Course: *Geometry*
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Board Approval: September 2023
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Section I: Course Description

Geometry will explore our physical world through the study of points, line planes, and other geometric figures. Through the course, students will develop an in-depth understanding of fundamental geometric vocabulary, constructions, and two- and three-dimensional figures. Students will extend their geometric knowledge foundation established in grades 6-8 to coordinate geometry, trigonometry, and measurement formulas. Real-world applications provide evidence that the study of geometry is an important aspect of our physical world and the knowledge acquired has practical applications that extend beyond our classroom. These connections include links to architecture and engineering, computer graphics and design, cartography, art, 3D printing, medicine, and astronomy.

Section II: NJSLS: New Jersey Student Learning Standards/Learning Objectives

1. **2023 New Jersey Student Learning Standards – Mathematics:**
   - "A New Jersey education in Mathematics builds quantitatively and analytically literate citizens prepared to meet the demands of college and career, and to engage productively in an information-driven society; …A high-quality mathematics education fosters a population that…leverages data in decision-making and as a lens for discussing, analyzing, and responding to practical questions, persists to make sense of and model problems arising in everyday life, society, and the workplace, thinks critically and strategically to assess quantitative relationships and to solutions to complex problems, employs precise reasoning and constructs viable arguments to deduce conclusions, recognize false statements and assess peers' reasoning, interprets, evaluates and critiques the mathematics embedded in social, scientific and commercial systems, as well as the claims made in the private and public sectors, communicates precisely when conveying, representing, and justifying both qualitative and quantitative perspectives."

2. **2023 New Jersey Student Learning Standards English Language Arts:**
   - A New Jersey education in English Language Arts builds readers, writers, and communicators prepared to meet the demands of college and career and to engage as productive American citizens with global responsibilities. …Students will develop the necessary skills in reading, writing, speaking, and listening that are the foundations for creative and purposeful expression in language read rich, challenging texts that build their knowledge of the world, grow their confidence and identities as readers, and develop critical thinking skills and vocabulary necessary for long-term success[; e]ngage in regular, meaningful, writing authentic tasks, exploring valued topics, writing for impact and expression, and sharing their work with others (including authentic audiences) leverage complex texts and digital media to develop comprehension, active listening, and discussion skills ground daily writing and discussion in evidence, fostering an ability to read critically, build arguments, cite evidence, and communicate ideas to contribute meaningfully as productive citizens evaluate the reliability, credibility, and perspective of authors and speakers across all forms of media express ideas and knowledge through a variety of modalities and media, and serve as effective communicators who purposefully read, write, and speak across multiple disciplines [and l]earn to persist in reading complex texts, establishing lifelong habits to read voluntarily for pleasure, for further education, for information on public policy, and for advancement in the workplace.

3. **Standard 8.1 (Computer Science) and 8.2 (Design Thinking) of the 2020 NJSLS:**
   - "The 'Intent and Spirit of the Computer Science and Design Thinking Standards' is to focus on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers."

4. **Standard 9.4 (Life Literacies and Key Skills) of the 2020 NJSLS:**
   - "This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy."
   - ***Climate Change:** The state of New Jersey has mandated instruction in, "Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs."

5. *Amistad Law: N.J.S.A. 18A 52:16A-88:*
   ○ The inclusion of lessons and resources/texts dealing with the African slave trade, slavery in America, the vestiges of slavery in this country, and the contributions of African Americans to our society will be implemented in English and Social Studies courses in accordance with state law: "Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students."

6. *Holocaust Law: N.J.S.A. 18A 35-28:*
   ○ The inclusion of lessons and resources/texts that enable pupils to identify and analyze applicable theories concerning human nature and behavior; to understand that genocide is a consequence of prejudice and discrimination; and to understand that issues of moral dilemma and conscience have a profound impact on life will be implemented in English and Social Studies courses in accordance with state law: "Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens."

7. *LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35:*
   ○ A transformative approach to the inclusion of lessons and resources/texts on the contributions and issues concerning the LGBTQ+ population and people with disabilities will be implemented across all core subjects in accordance with state law: "A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35."

8. *Asian American and Pacific Islanders Legislation: N.J.S.A 4021/A6100:*
   ○ The inclusion of lessons and resources/texts on the history and contributions of Asian Americans and Pacific Islanders will enable New Jersey's schools to provide a curriculum that reflects the diversity of our state. In accordance with state law: "A board of education shall include instruction on the history and contributions of Asian Americans and Pacific Islanders in an appropriate place in the curriculum of students in grades kindergarten through as part of the school district's implementation of the New Jersey Student Learning Standards in Social Studies."

