude about two triangles when you know that two pairs of corresponding sides and the corresponding included angles are congruent?
• There are shortcuts when determining if triangles are congruent.	• What conjectures can you make about the side lengths and angle measures of isosceles and equilateral triangles?
• Triangles can be proven congruent in terms of rigid motions.	• What can you conclude about two triangles when you know the corresponding sides are congruent?
• The angles and sides of isosceles and equilateral triangles have special relationships.	• What information is sufficient to determine whether two triangles are congruent?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.)	• Use of digital platforms (Quizizz, Formative, Quizlet live, Kahoot, Schoology, Big Ideas Platform, etc.)
• Homework Assignments (Worksheets, online assignments, etc.)	• Conferences
• Class Participation and Preparation	• Student Performance during group activities
• Class Discussion	• Activities i.e., stations, group work, independent practice, card sorts, task cards, etc.
• Quizzes	• Project Based Assessment (optional)
• Test	
Benchmark Assessment: Common Assessment	***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

5.1 Angles of Triangles (2 Days)
- Classifying Triangles by Sides and Angles
- Classifying a Triangle in the Coordinate Plane
- Finding an Angle Measure
- Modeling Real Life

5.2 Congruent Polygons (1 Day)
- Identifying Corresponding Parts
- Using Properties of Congruent Figures
- Showing that Figures are Congruent
- Proving the Triangles are Congruent

5.3 Proving Triangle Congruence by SAS (1 Day)
- Using SAS Congruence Theorems
- Using SAS and Properties of Shapes
- Modeling Real Life

5.4 Equilateral and Isosceles Triangles (1 Day)
- Using the Base Angles Theorem
- Finding Measures in Triangles
- Using Isosceles and Equilateral Triangles
- Modeling Real Life

5.5 Proving Triangle Congruence by SSS (1 Day)
- Using the SSS Congruence Theorem
- Modeling Real Life
- Using the Hypotenuse-Leg Congruence Theorem

5.6 Proving Triangle Congruence by ASA and AAS (1 Day)
- Identifying Congruent Triangles
- Using the ASA Congruence Theorem
- Using the AAS Congruence Theorem

5.7 Using Congruent Triangles (1 Day)
- Using Congruent Triangles
- Using Congruent Triangles for Measurement
- Planning a Proof Involving Pairs of Triangles
- Proving a Construction (Optional)

5.8 Coordinate Proofs (2 Days)
- Placing a Figure in a Coordinate Plane
- Applying Variable Coordinates
- Writing a Plan for a Coordinate Proof
- Writing a Coordinate Proof
- Modeling Real Life

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	- Invite students to explore different points of view on a topic of study and compare the two. - Assign a leadership role in classroom learning - Determine where student's interests lie and capitalize on their inquisitiveness. - Expose students to a selection and use of specialized resources
Struggling Learners	- Be flexible with time frames and deadlines - Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers - Group students - Intentional scheduling/grouping with student/teacher of alternative background - Provide support as at-risk students move through all levels of knowledge acquisition - Tap prior knowledge
English Language Learners	- Accommodate with completed study guides to assist with preparation on tests - Allow students to give responses in a form (oral or written) that's easier for him/her - Be flexible with time frames, deadlines, or modify assessments - Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience - Establish a framework allowing ELL students to understand and assimilate new ideas and information - Focus on domain specific vocabulary and keywords - Give alternate or paper copies to accommodate electronic assignments. - Have another student share class notes with the ELL student. - Intentional scheduling/grouping with student/teacher of language if possible - Mark texts with a highlighter. - Take more time to complete a task, project, or test. - Use manipulatives, graphic organizer, and real objects when possible - Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: - Variation of time: adapting the time allotted for learning, task completion, or testing - Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction - Variation of size: adapting the number of items the student is expected to complete - Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement.

	Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
RST.9-10.5: Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
WHST.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

New Jersey Student Learning Standards for Technology Education
9.3.ST.1: Use technology to acquire, manipulate, analyze and report data.
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Collaboration
Critical Thinking

Unit Title: Chapter 6 Relationships Within Triangles
Unit Description: In this chapter, students will prove theorems about lines, angles, and triangles.
Unit Duration: 7 Days

Desired Results

Standard(s): **G-CO.C:** Prove geometric theorems. **G-C.A:** Understand and apply theorems about circles.
Indicators: **HSG-CO.C.9:** Prove theorems about lines and angles. **HSG-CO.C.10:** Prove theorems about triangles. **HSG-C.A.3:** Construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle.

