

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Original Adoption: 2023 NJSL English Language Arts and English as a Second Language (8-21-24); Math NJSL Mathematics (8-21-24); 2020 NJSL Science, Social Studies, Career Readiness, Life Literacies & Key Skills, Computer Design & Thinking, Visual & Performing Arts, World Language, Comprehensive Health and Physical Education (5-11-22)

Created By:

Recommended Pacing Guide

Unit 1: Introduction to Geometry	33 days
Unit 2: Transformations	16 days
Unit 3: Congruence & Proofs	19 days
Unit 4: Dilations/Similar Triangles & Constructions	23 days
Unit 5: Parallelograms & Coordinate Geometry	22 days
Unit 6: Trigonometry	13 days
Unit 7: Circles	28 days
Unit 8: 3D Figures	17 days

Alignment with State Mandates

The following colors are used throughout this document to indicate areas in which the curriculum is aligned with the following NJSA requirements:

- Holocaust and genocides ([N.J.S.A. 18A:35-28](#))
- History and contributions of African-Americans (Amistad Law) ([N.J.S.A. 18A:35-4.43](#))
- Highlight and promote diversity and inclusion (Diversity & Inclusion Law) ([N.J.S.A. 18A:35-4.36a](#))
- History of disabled and LGBT persons included in middle and high school curriculum ([Section 18A:35-4.35](#))
- Climate Change - to prepare students to understand how and why climate change happens, the impact it has on our local and global communities and to act in informed and sustainable ways. Please [click here](#) for specific examples (by subject).

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Unit 1: Introduction to Geometry	33 days
<u>New Jersey Learning Standards-Mathematics</u>	
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.9.	Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i>
G.CO.C.10	Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.</i>
G.GPE.B.4.	Use coordinates to prove simple geometric theorems algebraically. <i>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, 3) lies on the circle centered at the origin and containing the point (0, 2).</i>
G.GPE.B.5.	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
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 compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
● SL.AS.9–10.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.
● RI.AA.9–10.7.	Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
Science Standards	
● HS-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
● HS-ESS2-1	Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Computer Science & Design Thinking

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- Geometric relationships are grounded in precise definitions, which provide the language needed to reason, prove, and communicate mathematical ideas.
- Coordinate geometry allows algebraic tools to verify or refute geometric claims, creating a bridge between visual intuition and formal proof. Transformations, angle relationships, and triangle theorems reveal consistent structures that hold true across all geometric figures.
- Slope serves as a powerful tool for understanding parallelism, perpendicularity, and the classification of geometric relationships in the coordinate plane.
- Proof is a method for establishing truth in mathematics, and constructing proofs develops logical reasoning that extends beyond geometry.
- Partitioning line segments and using distance relationships establish connections among ratio, similarity, and geometric modeling.
- Perimeter and area formulas arise from fundamental geometric properties and can be verified and applied efficiently through coordinate methods.
- Triangles possess unique and predictable properties that allow deeper insights into more complex geometric structures.

Essential Questions:

- How do precise geometric definitions strengthen our ability to reason, prove, and communicate mathematical ideas?
- In what ways does coordinate geometry help us verify or challenge assumptions about geometric figures?
- How do angle relationships and triangle theorems provide a foundation for proving broader geometric results?
Why does slope provide a reliable way to determine whether lines are parallel, perpendicular, or neither?
- How can algebraic methods enhance or clarify geometric reasoning in proofs and problem solving?
- What does it mean to partition a segment in a given ratio, and why is this concept useful in geometric modeling?
- How can we use coordinate tools to compute perimeter and area efficiently, even when shapes are irregular or positioned in varied ways?
- Why is the ability to construct and critique proofs essential for developing a deep understanding of geometry?

Content

Students will know...

- Types of geometric objects and how to measure them
- Midpoint formula
- Slope formula
- Parallel and perpendicular lines
- Partitioning line segments
- Ratios
- Distance formula
- Right angles are 90 degrees
- Linear pairs/a straight line is 180 degrees
- A complete angle is 360
- Vertical angles are always congruent
- Parallel lines intersected by a transversal create

Skills

Students will be able to ...