9. Acquisition/development/refinement of the higher-order critical thinking skills aligned with the *Revised Bloom's Taxonomy of Cognitive Objectives*

Section III: Curriculum Modifications

The *Geometry Curriculum* is subject to case-by-case modifications to support/advance the needs of all students, including special education students, English language learners, gifted students, and those at risk of school failure. These modifications are based on Individualized Learning Programs (IEPs), recommendations made by the district's English Language Learners (ELL) coordinator, feedback from members of the Intervention & Referral Services Team (*I&RS*) for at-risk students, and 504 Plans.

Coursework and assessments will be modified on an individual basis for students when necessary. Modifications may include but are not limited to those outlined on the Modifications/Accommodations for Mathematics Courses chart.

Section IV: Preparation for Standardized Testing

Instruction in *Geometry* is aligned with the requirements of state and national standardized assessments, including the *NJGPA, NJSLA*, the *ACT*, the *PSAT,* and the *SAT*.

Section V: Curriculum Pacing Guide

Curriculum Pacing Guide
Course Title: *Geometry*   **Grade Level:** 9-10

Unit I: Building Blocks of Geometry	Weeks 1-3
Unit II: Reasoning with Angles	Weeks 4-7
Unit III: Parallel Lines and Linear Systems	Weeks 8-9
Unit IV: Triangle Properties	Weeks 10-13
Unit V: Right Triangles	Weeks 14-17
Unit VI: Polygons	Weeks 18-21
Unit VII: Circles	Weeks 22-25
Unit VIII: Transformations	Weeks 26-28
Unit IX: Similarity	Week 29-30
Unit X: Trigonometry	Weeks 31-33
Unit XI: Two-Dimensional Measurement	Weeks 34-36
Unit XII: Three-Dimensional Measurement	Weeks 37-40

Section VI: Technology Skills
Students in *Geometry* are required to complete the technology skills components of the curriculum:
- TI-83/TI-84
- Desmos/ Geogebra
- Math XL
- Edulastic
- Google Suite

Section VII: Primary Texts and Year-Long Instructional Resources

The following texts and instructional resources are employed in *Geometry*:
- Common Sense Education (www.commonsense.org)
- Geometry, Core Curriculum, by Savvas Learning Co.
- *Math XL*
- *Illustrative Mathematics*
- *You Cubed*, Stanford Graduate School of Education
- *NRICH*, University of Cambridge

Section VIII: Grading Formula and Assessment Modes

Marking period grades in *Geometry* are determined via a percentage weighting model. The specific grading categories and weightings of each will be determined before each academic year's start and published in the posted/distributed course syllabi.

Assessments in *Geometry* vary greatly in format, scope/content/skills assessed, and alternative assessments, differentiation in assessments and choice will be incorporated as appropriate. Preliminary assessments of each format will be used as benchmarks and summative assessments will be created/revised collaboratively each year and planned by members of the *Geometry* instructional team to inform future learning and to measure student growth.

Section IX: Unit Templates

The following unit templates have been established for the *Geometry* curriculum by the *Geometry* instructional team:

Unit I: Building Blocks of Geometry
Unit Summary
In this unit, students will apply basic facts about points, lines, planes, segments, and angles. Students will measure segments and angles using geometry tools and algebraic equations. Students will apply these concepts to real-world problems. Finally, students will use formulas to find the distance and coordinates of a midpoint.
Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry*:
● *2023 New Jersey Student Learning Standards: Mathematics*
   ○ MP.1-8
   ○ A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
● *2023 New Jersey Student Learning Standards English Language Arts*
   ○ RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
● *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
   ○ 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
● *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
   ○ 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
● How do we develop an awareness of the structure of a mathematical system connecting definitions, postulates, and theorems? ● How are tools used to copy segments and angles and construct segment and angle bisectors?	● Points, lines, and planes are geometric concepts used to describe the shape and arrangement of objects in space. ● Perform constructions using a ruler and compass to produce congruent segments and angles, and bisect segments and angles.

Evidence of Learning		
Formative & Alternative Assessments: ● Classwork ● Homework ● Performance activities ● Unit IA Quiz ● Individual student check-ins with teacher	**Benchmark & Summative Assessments:** ● Unit I Test (Benchmark) ● Unit I Summative Assessment	**Resources Needed:** ● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens

Unit II: Reasoning with Angles

Unit Summary
Students will use inductive and deductive reasoning to make conjectures and conclusions. Students will write conditional and biconditional statements. Students will also use reasoning to justify solutions to algebraic equations.