Understandings: *Students will understand that…* • When all three segments – perpendicular bisector, angle bisector, median and altitude of a triangle are drawn they all have a concurrent point with its own special properties. • Relationships exist within the sides and angles of non-congruent triangles.	**Essential Questions:** • What conjectures can you make about a point on the perpendicular bisector of a segment and a point on the bisector of an angle? • What conjectures can you make about the perpendicular bisectors and angle bisectors of a triangle? • What conjectures can you make about medians and altitudes of a triangle? • How are the midsegments of a triangle related to the sides of a triangle? • How are the sides related to the angles of a triangle? • How are two sides of any triangle related to the third side? • If two sides of one triangle are congruent to two sides of another triangle, what can you saw about the third sides of the triangles?

Assessment Evidence

Performance Tasks: • Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes • Test Benchmark Assessment: Common Assessment	**Other Evidence:** • Use of digital platforms (Quizizz, Formative, Quizlet live, Kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. • Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**
Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

6.1 Perpendicular and Angle Bisectors (1 Day)
- Using Diagrams
- Using the Perpendicular Bisector Theorems
- Using the Angle Bisector Theorem
- Writing an Equation of a Bisector (Optional)

6.2 Bisectors of Triangles (Optional 1 Day)
- Modeling Real Life
- Finding the Circumcenter of a Triangle
- Using the Incenter of a Triangle
- Modeling Real Life

6.3 Medians and Altitudes of Triangles (Optional 1 Day)
- Using the Centroid of a Triangle
- Finding the Centroid of a Triangle
- Finding the Orthocenter of a Triangle
- Proving a Property of Isosceles Triangles (Optional)

6.4 The Triangle Midsegment Theorem (1 Day)
- Using a Midsegment in the Coordinate Plane
- Proving the Triangle Midsegment Theorem
- Using the Triangle Midsegment Theorem
- Modeling Real Life

6.5 Indirect Proof and Inequalities in One Triangle (1 Day)
- Writing an Indirect Proof (Optional)
- Relating Side Length and Angle Measure
- Ordering Angle Measures of a Triangle
- Ordering Side Lengths of a Triangle
- Finding Possible Side Lengths

6.6 Inequalities in Two Triangles (Optional 1 Day)
- Using the Converse of the Hinge Theorem
- Using the Hinge Theorem
- Proving Triangle Relationships (Optional)
- Modeling Real Life

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers

	• Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.
Interdisciplinary Connections	

Indicators:

New Jersey Student Learning Standards for English Language Arts
RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
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RST.9-10.5: Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

New Jersey Student Learning Standards for Technology Education
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
9.4.12.O.(1).7: Use mathematics, science and technology concepts and process to solve problems in projects involving design and/or production.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Critical Thinking

Unit Title: Chapter 7 Quadrilaterals and Other Polygons

Unit Description: In this chapter, students will prove theorems about parallelograms. They will also use coordinates and properties of trapezoids and kites to find measures.

Unit Duration: 12 Days

Desired Results

Standard(s):
G-CO.C: Prove geometric theorems
G-GPE.B: Use coordinates to prove simple geometric theorems algebraically.

Indicators:
HSG-CO.C.11: Prove theorems about parallelograms.
HSG-GPE.B.4: Use coordinates to prove simple geometric theorems algebraically.

Understandings:	Essential Questions:
Students will understand that… - There are different types of quadrilaterals, and each quadrilateral has its own properties. - There are special types of parallelograms that have their own additional set of properties. - You can classify quadrilaterals in the coordinate plane using the formulas for slope, distance, and midpoint	- 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 the properties of trapezoids and kites?

