Geometry

Prepared by:

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Superintendent of Schools:

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Approved by the Midland Park Board of Education on
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Born on **Date July 2017**
Revised NJSLS **Date January 7, 2020**
Revised NJSLS **Date August 22, 2022**

Course Description: In Geometry, students will begin with an understanding of the basic tools of geometry, including points, lines, and planes, and will go on to master angle and angle pair relationships, as well as polygons. Students will learn to construct proofs, and learn the relationships of parallel and perpendicular lines, as well as what constitutes congruent triangles. Students will become proficient in understanding the anatomy of triangles, as well as what makes triangles similar, and will master right triangles and basic trigonometry. Students will learn what defines a quadrilateral, and will learn the various types, as well as circles, including arc measures, and the areas and lengths of sectors. Students will learn the basic types of transformations and will learn to conduct compositions of transformations. Students will go on to learn to find the perimeter and area of various shapes and will learn to solve for the surface area and volume of three-dimensional shapes. Finally, students will be introduced to geometric probability.

Course Sequence:
Unit 1 Geometry Basics *14 days*
Unit 2 Logic & Proof *17 days*
Unit 3 Parallel & Perpendicular Lines *13 days*
Unit 4 Congruent Triangles *15 days*
Unit 5 Relationships in Triangles *13 days*
Unit 6 Similar Triangles *13 days*
Unit 7 Right Triangles & Trigonometry *19 days*
Unit 8 Quadrilaterals *20 days*
Unit 9 Transformations *12 days*
Unit 10 Circles *14 days*
Unit 11 Volume & Surface Area *18 days*
Unit 12 Probability *12 days*

Pre-requisite: Algebra I

Unit 1 - Overview	
Content Area: Geometry	
Unit Title: Geometry Basics	
Grade Level: 9 – 10	
Core Ideas: Students will learn to precisely define essential geometric terms. Using this vocabulary, students will find length and angle measures synthetically, on the coordinate plane, and algebraically. Students will classify angles and use angle pair relationships to solve for unknown measures. Students will create constructions of several geometric figures by hand using a straightedge and a compass.	
Unit 1 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
N-CN.B.	Represent complex numbers and their operations on the complex plane.
N-CN.B.6.	(+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
G-CO.A.	Experiment with transformations in the plane.
G-CO.A.1.	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
G-CO.C.	Prove geometric theorems.
G-CO.9.	Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
G-CO.D.	Make geometric constructions.
G-CO.D.12.	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*
G-GPE.B.	Use coordinates to prove simple geometric theorems algebraically.
G-GPE.B.6.	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
G-GPE.B.7.	Use coordinates to computer perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.

9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3.	Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.CT.2.	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.5.	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
8.1.12.DA.6.	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.1.	Design algorithms to solve computational problems using a combination of original and existing algorithms.
8.2.12.ED.6.	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ community, including but not limited to Juliette Bruce, NSF Postdoctoral Fellow at University of California, Berkeley, and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A 52:16A-88	Explore African American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African American woman to earn a Ph.D mathematics, and Elbert Frank Cox, the first African American man to earn a Ph.D in mathematics in the world.
Amistad Law NJSA 18A 52:16A-88	Discuss and analyze the movie *Hidden Figures,* the story of female African American mathematicians and engineers who worked for NASA.
Holocaust Law NJSA 18A 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from jewishjournal.com.
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist for the Lakers.

Interdisciplinary Connection	
NJSLSA.R7. *(English)*	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RH-11-12.7. *(English)*	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, qualitatively, as well as in words) in order to address a question or solve a problem.
RST.11-12.3. *(Science)*	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
6.1.12.EconEM.6.a.	Determine how supply and demand influenced price and output during the Industrial Revolution.
6.1.12.EconNE.6.a.	Analyze the impact of money, investment, credit, savings, debt, and financial institutions on the development of the nation and the lives of individuals.
6.1.12.EconGE.16.a.	Use quantitative data and other sources to assess the impact of international trade, global business organizations, and overseas competition on the United States economy and workforce.

Social Emotional Learning

Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts.

- Having a growth mindset
- Developing interests and a sense of purpose

Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts.

- Recognizing strengths in others
- Recognizing situational demands and opportunities

Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.

- Identifying and using stress-management strategies
- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
- Using planning and organizational skills

Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):	**Unit Enduring Understandings:**
• Why are point, line, and plane the undefined terms of geometry? • How do you use the basic ideas of points, lines, and distance along a line to build the vocabulary of geometry? • How can you describe the attributes of a segment or angle? • How can you find the lengths and midpoints of segments and the measures of angles?	• Points, lines, and planes are the foundations of geometry. • Number operations can be used to find and compare the lengths of segments and measures of angles. • Special angle pairs can be used to identify geometric relationships and to find angle measures. • Formulas can be used to find information about a figure.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

- All Things Algebra – Geometry Curriculum
- *Larson Geometry* textbook

Key Vocabulary:

- Acute angle
- Angle
- Angle Addition Postulate
- Angle bisector
- Bisector
- Collinear points
- Congruent angles
- Congruent segments
- Coplanar points
- Directed line segment
- Distance formula
- Horizontal component
- Intersecting lines
- Intersecting planes
- Line
- Midpoint formula
- Midpoint of a segment
- Non-collinear points
- Non-coplanar points
- Obtuse angle
- Parallel lines
- Partitioning a segment
- Perpendicular bisector
- Perpendicular lines
- Plane
- Point
- Right angle
- Segment
- Segment Addition Postulate
- Straight angle
- Vertex
- Vertical component

Suggested Pacing Guide

Lesson Name/ Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
1.1 Points, Lines, & Planes	• Identify and name points, lines, and planes. • Identify when points are collinear or non-collinear. • Identify when points are coplanar or non-coplanar. • Identify and name the intersections of lines and planes.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
1.2 Segment Addition Postulate	• Measure segments by finding the length between two points. • Determine if segments are congruent. • Use the Segment Addition Postulate to find the measure of unknown lengths. • Find the length of a line segment, given the midpoint. • Use lines, rays, or segments that intersect a segment at its midpoint (bisector) to find unknown lengths.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
1.3 Distance & Midpoint Formulas	• Use the distance formula to find the distance between two points. • Use the midpoint formula to find the midpoint between two points. • Use the midpoint formula to find an endpoint of a segment, given the midpoint and other endpoint.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
1.4 Partitioning a Segment	• Identify the initial and terminal points of a line segment.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework	2

	• Find the horizontal and vertical components of a directed line segment. • Given a directed line segment, partition a segment into two parts.	• Lecture • Model • Scavenger Hunt	
1.5 Angle Addition Postulate	• Classify angles as acute, obtuse, right, or straight. • Name the vertex and sides of an angle. • Name an angle using the correct notation. • Identify if angles are congruent. • Find the measure of an angle given an angle bisector. • Use perpendicular lines and perpendicular bisectors to find unknown angle measures. • Identify perpendicular lines and perpendicular bisectors in a figure. • Use the Angle Addition Postulate to find unknown angle measures.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
1.6 Angle Relationships	• Identify vertical angles, adjacent angles, linear pairs, complementary angles, and supplementary angles. • Use vertical angles, adjacent angles, linear pairs, complementary angles, and supplementary angles to find unknown angle measures.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
1.7 Constructions	• By hand, construct perpendicular bisectors, perpendicular lines, parallel lines, angle bisectors, and congruent angles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2