- Identify a given object, name, and label it
- Use a written description in geometric notation to draw a geometric figure
- Write statements using geometric notation to describe a given diagram
- Find a midpoint of a line segment on a graph
- Find a midpoint of a line segment using the coordinates only
- Find a missing endpoint of a line segment, using the coordinates of the midpoint and other endpoint.
- Calculate the slope of a given line or segment using the graph or slope formula
- Determine the slope of a line parallel or

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

alternate interior angles, alternate exterior angles, and corresponding angles, which are congruent, and consecutive angles, which are supplementary

- Segment addition and angle addition postulates
- Midpoints cut a line segment into two congruent parts
- Triangle angles add up to 180
- Angles in a triangle are related to the sides opposite them
- External angles are equal to the sum of the non-adjacent interior angles
- Equilateral triangles have 3 congruent sides and 3 congruent angles (60 degrees)
- Isosceles triangles have 2 congruent sides (legs) and the angles opposite them are congruent as well (base angles)

perpendicular to a given line

- Determine if two given line segments are parallel, perpendicular, or have no relationship
- Write the equation of a line that is parallel or perpendicular to a given line through a given point
- Find the partition point of a directed line segment on a number line, using fractions or ratios
- Find the partition point of a directed line segment on a graph, using a given fraction or ratio
- Explain the connection between the pythagorean theorem and distance
- Calculate the length of a line segment using the coordinates of the end points
- Identify the type of angle relationships demonstrated in a geometric figure
- Generate a figure demonstrating a given angle relationship
- Calculate the values of designated angles using angle relationships
- Write and solve equations algebraically using angle and segment relationships
- Identify specific types of triangles and angle types within the triangles
- Solve for the value of missing angle in the triangle
- Write and solve equations using triangle properties - both angles and sides.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- [HS-G.CO Activities](#)
- [HS-G.GPE Activities](#)

Supplemental resources:

- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- www.desmos.com
- www.kahoot.com
- www.quizizz.com
- <https://www.deltamath.com>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- [Mathematicians](#)
- <https://www.radicalmath.org/math-social-justice>
- [African Americans in Math](#)
- [Alan Turing Gizmos Grades 9-12](#)

Suggested Accommodations**English Language Learners:**

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 2: Transformations	16 days
<u>New Jersey Learning Standards-Mathematics</u>	
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.GO.A.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch)
G.CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
G.CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments.
G.CO.A.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another
G.CO.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.

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Standards of Mathematical Practices

MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
<ul style="list-style-type: none"> ● SL.AS.9–10.6. 	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.
<ul style="list-style-type: none"> ● RI.AA.9–10.7. 	Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
Science Standards	
<ul style="list-style-type: none"> ● HS-ETS1-2 	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
<ul style="list-style-type: none"> ● HS-ESS1-1 	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun’s core to release energy that eventually reaches Earth in the form of radiation.

Computer Science & Design Thinking	
8.1 Computer Science	
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim. 	
8.2 Design Thinking	
<ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. ● 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. ● 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). 	

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- Rigid motions preserve distance and angle, which allows us to define and justify congruence in a precise and mathematically consistent way.
- Transformations can be represented as functions that map every point in the plane to a new location, revealing patterns and structure in geometric relationships.
- The properties of figures, such as symmetry and invariance, determine how they behave under rotations, reflections, and translations.

Essential Questions:

- How do rigid motions help us decide whether two figures are truly congruent?
- In what ways can transformations be viewed as functions, and how does this perspective help us analyze geometric behavior?
- Why do precise definitions of lines, angles, distance, and circles matter when describing or performing transformations?
- How can we predict the effect of a given transformation on a figure, and what patterns emerge from these predictions?

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Understanding precise geometric definitions is essential because transformations rely on fundamental concepts like angle, line, distance, and circle.
- Any congruence relationship between two figures can be demonstrated through a sequence of rigid motions, which links visual intuition to formal justification.
- Symmetry in polygons and other shapes provides predictable transformation behavior that helps classify and analyze geometric structures.
- Dynamic geometry tools and coordinate representations deepen understanding by allowing transformations to be visualized and verified.
- Transformations provide a foundation for later work in proofs, similarity, trigonometry, and modeling because they establish how and why shapes can be moved without altering their essential properties.

- What does it mean for a transformation to preserve distance and angle, and why is this preservation important?
- How can a sequence of transformations demonstrate that two shapes are congruent even when they appear different at first glance?
- How do symmetries of polygons help us understand which transformations will map a figure onto itself?
- How do tools like graph paper, tracing paper, or geometry software enhance our ability to explore and justify transformations?

Content

Students will know...

- Transformations as functions (e.g. $F(P)$ is the image of point P created by transformation F).
- Impact of transformations on figures in the plane.
- Congruence in terms of rigid motion
- Triangle congruence in terms of rigid motion
- Criteria for triangle congruence

Skills

Students will be able to ...

- Represent transformations in the plane using transparencies, describe and explain transformations as functions, and compare rigid transformations to dilations, horizontal stretches and vertical stretches.
 - Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself, and identify lines of symmetry.
 - Develop formal definitions of rotations, reflections, and translations
 - Draw transformed figures using graph paper, tracing paper, and/or geometry software and identify a sequence of transformations required in order to map one figure onto another.
 - Use rigid transformations to determine and explain congruence of geometric figures.
 - Show and explain that two triangles are congruent by using corresponding pairs of sides and corresponding pairs of angles, and by using rigid motions (transformations).
 - Show and explain how the criteria for triangle congruence extend from the definition of congruence in terms of rigid motion.