Standards/Core Ideas/Performance Expectations
The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*   *2023 New Jersey Student Learning Standards: Mathematics*   - MP.1-8   - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3   *2023 New Jersey Student Learning Standards English Language Arts*   - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4   *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*   8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3   *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*   9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
- How are logical conclusions drawn in mathematics? - How will students use inductive and deductive reasoning to help them understand geometric properties?	- Students draw logical conclusions from given information through acquired knowledge of geometric vocabulary. - Students will understand that they have to use inductive or deductive reasoning to understand different geometric properties.

Evidence of Learning		
Formative & Alternative Assessments: - Classwork - Homework - Performance activities - Unit IIA Quiz - Unit IIB Quiz - Individual student check-ins with teacher	**Benchmark & Summative Assessments:** Unit II Summative Assessment	**Resources Needed:** - Whiteboard space - Dry erase markers - Boogie Boards - Colored Pencils - Graph Paper - Highlighters/Red Pens

Unit III: Parallel Lines & Linear Systems

Unit Summary
Students will identify parallel and perpendicular lines. Students will discover the relationships of angles formed by parallel lines and a transversal. Finally, students will review slope and slope-intercept forms to graph lines in the coordinate plane and identify parallel and perpendicular lines.

Standards/Core Ideas/Performance Expectations
The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*   *2023 New Jersey Student Learning Standards: Mathematics*   - MP.1-8   - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3   *2023 New Jersey Student Learning Standards English Language Arts*   - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4   *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*   8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3   *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*   9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
What are the relationships of the angles formed by parallel lines cut by a transversal?	When parallel lines are intersected by a transversal, several angles are formed that have specific relationships, forming either congruent or supplementary angles.

● How do you prove that two lines are parallel?	● Not all lines and not all planes intersect. ● Using basic construction techniques to explore properties, two lines can be proven to be parallel.

Evidence of Learning		
Formative & Alternative Assessments: ● Classwork ● Homework ● Performance activities ● Unit IIIA Quiz ● Unit IIIB Quiz ● Individual student check-ins with teacher	**Benchmark & Summative Assessments:** ● Unit III Summative Assessment	**Resources Needed:** ● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens

Unit IV: Triangle Properties

Unit Summary

Students will classify triangles and examine the Triangle Sum Theorem. This theorem allows students to apply their algebraic thinking. Students will also learn methods of proving triangles congruent as well as CPCTC. Students will position figures in the coordinate plane for use of proofs involving the distance formula. Students will discover properties of isosceles and equilateral triangles and apply these properties to geometric and algebraic word problems. Students will look at the points of concurrency in a triangle as well as construct them. Students will also learn and apply the Triangle Inequality Theorem. Finally, students will look at the Pythagorean Theorem, Pythagorean Inequalities, and special right triangles.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry*:
- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
● What is the least amount of information needed to determine if triangles are congruent? ● How is the Pythagorean Theorem used? ● What are the properties of triangles?	● The angle and side lengths are needed to prove triangle congruence. ● Pythagorean Theorem will be used to determine the length of a missing side of a right triangle. ● Triangles have three sides, and three angles and the sum of the interior angles is always 180 degrees.

Evidence of Learning		
Formative & Alternative Assessments: ● Classwork ● Homework ● Performance activities ● Unit IVA Quiz ● Individual student check-ins with teacher	**Benchmark & Summative Assessments:** ● Unit IV Test ● Unit IV Summative Assessment	**Resources Needed:** ● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens

Unit V: Right Triangles

Unit Summary

Students will 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. Students will also use the Pythagorean Theorem to find the missing side of a right triangle.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
- How can students find the missing side of a right triangle? - How can statements about triangles be proven?	- Students will learn to apply the Pythagorean Theorem and apply this skill to solving right triangles. - The sum of the angles of any triangle is 180 degrees. - Triangle inequalities can be used to classify the types of triangles.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
- Classwork - Homework - Performance activities - Unit VA Quiz - Individual student check-ins with teacher	- Unit V Test - Unit V Summative Assessment	- Whiteboard space - Dry erase markers - Boogie Boards - Colored Pencils - Graph Paper - Highlighters/Red Pens