Teacher Notes: This unit will take approximately 14 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies				
Students with Disabilities	**English Language Learners**	**Gifted and Talented Students**	**Students at Risk**	**504 Students**
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 2 - Overview	
Content Area: Geometry	
Unit Title: Logic & Proof	
Grade Level: 9 – 10	
Core Ideas: In this unit, students will explore methods of reasoning and learn to apply those methods to geometry. They will make conjectures, determine the truth values of compound statements, and construct truth tables. They also analyze conditional statements and write related conditionals. The term postulate and theorem are introduced. Algebraic properties of equality are applied to geometry, enabling students to write formal and informal proofs proving segment and angle relationships.	
Unit 2 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
A-SSE.B.	Write expressions in equivalent forms to solve problems.
A-SSE.B.3.	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
A-REI.A.	Understand solving equations as a process of reasoning and explain the reasoning.
A-REI.A.1.	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
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Unit Essential Question(s):

- How can you use reasoning to solve problems?
- Why is inductive and deductive reasoning important?
- How can we apply logical reasoning to develop and apply properties related to geometric relationships?

Unit Enduring Understandings:

- A conjecture is an educated guess based on known information.
- Examining several specific situations to arrive at a conjecture is called inductive reasoning.
- A statement is any sentence that is either true or false, but not both.
- Two or more statements can be joined to form a compound statement.
- Conjunctions and disjunctions can be illustrated with Venn diagrams.
- Deductive reasoning uses facts, rules, definitions, or properties to reach logical conclusions.
- Algebraic proofs can be used to justify each step when solving an equation.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

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- *Larson Geometry* textbook

Key Vocabulary:

- Addition Property of Equality
- Angle Addition Postulate
- Biconditional statement
- Complement Theorem
- Compound statement
- Conclusion

	• Conditional statement • Congruent Complements Theorem • Congruent Supplements Theorem • Conjecture • Conjunction • Contrapositive • Converse • Counterexample • Deductive reasoning • Definition • Definition of an Angle Bisector • Definition of Complementary Angles • Definition of Congruence • Definition of Midpoint • Definition of Perpendicular • Definition of a Right Angle • Definition of Supplementary Angles • Disjunction • Distributive Property • Division Property of Equality • Hypothesis • Inductive reasoning • Invalid • Inverse • Law of Detachment • Law of Syllogism • Linear Pair Theorem (Supplement Theorem) • Multiplication Property of Equality • Negation • Postulate • Property • Reason • Reflexive Property of Congruence • Reflexive Property of Equality • Segment Addition Postulate • Statement • Substitution Property of Equality • Subtraction Property of Equality • Symmetric Property of Congruence • Symmetric Property of Equality • Theorem • Transitive Property of Congruence • Transitive Property of Equality • Truth table • Truth value • Venn diagram • Vertical Angles Theorem
Suggested Pacing Guide	

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
2.1 Inductive Reasoning	• Use inductive reasoning to make a conjecture. • Determine whether a conjecture is true or false. • Provide a counterexample when a conjecture is false.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
2.2 Compound Statements	• Determine the truth value of a statement. • Determine the negation of a statement. • Write a compound statement (conjunctions and disjunctions). • Create and analyze truth tables.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
2.3 Conditional Statements	• Write conditional statements in if-then form. • Identify the hypothesis and conclusion of a statement. • Write the inverse, converse, and contrapositive given a conditional statement. • Determine the truth value of conditional statements, inverses, converses, and contrapositives. • Write biconditional statements.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
2.4 Venn Diagrams	• Use Venn diagrams to show relationships. • Draw Venn diagrams to represent a statement. • Create conditional or compound statements from Venn diagrams.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
2.5 Deductive Reasoning	• Use deductive reasoning, specifically the Laws of Detachment and Syllogism to write valid conclusions.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
2.6 – 2.7 Algebraic Proofs	• Use properties of equality to complete proofs.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model	1

		• Scavenger Hunt	
2.8 Segment Proofs	• Complete segment proofs using properties of equality, properties of congruence, and geometric definitions. • Use the Segment Addition Postulate to find missing measures.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
2.9 Angle Proofs	• Complete angle proofs using properties of equality, properties of congruence, geometric definitions, postulates, and theorems.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2

Teacher Notes: This unit will take approximately 17 days, including review (1), quiz (1), and test days (2).

Additional Resources:

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- Delta Math
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Differentiation/Modification Strategies				
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Unit 3 - Overview	
Content Area: Geometry	
Unit Title: Parallel & Perpendicular Lines	
Grade Level: 9 – 10	
Core Ideas: Students will identify the special angle relationships that result when a transversal intersects parallel lines. Slope and forms for the equation of a line are reviewed. Students solve problems by writing linear equations and use slope to determine whether two lines are parallel, perpendicular, or neither.	
Unit 3 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
F-IF.C.	Analyze functions using different representations.
F.IF.C.7.	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
F-IF.C.7.a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.
G-CO.C.	Prove geometric theorems.
G-CO.C.9.	Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
G-GPE.B.	Use coordinates to prove simple geometric theorems algebraically.
G-GPE.B.2.	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
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Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
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Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts. • Having a growth mindset • Developing interests and a sense of purpose Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts.	

- Recognizing strengths in others
- Recognizing situational demands and opportunities

Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.

- Identifying and using stress-management strategies
- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
- Using planning and organizational skills

Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):	**Unit Enduring Understandings:**
• How are parallel lines and planes used in architecture? • How can properties of parallel lines be used to determine the measure of an angle? • How can slope be used to identify if lines are parallel, perpendicular, or neither? • How can two lines be proved parallel?	• Identify the relationships between two lines or two planes. • Special angle pairs are formed by a pair of lines and a transversal. • The slope of a line is the ratio of its vertical rise to its horizontal run. • Lines can be proved parallel if certain angle conditions are met.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:	**Key Vocabulary:**
• All Things Algebra – Geometry Curriculum • *Larson Geometry* textbook	• Alternate Exterior Angles • Alternate Exterior Angles Converse • Alternate Interior Angles • Alternate Interior Angles Converse • Consecutive (Same-Side) Exterior Angles • Consecutive (Same-Side) Exterior Angles Converse • Consecutive (Same-Side) Interior Angles • Consecutive (Same-Side) Interior Angles Converse • Coplanar lines • Corresponding Angles • Corresponding Angles Converse • Horizontal line