Assessment Evidence

Performance Tasks:	Other Evidence:
- Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) - Homework Assignments (Worksheets, online assignments, etc.) - Class Participation and Preparation - Class Discussion - Quizzes - Test Benchmark Assessment: Common Assessment	- Use of digital platforms (Quizizz, Formative, Quizlet live, Kahoot, Schoology, Big Ideas Platform, etc.) - Conferences - Student Performance during group activities - Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. - Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

7.1 Angles of Polygons (2 Days)
- Finding the Sum of Angle Measures in a Polygon
- Finding the Number of Sides of a Polygon
- Finding an Unknown Interior Angle Measure
- Finding Angle Measures in Polygons
- Finding Unknown Exterior Angle Measures
- Finding Angle Measures in Regular Polygons

7.2 Properties of Parallelograms (1 Day)
- Using Properties of Parallelograms
- Writing a Two Column Proof
- Using Parallelograms in the Coordinate Plane

7.3 Proving that a Quadrilateral is a Parallelogram (2 Days)
- Identifying a Parallelogram

- Finding Side Lengths of a Parallelogram
- Finding Diagonal Lengths of a Parallelogram
- Identifying a Parallelogram in the Coordinate Plane

7.4 Properties of Special Parallelograms (2 Days)
- Using Properties of Special Quadrilaterals
- Classifying Special Quadrilaterals
- Finding Angle Measures in a Rhombus
- Identifying a Rectangle
- Finding Diagonal Lengths in a Rectangle
- Identifying a Parallelogram in the Coordinate Plane

7.5 Properties of Trapezoids and Kites (2 Days)
- Identifying a Trapezoid in the Coordinate Plane
- Using Properties of Isosceles Trapezoids
- Using the Midsegment of a Trapezoid
- Using a Midsegment in the Coordinate Plane
- Finding Angle Measures in a Kite
- Identifying a Quadrilateral

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords

	- Give alternate or paper copies to accommodate electronic assignments. - Have another student share class notes with the ELL student. - Intentional scheduling/grouping with student/teacher of language if possible - Mark texts with a highlighter. - Take more time to complete a task, project, or test. - Use manipulatives, graphic organizer, and real objects when possible - Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: - Variation of time: adapting the time allotted for learning, task completion, or testing - Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction - Variation of size: adapting the number of items the student is expected to complete - Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
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Interdisciplinary Connections

Indicators:

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RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

WHST.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

New Jersey Student Learning Standards for Technology Education
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills
Indicators: The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes: Communication Collaboration Critical Thinking

Unit Title: Chapter 8 Similarity

Unit Description: In this chapter, students will understand properties of similar figures and prove theorems involving similarity.
Unit Duration: 9 Days

Desired Results

Standard(s):
G-SRT.A: Understand similarity in terms of similarity transformations.
G-SRT.B: Prove theorems involving similarity.
G.GPE.B: Use coordinates to prove simple geometric theorems algebraically.

Indicators:
HSG-SRT.A.2: Given two figures, use definitions 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.
HSG-SRT.A.3: Use properties of similarity transformations to establish the AA criterion for two triangles to be similar.
HSG-SRT.B.4: Prove theorems about triangles.
HSG-SRT.B.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
HSG-GPE.B.5: Prove slope criteria for parallel and perpendicular lines and use them to solve geometric problems.
HSG-GPE.B.6: Find the point on a directed line segment between two given points that partitions the segment into a given ratio.

Understandings:	**Essential Questions:**
Students will understand that… • Two geometric figures are similar when corresponding lengths are proportional and corresponding angles are congruent. • In mathematics, similarity has a more specific definition: objects or figures can only be similar if they have the same shape. • You can use ratios and proportions to decide whether two polygons are similar and to find unknown side lengths of similar figures. • You can show that two triangles are similar when you know the relationships between only two or three pairs of corresponding parts • When two or more parallel lines intersect other lines, proportional segments are formed	• 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?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes • Test Benchmark Assessment: Common Assessment	• Use of digital platforms (Quizizz, Formative, quizlet live, kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. • Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**
Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.
 	