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- [HS-G.CO Activities](#)

Supplemental resources:

- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- www.desmos.com
- www.kahoot.com
- www.quizizz.com
- <https://www.deltamath.com>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- <https://www.radicalmath.org/math-social-justice>
- [African Americans in Math](#)
- [Alan Turing Gizmos Grades 9-12](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating

- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Unit 3: Congruence & Proofs	19 days
<u>New Jersey Learning Standards-Mathematics</u>	
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.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.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.C.10	Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180° ; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models,

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

	<p>ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)</p> <ul style="list-style-type: none"> ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
● SL.AS.9–10.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.
● RI.AA.9–10.7.	Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
Science Standards	
● HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
● HS-ESS2-3	Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection.

Computer Science & Design Thinking

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Knowledge & Skills

Enduring Understandings:

- Rigid motions provide a precise foundation for defining congruence, allowing geometric relationships to be justified rather than assumed.
- Triangle congruence criteria emerge naturally from the properties of rigid motions and form the basis for many geometric proofs.
- Angle and line theorems reveal consistent structures in the plane, supporting logical reasoning about how figures relate to one another.
- Proof is a systematic method for establishing truth in mathematics, strengthening the ability to justify claims with clarity and precision.
- Congruent triangles serve as powerful tools for proving additional relationships such as parallel lines, bisectors, and midsegments.
- Understanding properties of lines, angles, and triangles enables students to analyze complex geometric configurations with confidence.
- The relationships within a triangle, including its angle sum and special segments, are predictable and interconnected in ways that support broader geometric reasoning.
- Logical arguments in geometry mirror reasoning used across disciplines, reinforcing the importance of evidence, structure, and justification.

Essential Questions:

- How do rigid motions help us understand what it truly means for two figures to be congruent?
- Why do the triangle congruence criteria (ASA, SAS, SSS) follow directly from the definition of congruence?
- How can congruent triangles be used to prove new results about lines, angles, and other geometric relationships?
- What makes a geometric proof convincing, and why is proof essential for establishing certainty in mathematics?
- How do angle relationships change when lines intersect or when a transversal crosses parallel lines?
- Why is the angle sum of a triangle always 180 degrees, and what does this tell us about the structure of the plane?
- How do special segments in a triangle (medians, midsegments, bisectors) reveal deeper patterns and relationships?
- In what ways does constructing logical arguments in geometry strengthen reasoning skills that apply beyond mathematics?

Content

Students will know...

- The definition of congruence in terms of rigid motions and how transformations preserve distance and angle measure.
- The criteria for triangle congruence (SSS, SAS, ASA, AAS, HL) and how they are derived.
- How to identify corresponding parts of congruent figures and use proper geometric notation.
- The theorems related to lines, angles, and triangles, including the Vertical Angles Theorem, Triangle Sum Theorem, Isosceles Triangle Theorem, and Midsegment Theorem.
- That CPCTC (Corresponding Parts of Congruent Triangles are Congruent) is used as a logical extension of triangle congruence in proofs.
- The structure and components of a formal proof,

Skills

Students will be able to ...

- Identify and label congruent figures, sides, and angles using proper geometric notation.
- Determine and justify triangle congruence using appropriate postulates (SSS, SAS, ASA, AAS, HL).
- Construct and complete formal two-column proofs involving triangle congruence and geometric relationships.
- Apply geometric theorems to prove relationships among lines, angles, and triangles.
- Use features of a diagram (reflexive property, vertical angles, shared segments) as part of logical reasoning in proofs.
- Integrate algebraic reasoning (substitution, addition, subtraction) with geometric reasoning to complete proofs.
- Use CPCTC to extend triangle congruence to

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

including statements, reasons, and justification of each step.

- How segment and angle relationships (addition, subtraction, partitioning, and midpoint properties) support geometric proofs.
- That reasoning, precision, and notation are essential for communicating mathematical arguments effectively.

additional corresponding parts or polygons.