	• Intersect • Line • Line segment • Linear Pair • Negative reciprocals • Negative slope • Non-coplanar lines • Parallel lines • Parallel planes • Perpendicular bisector • Perpendicular lines • Plane • Point-slope form • Positive slope • Proof • Ray • Slope • Slope-intercept form • Skew lines • Standard form • Transitive Property of Parallel Lines • Transversal • Undefined slope • Vertical Angles • Vertical line • *Y*-intercept • Zero slope

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
3.1 Parallel Lines & Transversals	• Determine if two lines are parallel or skew. • Determine if two planes are parallel. • Identify a transversal. • Determine the relationship of two angles formed by a transversal.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
3.2 Parallel Lines Cut by a Transversal	• Find the measure of angles formed by two parallel lines cut by a transversal.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

3.3 Proving Lines are Parallel	• Use the converse theorems to prove lines are parallel. • Use the transitive property of parallel lines to determine if lines are parallel.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
3.4 Parallel Line Proofs	• Complete proofs involving parallel lines.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
3.5 Slopes of Lines; Parallel & Perpendicular Lines	• Find the slope of lines given the graph of a line or two ordered pairs. • Determine if lines are parallel or perpendicular by finding and comparing their slopes.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
3.6 Slope-Intercept Form & Standard Form	• Graph lines in slope-intercept form. • Graph lines in standard form. • Graph vertical and horizontal lines. • Given graphs or equations of lines, determine if the lines are parallel, perpendicular, or neither.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
3.7 Point-Slope Form	• Graph lines in point-slope form. • Given graphs or equations of lines, determine if the lines are parallel, perpendicular, or neither. • Write equations of parallel and perpendicular lines. • Write equations of perpendicular bisectors.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
Teacher Notes: This unit will take approximately 13 days, including review (1), quiz (1), and test days (2).			
Additional Resources: • Khan Academy • Delta Math • Desmos			
Differentiation/Modification Strategies			

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 4 - Overview
Content Area: Geometry
Unit Title: Congruent Triangles
Grade Level: 9 – 10
Core Ideas: In this unit, students identify and classify triangles by various methods. Students prove triangles congruent using SSS, SAS, ASA, and AAs. They also learn how to write the coordinate proof. Students apply the Angle Sum Theorem and the Exterior Angle Theorem. The special properties of isosceles and equilateral triangles are introduced, and students are expected to use those properties in proofs.

Unit 4 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G-CO.B.	Understand congruence in terms of rigid motions.
G-CO.B.7.	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
G-CO.B.8.	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
G-CO.C.	Prove geometric theorems.
G-CO.C.10.	Prove theorems about triangles. *Theorems include: measure of interior angles of a triangle sum to* 180°; *base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3.	Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.CT.2.	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

8.1.12.DA.5.	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
8.1.12.DA.6.	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.1.	Design algorithms to solve computational problems using a combination of original and existing algorithms.
8.2.12.ED.6.	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ community, including but not limited to Juliette Bruce, NSF Postdoctoral Fellow at University of California, Berkeley, and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A 52:16A-88	Explore African American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African American woman to earn a Ph.D mathematics, and Elbert Frank Cox, the first African American man to earn a Ph.D in mathematics in the world.
Amistad Law NJSA 18A 52:16A-88	Discuss and analyze the movie *Hidden Figures,* the story of female African American mathematicians and engineers who worked for NASA.
Holocaust Law NJSA 18A 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from jewishjournal.com.
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist for the Lakers.
Interdisciplinary Connection	
NJSLSA.R7. *(English)*	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RH-11-12.7. *(English)*	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, qualitatively, as well as in words) in order to address a question or solve a problem.
RST.11-12.3. *(Science)*	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
6.1.12.EconEM.6.a.	Determine how supply and demand influenced price and output during the Industrial Revolution.
6.1.12.EconNE.6.a.	Analyze the impact of money, investment, credit, savings, debt, and financial institutions on the development of the nation and the lives of individuals.
6.1.12.EconGE.16.a.	Use quantitative data and other sources to assess the impact of international trade, global business organizations, and overseas competition on the United States economy and workforce.
Social Emotional Learning	
Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts. • Having a growth mindset • Developing interests and a sense of purpose Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts.	

- Recognizing strengths in others
- Recognizing situational demands and opportunities

Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.

- Identifying and using stress-management strategies
- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
- Using planning and organizational skills

Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):

- What are the characteristics of isosceles and equilateral triangles and how can they be used to find unknown side and angle measures?
- How can triangles be proved congruent?
- What is CPCTC and how can it be used to show corresponding parts of congruent triangles are congruent?

Unit Enduring Understandings:

- Triangles can be classified by sides or angles.
- The Triangle Sum Theorem and the Exterior Angle Theorem can be used to find missing angle measures in a triangle.
- Triangles can be proved congruent by SSS, SAS, ASA, AAS, and HL.
- CPCTC is a theorem that can be used to show corresponding parts of congruent triangles are congruent.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

- All Things Algebra – Geometry Curriculum
- *Larson Geometry* textbook

Key Vocabulary:

- AAS (Angle-Angle-Side) Congruence Theorem
- Acute triangle
- Alternate Interior Angles
- ASA (Angle-Side-Angle) Congruence Theorem
- Base
- Base angles
- Congruent sides
- Congruence statement
- Congruent triangles
- Converse of the Isosceles Triangle Theorem

	• Corresponding Angles • Corresponding sides • CPCTC (Corresponding Parts of Congruent Triangles are Congruent) • Definition of Angle Bisector • Definition of Midpoint • Equiangular triangle • Equilateral triangle • Exterior Angle Theorem • HL (Hypotenuse-Leg) Congruence Theorem • Hypotenuse • Included angle • Isosceles triangle • Isosceles Triangle Theorem • Leg • Non-included side • Obtuse triangle • Reflexive Property • Right triangle • Scalene triangle • SAS (Side-Angle-Side) Congruence Theorem • SSS (Side-Side-Side) Congruence Theorem • Triangle Angle Sum Theorem • Vertex angle • Vertical Angles

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
4.1 Classifying Triangles	• Classify triangles as acute, obtuse, right, or equiangular. • Classify triangles as scalene, isosceles, or equilateral. • Classify triangles in the coordinate plane.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
4.2 Angles of Triangles	• Use the Triangle Angle Sum Theorem to find missing angle measures in triangles. • Use the Exterior Angle Theorem to find missing angle measures.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
4.3 Isosceles & Equilateral Triangles	• Use theorems about isosceles triangles to find missing angle and side measures. • Use the definition of an equilateral triangle to find	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture	1

	missing angle and side measures in a triangle.	• Model • Scavenger Hunt	
4.4 Congruent Triangles	• Determine if triangles are congruent. • Write a congruency statement when triangles are congruent. • Use CPCTC to prove parts of congruent triangles are congruent.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
4.5 Congruent Triangle Proofs: SSS & SAS	• Use SSS and SAS to prove triangles congruent. • Determine if triangles are congruent in the coordinate plane using the distance formula.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
4.6 Congruent Triangle Proofs: ASA, AAS, & HL	• Use ASA, AAS, & HL to prove triangles congruent.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
4.7 Proofs Review: All Methods (includes CPCTC)	• Use CPCTC to prove parts of congruent triangles are congruent.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2