8.1 Similar Polygons (3 Days)
   • Using Similarity Statements
   • Finding a Corresponding Length
   • Modeling Real Life
   • Finding Areas of Similar Polygons
8.2 Proving Triangle Similarity by AA (1 Day)
   • Using the AA Similarity Theorem
   • Modeling Real Life
8.3 Proving Triangle Similarity by SSS and SAS (1 Day)
   • Using the SSS Similarity Theorem
   • Modeling Real Life
8.4 Proportionality Theorems (2 Days)
   • Finding the Length of a Segment
   • Modeling Real Life
   • Using the Three Parallel Lines Theorem
   • Using the Triangle Angle Bisector Theorem
 	
Test (1 Day)
 	
*Additional 1 day used for extra practice, review, and quiz days *
 	
Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience

	• Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
RST.9-10.5: Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

New Jersey Student Learning Standards for Technology Education
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills
Indicators: The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes: Communication Collaboration Critical Thinking

Unit Title: Chapter 9 Right Triangles and Trigonometry

Unit Description: In this chapter, students will prove the Pythagorean Theorem and its converse. They will use the Pythagorean Theorem to solve right triangles in application problems.
Unit Duration: 16 Days

Desired Results

Standard(s):
G-SRT.B: Prove theorems involving similarity.
G-SRT.C: Define geometric ratios and solve problems involving right triangles.

Indicators:
HSG-SRT.B.4: Prove theorems about triangles.
HSG-SRT.B.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
HSG-SRT.C.6: Understand by similarity, side ratios in right triangles are properties of the angles in the triangle, leasing to definitions of trigonometric ratios for acute angles.
HSG-SRT.C.7: Explain and use relationships between the sine and cosine of complementary angles.
HSG-SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Understandings:	**Essential Questions:**
Students will understand that… • If you know the lengths of any two sides of a right triangle, you can find the length of the third side by using the Pythagorean Theorem. • Certain right triangles have properties that allow you to use shortcuts to determine side lengths without using Pythagorean Theorem • Trigonometric ratios are used to solve the missing angles and sides in right triangles. • Trigonometric ratios can be applied to real world problems.	• How can you prove the Pythagorean Theorem? • What is the relationship among the side lengths of 45-45-90 and 30-60-90 triangles? • How is a right triangle used to find the tangent of an acute angle? • 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?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes • Test Benchmark Assessment: Common Assessment	• Use of digital platforms (Quizizz, Formative, quizlet live, kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. • Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

9.1 The Pythagorean Theorem (2 Days)
- Using the Pythagorean Theorem
- Modeling Real Life
- Verifying Right Triangles
- Classifying Triangles

9.2 Special Right Triangles (2 Days)
- Finding Side Lengths of 45-45-90 Triangles
- Finding Side Lengths of 30-60-90 Triangles
- Modeling Real Life

9.3 Similar Right Triangles (2 Days)
- Identifying Similar Triangles
- Modeling Real Life
- Finding a Geometric Mean
- Using a Geometric Mean
- Using Indirect Measurement

9.4 The Tangent Ratio (2 Days)
- Finding Tangent Ratios
- Finding a Leg Length
- Using a Special Right Triangle to Find a Tangent
- Modeling Real Life

9.5 The Sine and Cosine Ratios (2 Days)
- Finding Sine and Cosine Ratios
- Rewriting Trigonometric Expressions
- Finding Leg Lengths
- Finding the Sine and Cosine of 45
- Finding the Sine and Cosine of 30
- Modeling Real Life

9.6 Solving Right Triangles (1 Day)
- Identifying Angles from Trigonometric Ratios
- Finding Angle Measures
- Solving a Right Triangle
- Modeling Real Life

9.7 Law of Sines and Law of Cosines (2 Days)
- Finding Trigonometric Ratios for Obtuse Triangles
- Finding the Area of a Triangle
- Using the Law of Sines (SSA Case)
- Using the Law of Sines (AAS Case)
- Using the Law of Sines (ASA Case)
- Using the Law of Cosines (SAS Case)
- Using the Law of Cosines (SSS Case)

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students

Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that

	can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
RST.9-10.5: Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

New Jersey Student Learning Standards for Technology Education
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
9.4.12.O.(1).7: Use mathematics, science and technology concepts and process to solve problems in projects involving design and/or production.

Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Collaboration
Critical Thinking
Creativity

Unit Title: Chapter 10 Circles

Unit Description: In this chapter, students will understand and apply theorems about circles. They will translate between geometric descriptions and equations for circles.
Unit Duration: 12 Days

Desired Results

Standard(s):
G-CO.A: Experiment with transformations in the plane.
G-CO.D: Make geometric constructions.
G-C.A: Understand and apply theorems about circles.
G-GPE.A: Translate between geometric descriptions and the equation for a conic section.
G-GPE.B: Use coordinate to prove simple geometric theorems algebraically.

Indicators:
HSG-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.
HSG-CO.D.13: Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
HSG-C.A.1: Prove that all circles are similar.
HSG-C.A.2: Identify and describe relationships among inscribed angles, radii, and chords.
HSG-C.A.3: Construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle.
HSG-C.A.4: Construct a tangent line from a point outside a given circle to the circle.
HSG-GPE.A.1: Derive the equation of a circle given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle by an equation.
HSG-GPE.B.4: Use coordinates to prove simple geometric theorems algebraically.

Understandings:	**Essential Questions:**
Students will understand that… • Circles can be used for their shape, to model a circular object or for their properties, or to model an equal distance around a certain point. • You can find the length of part of a circle's circumference by relating it to an angle in the circle. • A radius of a circle and the tangent that intersects the endpoint of the radius on the circle have a special relationship. • Angles formed by intersecting lines have a special relationship to the related arcs formed when the lines intersect inside or outside the circle. • The information in the equation of a circle allows you to graph the circle.	• What are the definitions of the lines and segments that intersect a circle? • How are circular arcs measured? • What are two ways to determine when a chord is a diameter of a circle? • How are inscribed angles related to their intercepted arcs? • How are the angles of an inscribed quadrilateral related to each other? • When a chord intersects a tangent line or another chord, what relationships exist among the angles and arcs formed? • What relationships exist among the segments formed by two intersecting chords or among segments of two secants that intersect outside a circle? • What is the equation of a circle with center (h, k) and radius r in the coordinate plane?

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes • Test Benchmark Assessment: Common Assessment	• Use of digital platforms (Quizizz, Formative, quizlet live, kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. • Project Based Assessment (optional)

	*Additional or alternative performance tasks may be used

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

10.1 Lines and Segments that Intersect Circles (1 Day)
- Identifying Special Segments and Lines
- Drawing and Identifying Common Tangents
- Verifying a Tangent to a Circle
- Finding the Radius of a Circle
- Using Properties of Tangents

10.2 Finding Arc Measures (1 Day)
- Finding Measure of Arcs
- Using the Arc Addition Postulate
- Finding Measures of Arcs
- Identifying Congruent Arcs

10.3 Using Chords (2 Days)
- Using Congruent Chords to Find an Arc Measure
- Using a Diameter
- Using Perpendicular Bisectors
- Using Congruent Chords to Find a Circle's Radius

10.4 Inscribed Angles and Polygons (1 Day)
- Using Inscribed Angles
- Finding the Measure of an Intercepted Arc
- Finding the Measure of an Angle
- Using Inscribed Polygons
- Using a Circumscribed Circle

10.5 Angle Relationships in Circles (2 Days)
- Finding Angle and Arc Measures
- Finding an Angle Measure
- Finding Angle Measures
- Modeling Real Life

10.6 Segment Relationships in Circles (1 Day)
- Using Segments of Chords
- Using Segments of Secants
- Using Segments of Secants and Tangents
- Finding the Radius of a Circle

10.7 Circles in the Coordinate Plane (1 Day)
- Writing the Standard Equation of a Circle
- Graphing a Circle
- Writing a Coordinate Proof Involving a Circle (Optional)
- Modeling Real Life

10.8 Focus of a Parabola (Optional)
- Deriving an Equation
- Graphing an Equation of a Parabola
- Writing an Equation of a Parabola
- Writing an Equation of Translated Parabola
- Modeling Real Life

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
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Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

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Life and Literacy Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Integration of 21st Century Skills

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Critical Thinking
Creativity

Unit Title: Chapter 11 Circumference and Area
Unit Description: In this chapter, students will develop their skills with Circumference and Area. Students will use formulas to find circumference and arc length. Formulas will be developed and used to calculate the area of Circles, Sectors, and Polygons (including Regular Polygons). Students will also apply geometric concepts by modeling real-life situations.
Unit Duration: 8 Days

Desired Results

Standard(s):

G-C.B: Find arc lengths and areas of sectors of circles.
G-GMD.A: Explain volume formulas and use them to solve problems.
G-MG.A: Apply geometric concepts in modeling situations.