- Communicate proofs logically and clearly, providing justification for every statement using definitions, postulates, and theorems.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- [HS-G.CO Activities](#)

Supplemental resources:

- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- www.desmos.com
- www.kahoot.com
- www.quizizz.com
- <https://www.deltamath.com>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- <https://www.radicalmath.org/math-social-justice>
- [African Americans in Math](#)
- [Alan Turing Gizmos Grades 9-12](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions

- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Unit 4: Dilations/Similar Triangles & Constructions	23 days
<u>New Jersey Learning Standards-Mathematics</u>	
G.CO.C.9.	Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i>
G.CO.C.10	Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.</i>
G.CO.C.11.	Prove theorems about parallelograms. <i>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.</i>
G.SRT.A.1 G.SRT.A.1a G.SRT.A.1b	Verify experimentally the properties of dilations given by a center and a scale factor: A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
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.4.	Prove theorems about triangles. <i>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</i>
G.SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

	<ul style="list-style-type: none"> ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
<ul style="list-style-type: none"> ● SL.AS.9–10.6. 	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.
<ul style="list-style-type: none"> ● RI.AA.9–10.7. 	Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Science Standards	
<ul style="list-style-type: none"> ● HS-PS4-1 	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
<ul style="list-style-type: none"> ● HS-ETS1-3 	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Computer Science & Design Thinking

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

<ul style="list-style-type: none"> ● DOL ● Quiz Classwork ● NJSLA Released questions ● Problem of the Day 	
Summative Assessments: <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	Benchmark Assessments: <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment

Knowledge & Skills	
Enduring Understandings: <ul style="list-style-type: none"> ● Dilations and similarity transformations preserve angle measures while changing side lengths proportionally, allowing figures to maintain their fundamental shape even as they scale. ● Similarity provides a powerful tool for analyzing geometric relationships, proving theorems, and solving problems involving proportional reasoning. ● The AA similarity criterion emerges naturally from the properties of dilations and angle relationships, demonstrating the deep structure of triangles. ● Many geometric theorems about lines, angles, triangles, and parallelograms can be explained or justified using similarity and proportional reasoning. ● Constructions and proofs reveal underlying geometric patterns, helping students understand why certain relationships always hold true. ● The Pythagorean Theorem and other major results gain meaning when derived through similarity rather than memorization alone. ● Understanding how parallel lines create proportional segments strengthens students' ability to analyze complex figures and justify relationships. ● Similarity and congruence criteria form a unified system of reasoning that supports problem solving, modeling, and formal proof. 	Essential Questions: <ul style="list-style-type: none"> ● How do dilations change a figure, and what properties remain unchanged under these transformations? ● What does it mean for two figures to be similar, and how can similarity transformations justify that relationship? ● Why is the AA criterion sufficient to guarantee triangle similarity, and what does this reveal about the structure of triangles? ● How do parallel lines create proportional relationships in triangles, and how can this be used to solve problems? ● In what ways do similarity and congruence principles help us prove deeper geometric theorems about triangles and parallelograms? ● How can the Pythagorean Theorem be understood through similarity rather than through algebraic manipulation alone? ● Why are constructions an essential part of geometric reasoning, and how do they support clear, logical proof? ● How does understanding similarity improve our ability to analyze, model, and predict geometric relationships in real-world contexts?

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Content

Students will know...

- Dilation of a line that passes through the center of dilation results in the same line.
- Dilation of a line that does not pass through the center of dilation results in a line that is parallel to the original line.
- Dilation of a line segment results in a longer line segment when, for scale factor k , $|k|$ is greater than 1.
- Dilation of a line segment results in a shorter line segment when, for scale factor k , $|k|$ is less than 1.
- Similarity transformations are used to determine the similarity of two figures.
- Angle-Angle criterion for similarity
- A formal proof may be represented with a paragraph proof or a two-column proof.
- Corresponding parts of congruent triangles are congruent (CPCTC)

Skills

Students will be able to ...

- Verify the properties of dilations given by a center and a scale factor.
- Use the definition of similarity in terms of similarity transformations to decide if two given figures are similar and explain, using similarity transformations, the meaning of triangle similarity.
- Use the properties of similarity transformations to establish the Angle-Angle criterion for two triangles to be similar.
- Construct and explain formal proofs of theorems involving lines, angles, triangles, and parallelograms.
- Prove theorems about triangles.
- Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- [HS-G.CO Activities](#)
- [HS-G.SRT Activities](#)

Supplemental resources:

- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- www.desmos.com
- www.kahoot.com
- www.quizizz.com
- <https://www.deltamath.com>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- <https://www.radicalmath.org/math-social-justice>
- [African Americans in Math](#)
- [Alan Turing Gizmos Grades 9-12](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information

- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available

- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 5: Parallelograms & Coordinate Geometry	22 days
<u>New Jersey Learning Standards-Mathematics</u>	
G.CO.C.9.	Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i>
G.CO.C.10.	Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.</i>
G.CO.C.11	Prove theorems about parallelograms. <i>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.</i>
G.GPE.B.4	Use coordinates to prove simple geometric theorems algebraically. <i>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, 3) lies on the circle centered at the origin and containing the point (0, 2).</i>
G.GPE.B.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
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 compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