Teacher Notes: This unit will take approximately 15 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 5 - Overview	
Content Area: Geometry	
Unit Title: Relationships in Triangles	
Grade Level: 9 – 10	
Core Ideas: In this unit, students expand their knowledge of triangles and their properties. Bisectors, medians, and altitudes are identified and explored. Students apply properties of inequalities relating to the measures of angles and sides of a triangle and then extend those properties to two triangles.	
Unit 5 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G.CO.C.	Prove geometric theorems.
G.CO.C.9.	Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
G-CO.D.	Make geometric constructions.
G-CO.D.12.	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3.	Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.CT.2.	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.5.	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

8.1.12.DA.6.	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.1.	Design algorithms to solve computational problems using a combination of original and existing algorithms.
8.2.12.ED.6.	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ community, including but not limited to Juliette Bruce, NSF Postdoctoral Fellow at University of California, Berkeley, and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A 52:16A-88	Explore African American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African American woman to earn a Ph.D mathematics, and Elbert Frank Cox, the first African American man to earn a Ph.D in mathematics in the world.
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Interdisciplinary Connection	
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RST.11-12.3. *(Science)*	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
6.1.12.EconEM.6.a.	Determine how supply and demand influenced price and output during the Industrial Revolution.
6.1.12.EconNE.6.a.	Analyze the impact of money, investment, credit, savings, debt, and financial institutions on the development of the nation and the lives of individuals.
6.1.12.EconGE.16.a.	Use quantitative data and other sources to assess the impact of international trade, global business organizations, and overseas competition on the United States economy and workforce.
Social Emotional Learning	
Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts. • Having a growth mindset • Developing interests and a sense of purpose Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts. • Recognizing strengths in others	

- Recognizing situational demands and opportunities

Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.

- Identifying and using stress-management strategies
- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
- Using planning and organizational skills

Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):	**Unit Enduring Understandings:**
• How can circumcenters, incenters, centroids, and altitudes be found in triangles? • How can sides and angles be compared in a triangle?	• Use perpendicular bisectors and angle bisectors in triangles. • Use medians and altitudes in triangles. • Apply properties of inequalities to the measures of angles of a triangle. • Apply properties of inequalities to the relationships between angles and sides of a triangle.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:	**Key Vocabulary:**
• All Things Algebra – Geometry Curriculum • *Larson Geometry* textbook	• Altitude • Angle bisector • Angle Bisector Theorem • Centroid • Circumcenter • Compass • Converse of the Angle Bisector Theorem • Converse of the Hinge Theorem • Converse of the Perpendicular Bisector Theorem • Hinge Theorem • Hypotenuse • Incenter • Intersection • Leg

	• Median • Midpoint • Orthocenter • Parallel • Perpendicular • Perpendicular bisector • Perpendicular Bisector Theorem • Pythagorean Theorem • Right triangle • Slope • Straightedge • Triangle Inequality Theorem • Triangle midsegment • Triangle Midsegment Theorem • Vertex

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
5.1 Triangle Midsegments	• Use triangle midsegments and the Triangle Midsegment Theorem to find unknown measures in a triangle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
5.2 Perpendicular & Angle Bisectors	• Use perpendicular bisector theorems to find missing measures in a triangle. • Use angle bisector theorems to find missing measures in a triangle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
5.3 Circumcenter & Incenter	• Use the Pythagorean Theorem to find missing side lengths of a right triangle. • Use the circumcenter to find missing measures in a triangle. • Use the incenter to find missing measures in a triangle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
5.4 Centroid & Orthocenter	• Use the centroid to find missing measures in a triangle. • Use the altitude to find missing measures in a triangle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

5.5 Centers of Triangles Review	• Review and use circumcenters, incenters, centroids, and altitudes to find missing measures in a triangle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
5.6 Constructing Triangle Centers	• Construct centers of triangles using a compass and a straightedge.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
5.7 Centers of Triangles on the Coordinate Plane	• Find the circumcenter, centroid, and orthocenter on the coordinate plane.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
5.8 Triangle Inequalities	• Use the Triangle Inequality Theorem to determine if a triangle can be formed. • Find the range of the third side of a triangle given two sides. • Order angles from least to greatest and greatest to least given the side lengths of the triangle. • Order side lengths from least to greatest and greatest to least given the angle measures in a triangle. • Use the Hinge Theorem to compare side lengths in two different triangles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
5.9 Triangle Inequalities & Algebra	• Use the Triangle Inequality Theorem to determine if a triangle can be formed. • Find the range of the third side of a triangle given two sides. • Order angles from least to greatest and greatest to least given the side lengths of the triangle. • Order side lengths from least to greatest and greatest to least	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

	given the angle measures in a triangle. • Use the Hinge Theorem to compare side lengths in two different triangles.		

Teacher Notes: This unit will take approximately 13 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 6 - Overview	
Content Area: Geometry	
Unit Title: Similar Triangles	
Grade Level: 9 – 10	
Core Ideas: In this unit, students extend their knowledge of ratios and proportions to similar figures. The term scale factor is introduced, and students solve problems using cross products and proportions. They also learn to recognize and use proportional parts and relationships to solve problems involving similar triangles and parallel lines.	
Unit 6 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G-SRT.A.	Understand similarity in terms of similarity transformations.
G-SRT.A.2.	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
G-SRT.A.3.	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
G-SRT.B.	Prove theorems involving similarity.
G-SRT.B.4.	Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3.	Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.CT.2.	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

8.1.12.DA.5.	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
8.1.12.DA.6.	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.1.	Design algorithms to solve computational problems using a combination of original and existing algorithms.
8.2.12.ED.6.	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ community, including but not limited to Juliette Bruce, NSF Postdoctoral Fellow at University of California, Berkeley, and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A 52:16A-88	Explore African American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African American woman to earn a Ph.D mathematics, and Elbert Frank Cox, the first African American man to earn a Ph.D in mathematics in the world.
Amistad Law NJSA 18A 52:16A-88	Discuss and analyze the movie *Hidden Figures,* the story of female African American mathematicians and engineers who worked for NASA.
Holocaust Law NJSA 18A 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from jewishjournal.com.
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist for the Lakers.
Interdisciplinary Connection	
NJSLSA.R7. *(English)*	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RH-11-12.7. *(English)*	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, qualitatively, as well as in words) in order to address a question or solve a problem.
RST.11-12.3. *(Science)*	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
6.1.12.EconEM.6.a.	Determine how supply and demand influenced price and output during the Industrial Revolution.
6.1.12.EconNE.6.a.	Analyze the impact of money, investment, credit, savings, debt, and financial institutions on the development of the nation and the lives of individuals.
6.1.12.EconGE.16.a.	Use quantitative data and other sources to assess the impact of international trade, global business organizations, and overseas competition on the United States economy and workforce.
Social Emotional Learning	
Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts. • Having a growth mindset • Developing interests and a sense of purpose Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts.	