Unit VI: Polygons

Unit Summary

Students will verify that polygons are similar using corresponding angles and sides. Students will also review and practice using proportions to solve for missing side lengths. Students will use properties of similar polygons and write proofs about similar polygons.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
- What are the different types of quadrilaterals? - What are the differences between the special quadrilaterals?	- Special quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi, and kites, all have unique properties. - Squares, rectangles, and rhombuses are all special types of parallelograms with their own parameters and reasonings.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
● Classwork ● Homework ● Performance activities ● Unit VIA Quiz ● Unit VIB Quiz ● Common Sense Education ● Individual student check-ins with teacher	● Unit VI Summative Assessment	● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens

Unit VII: Circles

Unit Summary

Students will solve problems involving circles. Students will familiarize themselves with vocabulary associated with parts of circles. Students will find lengths, angle measures, and areas associated with circles. Students will apply circle theorems to solve a wide range of problems.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*
- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
● What is a radius, chord, diameter, arc, tangent, secant? ● What is the difference between arc length and arc measure?	● The central angle is formed by the center of the circle and the radius and equals the measure of the intercepted arc. ● Lines tangent to a circle have specific properties that will allow for problem-solving. ● Chords and secants are line segments found within a circle. ● Arc length is the actual length along the curved path of the arc, while arc measure is the angle subtended by the arc at the center of the circle.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
● Classwork ● Homework ● Performance activities ● Unit VIIA Quiz ● Unit VIIB Quiz ● Individual student check-ins with teacher	● Unit VII Summative Assessment	● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens

Unit VIII: Transformations

Unit Summary

Students will be introduced to the three rigid transformations: translation, rotation, and reflection. Students will also see dilations. Students will apply rules for transformations in the coordinate plane. Students will study transformations that preserve the congruence of figures. Finally, students will observe and describe the properties of figures such as symmetry.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*
- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
- What are the three rigid transformations? - What are dilations?	- The 3 rigid transformations are translations, reflections, and rotations. - A dilation is changing the size of an object without changing the shape.

Evidence of Learning		
Formative & Alternative Assessments: - Classwork - Homework - Performance activities - Unit VIIIA Quiz - Unit VIIIB Quiz - Individual student check-ins with teacher	**Benchmark & Summative Assessments:** Unit VIII Summative Assessment	**Resources Needed:** - Whiteboard space - Dry erase markers - Boogie Boards - Colored Pencils - Graph Paper - Highlighters/Red Pens

Unit IX: Similarity

Unit Summary

Students will verify that polygons are similar using corresponding angles and sides. Students will also review and practice using proportions to solve for missing side lengths. Students will use properties of similar polygons and write proofs about similar polygons.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*
- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
- What is a proportion? - What makes figures similar?	- A proportion is defined as two equal ratios, where cross multiplication is a strategy to solve. - Similar figures must have congruent corresponding angles and corresponding sides that are in proportion.

Evidence of Learning		
Formative & Alternative Assessments: - Classwork - Homework	**Benchmark & Summative Assessments:** Unit IX Summative Assessment	**Resources Needed:** - Whiteboard space - Dry erase markers - Boogie Boards

• Performance activities • Unit IXA Quiz • Unit IX Test • Individual student check-ins with teacher		• Colored Pencils • Graph Paper • Highlighters/Red Pens

Unit X: Trigonometry

Unit Summary

Trigonometry is a branch of mathematics that deals with the relationships between the angles and sides of triangles, using various ratios to solve. There are extensive real-world applications within the topic including physics, engineering, and astronomy. Students will apply knowledge from previous units by using ratios and proportions to find missing side lengths in right triangles.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry*:
- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - F.TF.B.7, A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
• What is trigonometry? • How can trigonometry be used to solve problems involving right triangles?	• Trigonometry is a branch of mathematics that deals with the relationships between the angles and sides of triangles, where the ratios of sine, cosine, and tangent will be applied. • Trigonometry can be used to find the missing side or angle of a right triangle when given either 2 sides or 1 angle and 1 side of the right triangle.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Classwork • Homework • Performance activities • Unit XA Quiz • Unit XB Quiz • Individual student check-ins with teacher	• Unit X Summative Assessment	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/Red Pens