<u>Standards of Mathematical Practices</u>	
MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s personal traits, strengths, and limitations Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> Recognize the skills needed to establish and achieve personal and educational goals Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
<ul style="list-style-type: none"> SL.AS.9–10.6. 	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.
<ul style="list-style-type: none"> RI.AA.9–10.7. 	Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
Science Standards	
<ul style="list-style-type: none"> HS-LS1-2 	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
<ul style="list-style-type: none"> HS-PS2-1 	Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Computer Science & Design Thinking	
8.1 Computer Science	
<ul style="list-style-type: none"> 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim. 	
8.2 Design Thinking	
<ul style="list-style-type: none"> 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). 	

Career Readiness, Life Literacies & Key Skills	
9.1 Personal Financial Literacy	
<ul style="list-style-type: none"> 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.” 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products. 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising. 	

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- Geometric relationships among lines, angles, and triangles provide the logical foundation for analyzing and proving properties of more complex figures, including parallelograms.
- Parallelograms have predictable and interconnected properties that can be established through deductive reasoning and used to solve geometric problems.
- Coordinate geometry offers algebraic methods to verify geometric relationships, allowing students to prove or disprove conjectures with precision.
- Slope is a powerful tool for identifying parallel and perpendicular lines, supporting both geometric reasoning and real-world modeling.
- Partitioning and measuring segments on the coordinate plane strengthens students'

Essential Questions:

- How do the properties of lines and angles help us prove deeper geometric results about triangles and parallelograms?
- What characteristics define a parallelogram, and how can we prove that a given quadrilateral meets those conditions?
- How does coordinate geometry allow us to verify geometric relationships more precisely than with diagrams alone?
- Why is slope an effective tool for determining whether lines are parallel, perpendicular, or neither?
- How can partitioning a segment in a given ratio help us solve real-world and geometric problems?
- In what ways do distance and coordinate methods help us calculate perimeters and areas of polygons?

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

<p>understanding of proportionality and spatial structure.</p> <ul style="list-style-type: none"> ● The distance formula and coordinate methods allow perimeters and areas of polygons to be computed accurately, supporting mathematical modeling. ● Geometry and algebra work together in coordinate proofs, revealing deeper patterns and strengthening students' ability to justify mathematical relationships. ● Understanding these geometric concepts supports broader skills in scientific modeling, engineering design, and spatial analysis. 	<ul style="list-style-type: none"> ● How do algebraic and geometric reasoning complement one another when constructing coordinate proofs? ● How can understanding these geometric relationships enhance our ability to model and analyze real-world phenomena?
---	--

<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● The definitions and distinguishing properties of all quadrilaterals, including parallelograms, rectangles, rhombi, and squares. ● The angle-sum relationship for polygons and how it is derived from the triangle sum theorem. ● The characteristics of parallelograms: opposite sides and angles congruent, diagonals that bisect, and consecutive angles supplementary. ● That rectangles have congruent diagonals and right angles, rhombi have perpendicular diagonals and all sides congruent, and squares share both sets of properties. ● How to use coordinate geometry formulas (distance, midpoint, slope) to verify parallelism, perpendicularity, congruence, and bisected diagonals. ● How to apply the Slope, Distance, and Midpoint Formulas to justify classifications of quadrilaterals on the coordinate plane. ● That perimeter and area can be computed algebraically from vertex coordinates. ● How to construct and justify formal proofs demonstrating a figure's classification as a specific type of quadrilateral. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Derive and explain the angle-sum formula for any polygon, focusing on quadrilaterals. ● Identify and classify parallelograms and their special cases by analyzing side, angle, and diagonal relationships. ● Apply properties of parallelograms, rectangles, rhombi, and squares to find unknown side and angle measures. ● Prove relationships among sides, angles, and diagonals using deductive reasoning and two-column proofs. ● Use coordinate geometry to verify geometric relationships and classify figures based on calculated measures. ● Compute area and perimeter of quadrilaterals and other polygons in the coordinate plane using algebraic methods. ● Write and justify proofs that verify whether a quadrilateral meets the conditions of a parallelogram, rectangle, rhombus, or square. ● Explain reasoning clearly through precise notation, diagrams, and logical statements connecting algebraic and geometric evidence.
--	--

Core Instructional & Supplemental Materials
--

<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● HS-G.CO Activities ● HS-G.GPE Activities 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● www.desmos.com
---	--

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- www.kahoot.com
- www.quizizz.com
- <https://www.deltamath.com>
- <https://www.ixl.com/math>
- <https://nj.digitalitemlibrary.com/home>
- <https://www.radicalmath.org/math-social-justice>
- [African Americans in Math](#)
- [Alan Turing Gizmos Grades 9-12](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books

- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 6: Trigonometry	13 days
<u>New Jersey Learning Standards-Mathematics</u>	
G.SRT.C.6.	Understand that by similarity, side ratios in right triangles are 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.