- Recognizing strengths in others
- Recognizing situational demands and opportunities

Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.

- Identifying and using stress-management strategies
- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
- Using planning and organizational skills

Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):

- How are ratios used in real-world scenarios?
- What determines if triangles are similar?

Unit Enduring Understandings:

- A ratio is a comparison of two quantities.
- An equation stating that two ratios are equal is a proportion.
- When figures have the same shape but may be different in size, they are similar figures.
- For triangles to be similar, their corresponding angles must be congruent and the measures of their corresponding sides must be proportional.
- Similarity of triangles is reflexive, symmetric, and transitive.
- The Triangle Proportionality Theorem and the converse of this theorem relates parallel lines and segments in triangles to find unknown measures.
- If two triangles are similar, then the perimeters are proportional to the measures of corresponding sides.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

- All Things Algebra – Geometry Curriculum
- *Larson Geometry* textbook

Key Vocabulary:

- AA~ (Angle-Angle Similarity)
- Altitude
- Angle bisector

	• Comparison • Converse of the Triangle Proportionality Theorem • Corresponding angles • Corresponding sides • Cross Product Property • Equation • Extended ratio • Median • Parallel lines • Perimeter • Proof • Proportion • Proportional parts • Ratio • Scale factor • Shape • Similar polygons • Similar triangles • Similarity statement • Size • SAS~ (Side-Angle-Side Similarity) • SSS~ (Side-Side-Side Similarity) • Triangle Angle Bisector Theorem • Triangle Proportionality Theorem

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
6.1 Ratio & Proportion	• Find and use ratios to compare two or more quantities. • Find unknown measures by solving a proportion.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
6.2 Similar Figures	• Determine if polygons are similar by comparing corresponding angle measures and side lengths. • Find the scale factor between two similar figures. • Given similar figures, find unknown side lengths.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
6.3 Proving Triangles Similar:	• Prove triangles are similar using AA~, SSS~, or SAS~.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework	2

SSS, SAS, & AA		• Lecture • Model • Scavenger Hunt	
6.4 Similar Triangle Proofs	• Prove triangles are similar using AA~, SSS~, or SAS~. • Complete proofs involving similar triangles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
6.5 Parallel Lines & Proportional Parts	• Use the Triangle Proportionality Theorem to find missing side lengths of triangles. • Use parallel lines and proportional parts to find missing lengths.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
6.6 Parts of Similar Triangles	• Given similar triangles, and altitudes, angle bisectors, or medians, find the missing side lengths. • Use the Triangle Angle Bisector Theorem to solve for unknown side lengths in a triangle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2

Teacher Notes: This unit will take approximately 13 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 7 - Overview	
Content Area: Geometry	
Unit Title: Right Triangles & Trigonometry	
Grade Level: 9 – 10	
Core Ideas: This unit provides students with an introduction to trigonometry. Students learn how to use the geometric mean to solve problems involving side length. They solve problems using the Pythagorean Theorem and its converse. Trigonometric ratios are defined and then used to solve right triangle problems. Students also use the Law of Sines and the Law of Cosines to solve non-right triangles.	
Unit 7 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G.SRT.C.	Define trigonometric ratios and solve problems involving right triangles.
G.SRT.C.6.	Understand that similarity, side ratios in right triangles area properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
G.SRT.C.7.	Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.C.8.	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3.	Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.CT.2.	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.5.	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
8.1.12.DA.6.	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.1.	Design algorithms to solve computational problems using a combination of original and existing algorithms.

8.2.12.ED.6.	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ community, including but not limited to Juliette Bruce, NSF Postdoctoral Fellow at University of California, Berkeley, and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A 52:16A-88	Explore African American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African American woman to earn a Ph.D mathematics, and Elbert Frank Cox, the first African American man to earn a Ph.D in mathematics in the world.
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Social Emotional Learning	
Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts. • Having a growth mindset • Developing interests and a sense of purpose Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts. • Recognizing strengths in others • Recognizing situational demands and opportunities Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations. • Identifying and using stress-management strategies	

- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
- Using planning and organizational skills

Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):

- How can the Pythagorean Theorem and its converse be used to classify triangles by angles?
- How can special right triangles be used in geometry to solve for unknown side measures?
- What is trigonometry and how is it used to solve for unknown side and angle measures?

Unit Enduring Understandings:

- The Pythagorean Theorem states that in a right triangle, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse.
- $45° - 45° - 90°$ and $30° - 60° - 90°$ are two special right triangles with special properties.
- A ratio of the lengths of the sides of a right triangle is called a trigonometric ratio. The three most common trigonometric ratios are sine, cosine, and tangent.
- Trigonometric ratios are used to find missing measures of a right triangle.
- Angles of elevation and angles of depression can be used to solve real-world applications.
- The Laws of Sines and Cosines can be used to find missing measures of triangles that are not right triangles.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

- All Things Algebra – Geometry Curriculum
- *Larson Geometry* textbook

Key Vocabulary:

- Adjacent
- Angle of depression
- Angle of elevation
- Cosine
- Geometric mean
- Geometric Mean Altitude Theorem
- Geometric Mean Leg Theorem
- Hypotenuse

	• Law of Cosines • Law of Sines • Legs • Opposite • Pythagorean Theorem • Pythagorean Theorem Converse • Right triangle • Right Triangle Similarity Theorem • Sine • Special right triangles • Tangent • Trigonometry

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
7.1 Pythagorean Theorem & its Converse	• Use the Pythagorean Theorem to find missing measures in a right triangle. • Use the Pythagorean Theorem in real-world applications. • Use the converse of the Pythagorean Theorem to determine if triangles are acute, obtuse, or right.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
7.2 Special Right Triangles	• Use special right triangles to find missing side lengths of right triangles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
7.3 Similar Right Triangles & Geometric Mean	• Use similarity in right triangles to find missing side lengths in overlapping right triangles. • Find the geometric mean of two numbers. • Use the Geometric Mean Altitude Theorem and the Geometric Mean Leg Theorem to find missing side lengths of right triangles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
7.4 Trigonometric Ratios & Finding Missing Sides	• Find simple trigonometric ratios. • Find side lengths using trigonometry. • Find angle measures using trigonometry. • Solve real-world applications involving trigonometric ratios.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2

7.5 Trigonometry: Finding Sides & Angles	• Find simple trigonometric ratios. • Find side lengths using trigonometry. • Find angle measures using trigonometry. • Solve real-world applications involving trigonometric ratios.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
7.6 Trigonometric Review	• Solve real-world applications using angles of elevation and depression. • Find missing side lengths and angle measures in right triangles by using trigonometry.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
7.7 Law of Sines	• Use the Law of Sines to find missing side lengths and angle measures in oblique triangles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
7.8 Law of Cosines	• Use the Law of Cosines to find missing side lengths and angle measures in oblique triangles. • Determine when to use Law of Sines and when to use Law of Cosines to solve oblique triangles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
7.9 Solving Triangles & Applications	• Review the Laws of Sines and Cosines and use these laws in real-world applications.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2