Indicators:

HSG-C.B.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
HSG-GMD.A.1: Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
HSG-GMD.A.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
HSG-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).
HSG-MG.A.2: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
HSG-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).

Understandings:	**Essential Questions:**
Students will understand that…	• What is the formula for finding the circumference of a circle?
• The formula for circumference can be used to find measures and arc lengths.	• What is the relationship between a circle's circumference and arc length? How can the circumference formula be modified to calculate arc length?
• The formula for circumference can be modified to find arc lengths.	
• Circles can alternatively be measured in Radians and radian measure is related to the circumference of a circle.	• How is Radian measure related to Degree measure in a circle? What is Radian measure based on? What are the conversion formulas?
• The area of a circle can be determined by a formula and this formula can similarly be modified to calculate areas of sectors.	• What is the formula for finding the area of a circle?
• The areas of Rhombi & Kites are related to their diagonals and, as a consequence, have the same formula for determining their area.	• What is the relationship between a circle's area and sector area? How can the area formula be modified to calculate sector area?
• The area of a regular polygon is dependent on its perimeter and its *apothem*. Trigonometry will often be required in this calculation.	• What is the formula for finding the area of a Rhombus and a Kite? Why are they the same formula?
• Areas of complex regions can be determined by subdividing into simpler shapes and adding the resultant areas.	• What is an apothem and what is the formula for determining the area of a regular polygon?
• Real-life problems can be modeled and solved using area.	• What is population density? How can it be modeled and calculated using area?
o Population density can be modeled using area and therefore calculated using various area formulas.	

Assessment Evidence	
Performance Tasks: • Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes • Test Benchmark Assessment: Common Assessment	**Other Evidence:** • Use of digital platforms (Quizizz, Formative, quizlet live, kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e. stations, group work, independent practice, card sorts, task cards, etc. • Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

11.1 Circumference & Arc Length (1 day)
- Using the Formula for Circumference
- Finding & Using Arc Lengths
- Using Circumference to Find Distance Traveled
- Using Arc Length to Find Distances
- Converting between Degree & Radian Measure

11.2 Areas of Circles and Sectors (2 days)
- Using the Formula for the Area of a Circle
- Finding Areas of Sectors
- Using the Area of a Sector
- Finding the Area of a Region

11.3 Areas of Polygons (2 days)
- Finding the Area of a Rhombus / Kite
- Finding Angle Measures in a Regular Polygon
- Finding the Area of a Regular Polygon
- Modeling Real Life with Area

11.4 Modeling with Area (Optional / 2 days)
- Finding population Density
- Using the Formula for Population Density
- Modeling Real Life with Area

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning

	• Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
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Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
9th and 10th Grade Reading Standards
RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
RST.9-10.10. By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

9th and 10th Grade Writing Standards
WHST.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

New Jersey Student Learning Standards for Computer Science and Design Thinking
8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis.
8.1.8.DA.5: Test, analyze, and refine computational models.

New Jersey Student Learning Standards for Technology Education
Technology Education Practices
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.2: Demonstrate mathematics knowledge and skills required to pursue the full-range of postsecondary education and career opportunities.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.12: Develop and interpret tables, charts, and figures to support written and oral communications.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
9.4.12.O.(1).7: Use mathematics, science and technology concepts and process to solve problems in projects involving design and/or production.

Life Literacies & Key Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)

Integration of 21st Century Skills

Indicators:

The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Critical Thinking
Creativity

Unit Title: Chapter 12 Surface Area and Volume
Unit Description: Students will determine the shapes of cross sections of solids and create solids generated by rotations of 2D objects. Students will explain and use volume formulas for cylinders, pyramids, cones, and spheres. Students will also (optionally) apply geometric concepts in modeling situations, such as finding densities of solids.
Unit Duration: 10 Days

Desired Results

Standard(s):

G-GMD.A: Explain volume formulas and use them to solve problems.
G-GMD.B: Visualize relationships between two-dimensional and three-dimensional objects.
G-MG.A: Apply geometric concepts in modeling situations.