[Standards of Mathematical Practices](#)

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards

Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
-----------------------	---

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

<u>Interdisciplinary Connections</u>	
ELA Standards	
● SL.AS.9–10.6.	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.
● RIAA.9–10.7.	Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
Science Standards	
● HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
● HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

<u>Computer Science & Design Thinking</u>
8.1 Computer Science
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
8.2 Design Thinking
<ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. ● 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. ● 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

<u>Career Readiness, Life Literacies & Key Skills</u>
9.1 Personal Financial Literacy
<ul style="list-style-type: none"> ● 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.” ● 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products. ● 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- Right triangle similarity provides the foundation for defining trigonometric ratios, which describe consistent relationships between angles and side lengths.
- Trigonometric ratios capture predictable patterns in how angles relate to distances and heights, allowing real-world situations to be modeled with precision.
- The sine and cosine of complementary angles are interconnected, revealing underlying symmetry in right-triangle relationships.
- Trigonometry extends geometric reasoning to practical applications, including measurement, modeling, navigation, surveying, and scientific analysis.

Essential Questions:

- How do triangle similarity and proportionality lead to the definitions of the trigonometric ratios?
- Why do different right triangles with the same acute angle produce the same trigonometric ratios?
- How are the sine and cosine of complementary angles related, and why does this relationship matter?
- How can trigonometric ratios and the Pythagorean Theorem help us determine unknown distances and angles in real-world situations?
- In what ways does trigonometry extend geometric reasoning beyond the context of triangles?
- How do we decide which trigonometric ratio to use when solving a particular applied problem?
- How does changing the angle in a right triangle affect the values of sine, cosine, and tangent, and what does this reveal about real-world patterns?

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

<ul style="list-style-type: none"> ● The Pythagorean Theorem and trigonometric ratios work together to solve real-world problems involving unknown angles, distances, and elevations. ● Small changes in angle can produce significant changes in real-world outputs, helping students understand how trigonometry connects mathematics to physical systems. ● Trigonometric reasoning strengthens logical thinking, supporting deeper work in geometry, precalculus, physics, and environmental modeling. 	<ul style="list-style-type: none"> ● Why is trigonometry an essential mathematical tool for scientific modeling, engineering design, and environmental analysis?
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Side ratios in right triangles are properties of the angles in the triangle. ● Relationship between sine and cosine of complementary angles 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Use coordinates to prove simple geometric theorems algebraically. ● Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems. <ul style="list-style-type: none"> ● Find the point on a directed line segment between two given points that partitions the segment in a given ratio and use coordinates to compute perimeters of polygons and areas of triangles and rectangles. ● Show and explain that definitions for trigonometric ratios derive from similarity of right triangles. ● Explain and use the relationship between the sine and cosine of complementary angles; use trigonometric ratios and the Pythagorean Theorem to compute all angle measures and side lengths of triangles in applied

Core Instructional & Supplemental Materials
--

<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● HS-G.SRT Activities 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● www.desmos.com ● www.kahoot.com ● www.quizizz.com ● https://www.deltamath.com ● https://www.ixl.com/math ● https://nj.digitalitemlibrary.com/home ● https://www.radicalmath.org/math-social-justice ● African Americans in Math ● Alan Turing Gizmos Grades 9-12
---	---

Suggested Accommodations**English Language Learners:**

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 7: Circles	28 days
<u>New Jersey Learning Standards-Mathematics</u>	
G.C.A.1.	Prove that all circles are similar.
G.C.A.2.	Identify and describe relationships among inscribed angles, radii, 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.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.
G.GPE.A.1 (+)	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

[Standards of Mathematical Practices](#)

MP1. Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers
--	---

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

	<ul style="list-style-type: none"> ● Ask themselves the question: “Does this make sense?”
MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards

Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Interdisciplinary Connections

ELA Standards

- | | |
|--|---|
| <ul style="list-style-type: none"> ● SL.AS.9–10.6. | Adapt speech to a variety of contexts and tasks, demonstrating command of formal English. |
| <ul style="list-style-type: none"> ● RI.AA.9–10.7. | Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning. |

Science Standards

- | | |
|--|---|
| <ul style="list-style-type: none"> ● HS-ESS1-4 | Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. |
| <ul style="list-style-type: none"> ● HS-PS4-3 | Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other |

Computer Science & Design Thinking

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.illustrativemathematics.org/>
- <https://www.khanacademy.org/>
- <https://www.engageny.org>