Teacher Notes: This unit will take approximately 19 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 8 - Overview	
Content Area: Geometry	
Unit Title: Quadrilaterals	
Grade Level: 9 – 10	
Core Ideas: In this unit, students explore quadrilaterals. They begin by investigating the interior and exterior angles of polygons. Then students learn to recognize and apply the properties of parallelograms. Students' knowledge of parallelograms is extended as they explore rectangles, rhombi, and squares and their special properties. Trapezoids are also explored. Finally, students position quadrilaterals on the coordinate plane for use in coordinate proofs.	
Unit 8 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G-CO.C.	Prove geometric theorems.
G-CO.C.11.	Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*
G-GPE.B.	Use coordinates to prove simple geometric theorems algebraically.
G-GPE.B.4.	Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point* $(1, \sqrt{3})$ *lies on the circle centered a the origin and containing the point* $(0, 2)$.
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
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Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
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9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

8.1.12.DA.5.	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
8.1.12.DA.6.	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.1.	Design algorithms to solve computational problems using a combination of original and existing algorithms.
8.2.12.ED.6.	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
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Social Emotional Learning	
Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts. • Having a growth mindset • Developing interests and a sense of purpose Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts.	

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Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):

- How can I compare and contrast quadrilaterals and use their properties?
- How do I define and classify different types of quadrilaterals?

Unit Enduring Understandings:

- The Interior Angle Sum Theorem and the Exterior Angle Sum Theorem can be used to find the measure of interior and exterior angles of a triangle.
- Parallelograms have both pairs of opposite sides parallel. They have several special properties to help define them.
- Rectangles, rhombi, and squares are all in the family of parallelograms.
- Quadrilaterals can be classified on the coordinate plane by using slope, midpoint, and distance formulas.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

- All Things Algebra – Geometry Curriculum
- *Larson Geometry* textbook

Key Vocabulary:

- Congruent
- Decagon
- Diagonal
- Distance formula
- Exterior angle
- Heptagon
- Hexagon
- Interior angle
- Interior Angle Sum Formula
- Line segment

	• Nonagon • Octagon • Parallel • Parallelogram • Pentagon • Polygon • Quadrilateral • Rectangle • Regular polygon • Slope formula • Supplementary • Triangle

Suggested Pacing Guide

Lesson Name/Topic	**Student Learning Objective(s)**	**Suggested Tasks/Activities:**	**Day(s) to Complete**
8.1 Angles of Polygons	• Find the sum of the interior angle measures of a polygon. • Find the sum of the exterior angle measures of a polygon.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
8.2 Parallelograms	• Find missing side and angle measures by using the properties of parallelograms. • Prove quadrilaterals are parallelograms in the coordinate plane.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
8.3 Parallelogram Proofs	• Complete proofs involving parallelograms.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
8.4 Rectangles	• Find missing side and angle measures by using the properties of rectangles.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
8.5 Rhombi & Squares	• Find missing side and angle measures by using the properties of rhombi and squares.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework	1

		• Lecture • Model • Scavenger Hunt	
8.6 Classifying Quadrilaterals in the Coordinate Plane	• Using the distance and slope formulas, determine which quadrilateral lies in a coordinate plane.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
8.7 Trapezoids	• Find missing side and angle measures by using the properties of both non-isosceles and isosceles trapezoids. • Use the midsegment of a trapezoid to find missing lengths in a trapezoid.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
8.8 Kites	• Find missing side and angle measures by using the properties of kites.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

Teacher Notes: This unit will take approximately 20 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
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Unit 9 - Overview	
Content Area: Geometry	
Unit Title: Transformations	
Grade Level: 9 – 10	
Core Ideas: In this unit, students explore the different types of transformations: translations, reflections, rotations, and dilations. They learn to identify, draw, and recognize figures that have been transformed. Lastly, students identify different types of symmetry in figures.	
Unit 9 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G-CO.A.	Experiment with transformations in the plane.
G-CO.A.2.	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
G-CO.A.3.	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
G-CO.A.4.	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
G-CO.A.5.	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figures using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
G-CO.B.	Understand congruence in terms of rigid motions.
G-CO.B.6.	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
G-CO.B.7.	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
G-CO.B.8.	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.

Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3.	Investigate new challenges and opportunities for personal growth, advancement, and transition.

9.4.12.CT.2.	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
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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Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ community, including but not limited to Juliette Bruce, NSF Postdoctoral Fellow at University of California, Berkeley, and Stephen Hawking, former Director of Research at the University of Cambridge.
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AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist for the Lakers.
Interdisciplinary Connection	
NJSLSA.R7. *(English)*	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RH-11-12.7. *(English)*	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, qualitatively, as well as in words) in order to address a question or solve a problem.
RST.11-12.3. *(Science)*	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
6.1.12.EconEM.6.a.	Determine how supply and demand influenced price and output during the Industrial Revolution.
6.1.12.EconNE.6.a.	Analyze the impact of money, investment, credit, savings, debt, and financial institutions on the development of the nation and the lives of individuals.

6.1.12.EconGE.16.a.	Use quantitative data and other sources to assess the impact of international trade, global business organizations, and overseas competition on the United States economy and workforce.

Social Emotional Learning

Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts.

- Having a growth mindset
- Developing interests and a sense of purpose

Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts.

- Recognizing strengths in others
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Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.

- Identifying and using stress-management strategies
- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
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Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):	**Unit Enduring Understandings:**
• What are the different types of transformations and how are they used in math? • What is the difference between rigid and non-rigid transformations and what is an example of each?	• A reflection is a transformation representing a flip of a figure. • A translation is a transformation that moves all points of a figure the same distance in the same direction. • A rotation is a transformation that turns every point of a preimage through a specified angle and direction about a fixed point. • A dilation is a transformation that changes the size of the figure. • Figures that are commonly called symmetrical have a line of reflection, or a line of symmetry.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

- All Things Algebra – Geometry Curriculum
- *Larson Geometry* textbook

Key Vocabulary:

- Center of reduction
- Clockwise rotation
- Counterclockwise rotation
- Dilation
- Enlargement
- Horizontal shift
- Image
- Initial point
- Line of reflection
- Line symmetry
- Non-rigid motion
- Orientation
- Point symmetry
- Pre-image
- Transformation
- Translation
- Reduction
- Reflection
- Rigid motion
- Rotation
- Rotational symmetry
- Scale factor
- Sequence of transformation
- Similar figures
- Size
- Terminal point
- Vector
- Vertical shift

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
9.1 Translations	• Graph the image of a figure, given a pre-image. • Recognize that a translation is a rigid motion. • Translate figures by sliding them horizontally or vertically. • Translate figures using vectors.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
9.2 Reflections	• Graph the image of a figure, given a pre-image. • Graph figures over common lines of reflection.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture	1