Indicators:

HSG-GMD.A.1: Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
HSG-GMD.A.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
G-GMD.B.4: Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
HSG-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).
HSG-MG.A.2: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

Understandings: *Students will understand that…* • Three-dimensional solids have attributes that describe them and allow them to be classified. • Volumes of solids are often related to their cross sections. • Formulas can be derived for the calculation of both volume and surface area for polyhedra (Prisms and Pyramids) as well as Cylinders, Cones, and Spheres. • Volumes of composite solids can be determined by subdividing them into simpler shapes and adding the resultant volumes. • Volumes of similar solids can be determined using their scale factor. • Solids can be created through rotating two-dimensional shapes around an axis.	**Essential Questions:** • What are the characteristics that distinguish polyhedra from non-polyhedra? What is a cross section of a solid? • What are the appropriate volume and surface area formulas for polyhedra and non-polyhedra? • How is scale factor used to calculate volumes of similar solids? • How can the volume / surface area of a composite solid be determined? • What is density and how is it related to volume? • How can solids be created from two-dimensional shapes? How can this be used to determine their surface areas & volumes?

Assessment Evidence

Performance Tasks: • Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.) • Homework Assignments (Worksheets, online assignments, etc.) • Class Participation and Preparation • Class Discussion • Quizzes	**Other Evidence:** • Use of digital platforms (Quizizz, Formative, quizlet live, kahoot, Schoology, Big Ideas Platform, etc.) • Conferences • Student Performance during group activities • Activities i.e. stations, group work, independent practice, card sorts, task cards, etc.

• Test Benchmark Assessment: Common Assessment	• Project Based Assessment (optional) ***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

12.1 Cross Sections of Solids (1 day)
- Classifying Solids
- Describing Cross Sections
- Drawing a Cross Section (Optional)
- Modeling Real Life

12.2 Volumes of Prisms and Cylinders (2 days)
- Finding Volumes of Prisms
- Finding Volumes of Cylinders
- Modeling Real Life
- Volume of a Composite Solid
- Finding Surface Area & Volume of Similar Solids

12.3 Volumes of Pyramids (1 day)
- Finding Volumes of Pyramids
- Using the Volume of a Pyramid
- Finding Volume of Similar Solids
- Finding Volume of Composite Solids

12.4 Surface Area & Volumes of Cones (2 days)
- Finding the Surface Area of a Right Cone
- Finding the Volume of a Cone
- Finding Surface Area & Volume of Similar Solids
- Finding Volume of Composite Solids

12.5 Surface Area & Volumes of Spheres (1 day)
- Finding the Surface Area of a Sphere
- Finding Length in a Sphere (Optional)
- Finding the Volume of a Sphere
- Finding Volume of Composite Solids

12.6 Modeling with Surface Area and Volume (Optional, 1 day)
- Using the Formula for Density
- Using the Formula for Volume
- Modeling Real Life

12.7 Solids of Revolution (Optional, 1 day)
- Sketching & Describing Solids of Revolution
- Sketching a 2D shape and Axis
- Finding the Surface Area & Volume of a Solid of Revolution
- Forming a Solid of Revolution

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

Unit Modifications for Special Population Students

Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that

	can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the [Parent and Educator Resource Guide to Section 504](#) to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

New Jersey Student Learning Standards for English Language Arts
9th and 10th Grade Reading Standards
RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
RST.9-10.10. By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

9th and 10th Grade Writing Standards
WHST.9-10.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

New Jersey Student Learning Standards for Computer Science and Design Thinking
8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis.
8.1.8.DA.5: Test, analyze, and refine computational models.

New Jersey Student Learning Standards for Technology Education
Technology Education Practices
9.3.ST-SM.2: Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.4.12.O.2: Demonstrate mathematics knowledge and skills required to pursue the full-range of postsecondary education and career opportunities.
9.4.12.O.11: Apply active listening skills to obtain and clarify information.
9.4.12.O.12: Develop and interpret tables, charts, and figures to support written and oral communications.
9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
9.4.12.O.(1).7: Use mathematics, science and technology concepts and process to solve problems in projects involving design and/or production.