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- All circles share fundamental proportional relationships, which allows them to be classified as similar regardless of size.
- Angle relationships within a circle reveal predictable patterns among chords, tangents, radii, and arcs that support deeper geometric reasoning.
- The equation of a circle is derived from the Pythagorean relationship, linking algebraic and geometric representations of distance.
- Inscribed, central, and circumscribed angles each describe different perspectives on the same circular structure, yet follow consistent mathematical rules.
- Arc length and sector area depend on proportional relationships between an angle and the entire circle, leading to radian measure as a natural unit.
- Understanding circles involves connecting algebraic models, geometric diagrams, and transformational reasoning, reinforcing the coherence of mathematical ideas.

Essential Questions:

- What makes all circles similar, and why is this similarity important in geometry?
- How do relationships among inscribed angles, central angles, chords, and tangents reveal deeper structure within a circle?
- How does the Pythagorean Theorem lead to the algebraic equation of a circle, and why is this representation useful?
- In what ways do inscribed and circumscribed circles help us understand triangle properties and polygon relationships?
- Why is radian measure a natural way to describe angles, and how does it connect arc length, angle measure, and sector area?
- How can properties of circles help us solve complex geometric and real-world problems?
- How do geometric constructions and proofs strengthen our understanding of circular relationships?
- How do algebraic and geometric perspectives on circles complement each other to deepen mathematical understanding?

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

<ul style="list-style-type: none"> Circle theorems provide tools for analyzing real-world circular systems, including rotation, navigation, periodic motion, and spatial design. 	
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> Similarity of all circles A proportional relationship exists between the length of an arc that is intercepted by an angle and the radius of the circle. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> Derive the equation of a circle given the center and radius using the Pythagorean Theorem. Given an equation, complete the square to find the center and radius of the circle. <ul style="list-style-type: none"> Prove that all circles are similar Identify and describe relationships among inscribed angles, radii, and chords; use these relationships to solve problems. Find arc lengths and areas of sectors of circles; use similarity to show that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector. Prove the properties of angles for a quadrilateral inscribed in a circle and construct inscribed and circumscribed circles of a triangle using geometric tools and geometric software.

Core Instructional & Supplemental Materials
--

<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> HS-G.C Activities HS-G.GPE Activities 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> https://www.illustrativemathematics.org/ https://www.khanacademy.org/ www.desmos.com www.kahoot.com www.quizizz.com https://www.deltamath.com https://www.ixl.com/math https://nj.digitalitemlibrary.com/home https://www.radicalmath.org/math-social-justice African Americans in Math Alan Turing Gizmos Grades 9-12
--	---

Suggested Accommodations

<p>English Language Learners:</p> <ul style="list-style-type: none"> Multi-Sensory Instruction Flexible Grouping

- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 8: 3D Figures	17 days
<u>New Jersey Learning Standards-Mathematics</u>	
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.A.3.	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
G.GMD.B.4.	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
G.MG.A.1	Use geometric shapes, their measures, and properties to describe objects and solve modeling problems. (e.g., modeling a tree trunk or a human torso as a cylinder).
G.MG.A.2	Apply concepts of density derived from area and volume in modeling situations. (e.g., persons per square mile, BTUs per cubic foot).

Standards of Mathematical Practices

<p>MP1. Make sense of problems and persevere in solving them</p>	<ul style="list-style-type: none"> ● Find meaning in problems ● Look for entry points ● Analyze, conjecture and plan solution pathways ● Monitor and adjust ● Verify answers ● Ask themselves the question: “Does this make sense?”
---	---

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

MP2. Reason abstractly and quantitatively.	<ul style="list-style-type: none"> ● Make sense of quantities and their relationships in problems ● Learn to contextualized and decontextualized ● Create coherent representations of problems
MP3. Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> ● Understand and use information to construct arguments ● Make and explore the truth of conjectures ● Recognize and use counterexamples ● Justify conclusions and respond to arguments of others
MP4. Model with Mathematics.	<ul style="list-style-type: none"> ● Apply mathematics to problems in everyday life ● Make assumptions and approximations ● Identify quantities in a practical situation ● Interpret results in the context of the situation and reflect on whether the results make sense
MP5. Use appropriate tools strategically	<ul style="list-style-type: none"> ● Consider the available tools when solving problems ● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools) ● Make sound decisions of which of these tools might be helpful
MP6. Attend to precision.	<ul style="list-style-type: none"> ● Communicate precisely to others ● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes ● Calculate accurately and efficiently
MP7. Look for and make use of structure.	<ul style="list-style-type: none"> ● Discern patterns and structures ● Can step back for an overview and shift perspective ● See complicated things as single objects or as being composed of several objects