	• Identify the line of reflection, given a pre-image and an image.	• Model • Scavenger Hunt	
9.3 – 9.4 Rotations	• Graph the image of a figure, given a pre-image. • Graph images from preimages, using clockwise and counterclockwise rotations. • Rotate figures around other fixed points (not the origin).	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
9.5 – 9.6 Dilations	• Graph the image of a figure, given a pre-image. • Dilate figures around the origin and around other fixed points.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
9.7 Sequences of Transformations	• Perform a series of rigid and non-rigid transformations to graph an image from a pre-image.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
9.8 Symmetry	• Determine if figures have line symmetry, point symmetry, or rotational symmetry.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

Teacher Notes: This unit will take approximately 12 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 10 - Overview	
Content Area: Geometry	
Unit Title: Circles	
Grade Level: 9 – 10	
Core Ideas: This unit focuses exclusively on circles and their special properties. A circle is a unique geometric shape in which the angles, arcs, and segments intersecting the circle have special relationships. In this chapter, students identify the parts of a circle and solve problems involving circumference. They find arc and angle measures and the measures of segments in a circle. In addition, students write the equation of a circle and graph circles in the coordinate plane.	
Unit 10 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G-C.A.	Understand and apply theorems about circles.
G-C.A.1.	Prove that all circles are similar.
G-C.A.2.	Identify and describe relationships among inscribed angles, raii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
G-C.A.3.	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
G-C.A.4.	(+) Construct a tangent line from a point outside a given circle to the circle.
G-C.B.	Find arc lengths and areas of sectors of circles.
G-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.
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
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Technology Literacy (8 or 9.4)	

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Social Emotional Learning	
Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts. • Having a growth mindset	

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- Seeking or offering support and help when needed

Unit Essential Question(s):

- How are angles and intercepted arcs of circles related?
- How are the lengths of tangents, secants, and chords related?
- How can you use circles to solve real-world problems?

Unit Enduring Understandings:

- A circle is the locus of all points in a plane equidistant from a given point, which is the center of the circle.
- A central angle of a circle has the center of the circle at its vertex, and its sides are two radii of the circle.
- The sum of the measures of the central angles of a circle with no interior points in common is 360.
- A central angle of a circle has the center of the circle as its vertex, and its sides are two radii of the circle.
- The measure of each arc is related to the measure of its central angle.
- The endpoints of a chord are also endpoints of an arc.
- An inscribed angle is an angle that has its vertex on the circle and its sides contained in chords of the circle.
- Inscribed polygons have special properties.
- A tangent intersects a circle in exactly one point, called the point of tangency.
- A line that intersects a circle in exactly two points is called a secant.
- An equation for a circle with center (h, k) and radius of r units is $(x - h)^2 + (y - k)^2 = r^2$.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework

- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

- All Things Algebra – Geometry Curriculum
- *Larson Geometry* textbook

Key Vocabulary:

- Arc length
- Arc measure
- Area
- Bisect
- Center
- Central angle
- Chord
- Circumference
- Circumscribed
- Congruent
- Diameter
- External point
- External tangent
- Inscribed angle
- Inscribed quadrilateral
- Intercepted arc
- Internal point
- Internal tangent
- Perpendicular
- Point of tangency
- Polygon
- Radius
- Secant
- Standard form
- Tangent
- Tangent line

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
10.1 Parts of Circles	• Name different parts of a circle. • Find the circumference and area of a circle. • Find the radius or diameter given the circumference or area.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
10.2 Central	• Find the central angle or the arc measure of part of a circle.	• Entry / Exit Tickets • Think-Pair-Share	1

Angles & Arc Measures		• Classwork • Homework • Lecture • Model • Scavenger Hunt	
10.3 Arc Lengths	• Find the arc length of a given arc.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
10.4 Congruent Chords & Arcs	• Determine if chords and arcs are congruent to each other.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
10.5 Inscribed Angles	• Find the measure of an inscribed angle of a circle. • Find the measure of an angle in overlapping arcs. • Find measures of angles in inscribed quadrilaterals.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
10.6 Tangents	• Find angle measures and side lengths given lines tangent to the circle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
10.7 Angles formed by Chords, Secants, & Tangents	• Find angle measures formed by intersecting chords, secants, and tangents.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
10.8 Segment Lengths formed by Chords, Secants, & Tangents	• Find segment lengths formed by intersecting chords, secants, and tangents.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

10.9 – 10.10 Equations of Circles	• Graph a circle given the equation. • Write equations of circles given the center, a point on the circle, and / or the radius of the circle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2

Teacher Notes: This unit will take approximately 14 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 11 - Overview	
Content Area: Geometry	
Unit Title: Volume & Surface Area	
Grade Level: 9 – 10	
Core Ideas: In this unit, students find areas of parallelograms, rhombi, trapezoids, and triangles. They identify the apothem of a regular polygon and use that measure to find the areas of regular polygons. They also find the areas of irregular figures, circles, and sectors and segments of circles. Students begin their exploration of solids. The basic types of geometric figures are described and their characteristics are discussed. Students represent three-dimensional figures using orthogonal drawings, corner views, and nets. They find the lateral areas of prisms, cylinders, pyramids, and cones. They also find the surface areas of these figures. Students identify the parts of a sphere and find the surface areas of spheres and hemispheres.	
Unit 11 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
G-GMD.A.	Explain volume formulas and use them to solve problems.
G-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. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*
G-GMD.2.	(+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
G-GMD.3.	Use volume formulas for cylinders, pyramids, cone, and spheres to solve problems.
G-GMD.B.	Visualize relationships between two-dimensional and three-dimensional objects.
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.
G-MG.A.	Apply geometric concepts in modeling situations.
G-MG.A.1.	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
G-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).
G-MG.A.3.	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
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7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	
9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
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Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):

- How are surface area and volume calculated and what do they represent?
- How are the surface area of similar figures related?
- How are the volume of similar figures related?

Unit Enduring Understandings:

- The surface area and volume of prisms, cylinders, pyramids, cones, and spheres can be calculated from formulas.
- There is a relationship between surface area and volume with similar solids.