Life Literacies & Key Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)

Integration of 21st Century Skills

Indicators:

The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning. The skills used in this unit includes:

Communication
Collaboration
Critical Thinking
Creativity

Unit Title: Chapter 13 Probability

Unit Description: Students will develop an understanding of independent/dependent events and conditional probability. These concepts will then be utilized to interpret data and use probability rules to find probabilities of simple and compound events, permutations, and combinations.

Unit Duration: 8 days

Desired Results

Standard(s):

S-CP.A: Understand independence and conditional probability and use them to interpret data
S-CP.B: Use the rules of probability to compute probabilities of compound events in a uniform probability model

Indicators:

HSS-CP.A.1: Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
HSS-CP.A.2: Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities and use this characterization to determine if they are independent.
HSS-CP.A.: Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
HSS-CP.A.4: Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.
HSS-CP.A.5: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

HSS-CP.B.6: Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model.
HSS-CP.B.7: Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.
HSS-CP.B.8: (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model. 9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Understandings:	**Essential Questions:**
Students will understand that… • Theoretical Probability is the comparison of favorable outcomes to the total number of outcomes. • Sample spaces are a listing of all possible outcomes. • Conditional Probability can be determined using two-way tables or a formula. • Probability often involves determining if two events are independent or dependent. • Permutations are situations where order is important. • Combinations are situations where order is NOT important.	• What is theoretical probability? What is a sample space? • How can theoretical probability be calculated? • How is the complement of an event related to an event and how can it be determined? • What is conditional probability? How can it be determined using two-way tables? …a formula? • What makes an event independent? How can the conditional probability of an independent event be calculated? • What makes an event dependent? How does this affect the calculation of probability for a dependent event?

- Permutations and Combinations can be calculated using formulas involving factorials and the Fundamental Counting Principle.

- What is the difference between a permutation and a combination?
- How can permutations and combinations be used in solving real-world situations?

Assessment Evidence

Performance Tasks:
- Classwork Assignments (Practice worksheets, online assignments, activities, explorations/investigations, etc.)
- Homework Assignments (Worksheets, online assignments, etc.)
- Class Participation and Preparation
- Class Discussion
- Quizzes
- Test

Benchmark Assessment: Common Assessment

Other Evidence:
- Use of digital platforms (Quizizz, Formative, quizlet live, kahoot, Schoology, Big Ideas Platform, etc.)
- Conferences
- Student Performance during group activities
- Activities i.e. stations, group work, independent practice, card sorts, task cards, etc.
- Project Based Assessment (optional)

***Additional or alternative performance tasks may be used**

Benchmarks: Four common assessments will be given throughout the year

Learning Plan

Learning Activities: Guided Notes, worksheets, EdPuzzles, Do Nows, Formative, etc.

13.1 Sample Spaces & Probability (1 day)
- Finding a Sample Space
- Finding Theoretical Probability
- Finding Probabilities of Complements
- Using Area to Find Probability
- Modeling Real Life

13.3 Conditional Probability (1 day)
- Using Sample Space to find Conditional Probability
- Using a Formula to Find Conditional Probability
- Find Conditional Probabilities
- Using Conditional Probabilities to Make a Decision

13.4 Independent & Dependent Events (1 day)
- Determining Whether Events are Independent
- Finding the Probability of Independent Events
- Finding the Probability of Dependent Events

13.6 Permutations & Combinations (2 days)
- Counting Permutations
- Using the Permutations Formula
- Finding Probability using Permutations
- Counting Combinations
- Using the Combinations Formula
- Finding Probability using Combinations

Test (1 Day)

*Additional 2 days used for extra practice, review, and quiz days *

Resources: Textbook, online resources, etc.

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New Jersey Student Learning Standards for Computer Science and Design Thinking
8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.
8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

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Technology Education Practices
9.3.ST-SM.4: Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.
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9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

9.4.12.O.(2).5: Demonstrate critical thinking abilities and skills needed to review information, to explain statistical analyses, and to translate, interpret, and summarize research and statistical data collected and analyzed as the result of an investigation.

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