Social and Emotional Learning Standards

Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

Interdisciplinary Connections

ELA Standards	
<ul style="list-style-type: none"> ● SL.AS.9–10.6. 	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English.
<ul style="list-style-type: none"> ● RI.AA.9–10.7. 	Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
Science Standards	
<ul style="list-style-type: none"> ● HS-ESS2-2 	Analyze geoscience data to make the claim that one change to Earth’s surface can create feedback that causes changes to other Earth systems.
<ul style="list-style-type: none"> ● HS-LS1-1 	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

Computer Science & Design Thinking

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

Evidence of Student Learning	
<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Oral Questioning ● Student Conference ● Self-Assessment ● Hand Signals ● Communicators ● Graphic Organizers ● Teacher Observation ● DOL ● Quiz Classwork ● NJSLA Released questions ● Problem of the Day 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Teacher-Created Projects ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● https://www.engageny.org
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment

Knowledge & Skills	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Volume and surface-area formulas arise from logical geometric reasoning, including dissection arguments, Cavalieri’s Principle, and relationships among two- and three-dimensional shapes. ● Three-dimensional objects can be understood through their two-dimensional cross-sections, which reveal structural properties and connect geometry to real-world modeling. ● Mathematical modeling with volume, surface area, and geometric approximations allows us to represent real objects such as trees, buildings, containers, and natural formations. ● Density connects area, volume, and quantity, enabling comparisons and predictions in situations involving mass, population, energy, and environmental systems. ● Geometry provides tools for analyzing change and variation in three-dimensional space, reinforcing the relationship between spatial reasoning and scientific or engineering applications. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● How do geometric principles such as Cavalieri’s Principle help us understand and justify formulas for volume and surface area? ● What can two-dimensional cross-sections reveal about the structure, composition, or function of a three-dimensional object? ● How does rotating a two-dimensional figure create a three-dimensional solid, and why is this useful for modeling real-world objects? ● In what ways can we use geometric shapes to model complex physical structures, both natural and human-made? ● How does understanding density help us interpret or predict real-world phenomena involving mass, energy, or population distribution? ● How can volume formulas help us solve meaningful problems involving storage, capacity, natural resources, or environmental change? ● Why are geometric reasoning and spatial visualization essential for solving problems across mathematics, science, and engineering?

Lakewood School District Curriculum Guide

Grade: High School	Content Area: Mathematics - Geometry
---------------------------	---

<ul style="list-style-type: none"> ● Understanding geometric structure deepens students' ability to solve practical problems, from designing objects to interpreting scientific models and environmental data. 	<ul style="list-style-type: none"> ● How do geometric models help us analyze and interpret situations involving three-dimensional change over time?
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● The formulas for surface area and volume of prisms, cylinders, pyramids, cones, and spheres, and the geometric reasoning behind them. ● How 2-D shapes generate 3-D figures through rotation or translation, and how cross-sections relate to these solids. ● The meaning of density as a ratio that links mass (or quantity) to volume or area. ● The difference between surface area and volume, and when each is used in problem solving. ● That height must be perpendicular to the base when calculating volume. ● How units of measure (linear, square, cubic) connect across dimensions and impact accuracy in contextual problems. ● The role of geometric modeling in solving real-world problems involving construction, packaging, and material efficiency. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Derive and justify formulas for surface area and volume of prisms, cylinders, pyramids, cones, and spheres through informal reasoning and decomposition. ● Calculate surface area and volume of 3D figures using algebraic substitution and appropriate units. ● Visualize and describe solids formed by rotating two-dimensional figures about an axis and identify cross-sections of common solids. ● Apply formulas and geometric relationships to solve real-world problems involving volume, surface area, and density. ● Convert and manipulate units to maintain consistency in multi-step word problems. ● Use proportional reasoning to determine how changes in dimensions affect surface area and volume. ● Model real-world contexts using 3D geometry, applying reasoning to practical examples such as storage, construction, and fluid capacity. ● Explain and justify reasoning verbally and in writing, demonstrating conceptual understanding and procedural accuracy.

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● HS-G.GMD Activities ● HS-G.MG Activities 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● https://www.illustrativemathematics.org/ ● https://www.khanacademy.org/ ● www.desmos.com ● www.kahoot.com ● www.quizizz.com ● https://www.deltamath.com ● https://www.ixl.com/math ● https://nj.digitalitemlibrary.com/home ● https://www.radicalmath.org/math-social-justice ● African Americans in Math ● Alan Turing Gizmos Grades 9-12

Suggested Accommodations**English Language Learners:**

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments

Lakewood School District Curriculum Guide

Grade: High School

Content Area: Mathematics - Geometry

- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background