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:

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Key Vocabulary:

- Apothem
- Area
- Central angle
- Composite figure

	• Cone • Cylinder • Great circle • Intercepted arc • Lateral area • Prism • Pyramid • Radius • Regular polygon • Scale factor • Sector • Slant height • Sphere

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
11.1 Area of Plane Figures	• Find the area of plane figures.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
11.2 Area of Sectors	• Find the area of sectors of a circle.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
11.3 Area of Composite Figures & Shaded Regions	• Find the area of composite figures. • Find the area of shaded regions.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
11.4 Area of Regular Figures	• Find the area of a regular polygon.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
11.5 Surface Area of	• Classify 3D figures. • Find the surface area of prisms and cylinders.	• Entry / Exit Tickets • Think-Pair-Share • Classwork	1

Prisms & Cylinders	• Solve real-world applications involving the surface area of prisms and cylinders.	• Homework • Lecture • Model • Scavenger Hunt	
11.6 Surface Area of Pyramids & Cones	• Find the surface area of pyramids and cones. • Solve real-world applications involving the surface area of pyramids and cones.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
11.7 Volume of Prisms & Cylinders	• Find the volume of prisms and cylinders. • Solve real-world applications involving the volume of prisms and cylinders.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
11.8 Volume of Pyramids & Cones	• Find the volume of pyramids and cones. • Solve real-world applications involving the volume of pyramids and cones.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
11.9 Surface Area & Volume Review	• Review surface area and volume of 3D figures. • Find the surface area and volume of composite figures.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
11.10 Volume & Surface Area of Spheres	• Find the surface area and volume of spheres. • Solve real-world applications involving the surface area and volume of spheres.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
11.11 Similar Figures & Similar Solids	• Compare the surface area and volume of two similar solids.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

11.12 Effects of Changing a Dimension	• Determine what happens to the surface area or volume of a solid when a dimension is changed.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1

Teacher Notes: This unit will take approximately 18 days, including review (1), quiz (1), and test days (2).

Additional Resources:

- Khan Academy
- Delta Math
- Desmos

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Consult student IEP	Consult student ELL plan	Enrich assignments	Consult with I & RS	Consult student 504 plan

Unit 12 - Overview	
Content Area: Geometry	
Unit Title: Probability	
Grade Level: 9 – 10	
Core Ideas: In this unit, students determine geometric probability, which is a probability that involves a geometric measure.	
Unit 12 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
S-CP.A.	Understand independence and conditional probability and use them to interpret data.
S-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").
S-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.
S-CP.A.3.	Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probnability 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.
S-CP.A.4.	Construct and interpret two-way frequency tables of data when two categories are associated with each other 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.*
S-CP.B.	Use the rules of probability to compute probabilities to compound events in a uniform probability model.
S-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.
S-CP.B.9.	(+) Use permutations and combinations to compute probabilities of compound events and solve problems.
S-MD.A.	Calculate expected values and use them to solve problems.
S-MD.A.1.	(+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

Mathematical Practices	
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Career Readiness (9.2) Life Literacies, and Key Skills (9.1, 9.4)	

9.1.12.PB.3.	Design a personal budget that will help you reach your long-term and short-term financial goals.
9.2.12.CAP.3.	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1.	Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3.	Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.CT.2.	Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.4.	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4.	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Technology Literacy (8 or 9.4)	
8.1.12.DA.1.	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.5.	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
8.1.12.DA.6.	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.1.	Design algorithms to solve computational problems using a combination of original and existing algorithms.
8.2.12.ED.6.	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ community, including but not limited to Juliette Bruce, NSF Postdoctoral Fellow at University of California, Berkeley, and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A 52:16A-88	Explore African American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African American woman to earn a Ph.D mathematics, and Elbert Frank Cox, the first African American man to earn a Ph.D in mathematics in the world.
Amistad Law NJSA 18A 52:16A-88	Discuss and analyze the movie *Hidden Figures,* the story of female African American mathematicians and engineers who worked for NASA.
Holocaust Law NJSA 18A 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from jewishjournal.com.
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist for the Lakers.
Interdisciplinary Connection	
NJSLSA.R7. *(English)*	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RH-11-12.7. *(English)*	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, qualitatively, as well as in words) in order to address a question or solve a problem.

RST.11-12.3. *(Science)*	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
6.1.12.EconEM.6.a.	Determine how supply and demand influenced price and output during the Industrial Revolution.
6.1.12.EconNE.6.a.	Analyze the impact of money, investment, credit, savings, debt, and financial institutions on the development of the nation and the lives of individuals.
6.1.12.EconGE.16.a.	Use quantitative data and other sources to assess the impact of international trade, global business organizations, and overseas competition on the United States economy and workforce.

Social Emotional Learning

Self-Awareness: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts.

- Having a growth mindset
- Developing interests and a sense of purpose

Social Awareness: The abilities to understand the perspectives of and empathize with others, include those from diverse backgrounds, cultures, & contexts.

- Recognizing strengths in others
- Recognizing situational demands and opportunities

Self-Management: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.

- Identifying and using stress-management strategies
- Exhibiting self-discipline and self-motivation
- Setting personal and collective goals
- Using planning and organizational skills

Relationship Skills: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups.

- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups
- Seeking or offering support and help when needed

Unit Essential Question(s):	**Unit Enduring Understandings:**

Evidence of Learning

Formative Assessments:

- Quizzes
- Homework
- On-the-spot check for understanding activities
- Entry / Exit ticket

Summative/Benchmark Assessment(s):

- Quizzes
- Tests
- Projects

Alternative Assessments:

- Notebook & note checks

Resources/Materials:	**Key Vocabulary:**
• All Things Algebra – Geometry Curriculum • *Larson Geometry* textbook	• Chance • Combination • Complement

	• Compound probability • Conditional probability • Dependent events • Element • Empty set • Experiment • Experimental probability • Factorial • Favorable outcome • Finite set • Fundamental Counting Principle • Geometric probability • Independent events • Infinite set • Intersection • Outcome • Permutation • Probability • Relative frequency • Sample space • Set • Subset • Theoretical probability • Tree diagram • Two-way table • Union • Universal set • Venn diagram

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
12.1 Introduction to Sets & Venn Diagrams	• Describe a collection of objects using sets. • Recognize empty sets, universal sets, complements of sets, intersection of sets, and union of sets. • Use Venn diagrams to visually show complements, intersections, and unions. • Describe subsets.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
12.2 Sample Space	• Name all possible outcomes of an experiment. • List the sample space of possible outcomes. • Use tree diagrams to show all possible outcomes.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model	1

	• Use the Fundamental Counting Principle to determine the number of outcomes of an experiment. • Determine theoretical probability and experimental probability of an experiment.	• Scavenger Hunt	
12.3 Geometric Probability	• Find the geometric probability of an event. • Find probability with lengths probability with area, and probability with volume. • Use geometric probability in real-world applications.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	2
12.4 Compound Probability	• Determine the compound probability of two or more events. • Determine the probability of independent and dependent events.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
12.5 Conditional Probability	• Find the conditional probability of an event happening, given another event has already occurred. • Use Venn diagrams to find conditional probability.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
12.6 Two-Way Tables	• Use two-way tables to organize data and find probability. • Use two-way tables to find relative frequencies.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
12.7 Permutations & Combinations	• Find permutations and combinations. • Find probability using permutations and combinations.	• Entry / Exit Tickets • Think-Pair-Share • Classwork • Homework • Lecture • Model • Scavenger Hunt	1
Teacher Notes: This unit will take approximately 12 days, including review (1), quiz (1), and test days (2).			
Additional Resources: • Khan Academy • Delta Math • Desmos			

Differentiation/Modification Strategies				
Students with Disabilities	**English Language Learners**	**Gifted and Talented Students**	**Students at Risk**	**504 Students**
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