Unit XI: Two-Dimensional Measurement

Unit Summary

In this unit, students will explore the properties of polygons and special quadrilaterals. Students will identify the properties of trapezoids, rhombi, squares, rectangles, parallelograms, and kites. Students will show that a polygon is a special quadrilateral and write proofs involving special quadrilaterals. The unit will be extended to include special quadrilaterals in the coordinate plane. Students will be shown the derivation of area formulas and surface area formulas. They will find the area and perimeters of figures whose vertices are given by ordered pairs, areas, and perimeters of figures whose dimensions are found by using the Pythagorean Theorem, and the area and perimeters of figures in customary and metric units. Students will apply formulas to real-life application problems. Students will learn the properties of three-dimensional figures and applicable vocabulary. Students will apply area formulas to find the surface area of 3-D objects.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*
- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - F.TF.B.7, A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
- What is area? - What is the perimeter? - How do you calculate the area and perimeter of figures in the coordinate plane?	- Area is the total space taken up by a flat two-dimensional surface or shape of an object. - Perimeter is the distance around a two-dimensional object. - Formulas can be derived and used to calculate the area of complex figures.

Evidence of Learning		
Formative & Alternative Assessments: - Classwork - Homework - Performance activities - Quiz - Individual student check-ins with teacher	**Benchmark & Summative Assessments:** - Unit Test - Unit XI Summative Assessment	**Resources Needed:** - Whiteboard space - Dry erase markers - Boogie Boards - Colored Pencils - Graph Paper - Highlighters/Red Pens

Unit XII: Three-Dimensional Geometry

Unit Summary

Students will see the derivation and volume of three-dimensional figures and use them to find surface area or volume. Students will also solve application problems associated with surface area and volume. Students will see the effects of changing dimensions of changing 3-D figures proportionally. Finally, students will see the scale change due to dilation.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Geometry:*
- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8
  - F.TF.B.7, A.CED.A.4, G.CO.A.1-5, B.6-8, C.9-11 & D.12-13, G.SRT.A.1-3, B.4-5 & C.6-8, G.C.A.1-3 & B.5, G.GPE.A.1 & B.4-7, G.GMD.A.1, 3, & B.4, G.MG.A.1-3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.8.DC.4 & 6, 9.4.8.TL.2

Unit Essential Questions	Unit Enduring Understandings
- How are the surface area formulas derived? - What is volume? - How are the volume formulas derived? - Is there a relationship between the area and perimeter of a polygon and the surface area and volume of a solid?	- Surface area formulas are derived from the two-dimensional area formulas. - There are formulas to find the volume of a 3-D object that is derived from two-dimensional formulas. - The volume describes the amount of space inside of an object. - Similar solids have a similarity ratio that can be squared or cubed to compare their areas or volumes.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
● Classwork ● Homework ● Performance activities ● Unit XIIA Quiz ● Unit XII Alternate Assessment ● Individual student check-ins with teacher	● Unit XII Summative Assessment	● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens

Section X: Unit Reflection

The *Geometry* instructional team must confer upon the completion of each instructional unit in *Geometry* and rate the degrees to which the instructional units meet performance criteria established by the New Jersey Department of Education using the Unit Reflection Form. Completed unit reflection forms must be submitted to the Department Supervisor for approval upon completion of curriculum implementation with a complementing list of suggested modifications to the *Geometry* curriculum.

Unit Reflection Form: *Geometry*			
Lesson Activities:	Strongly	Moderately	Weakly
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills;			
Are challenging and require higher-order thinking and problem-solving skills;			
Allow for student choice;			
Provide scaffolding for acquiring targeted knowledge/skills;			
Integrate modern, global perspectives, especially those regarding diversity, genocide, global issues, and historical ones regarding racial relations;			
Integrate 21st century skills;			
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills;			
Are varied to address different student learning styles and preferences;			
Are differentiated based on student needs;			
Are student-centered with the teacher acting as a facilitator and co-learner during the teaching and learning process;			
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives;			
Provide opportunities for student reflection and self-assessment;			
Provide data to inform and adjust instruction to better meet the varying needs of learners.			

Appendix
Writing Instruction and the RFH Community

Writing instruction should happen across the RFH Community. Writing across the curriculum is a philosophy that advances the belief that writing is a method of learning. Since all departments are committed to helping students learn, writing must be used as a methodology to advance student learning.

Each academic discipline has its own unique conventions, formats and structures. It is the responsibility of each department to agree upon domain-specific writing praxes, model them for students, and require them to utilize them on a consistent basis. Students must understand that acceptable writing in one domain may not be acceptable writing in another area. The development of domain-specific writing skills supports the overall development of the student writer because all writing is grounded in the writing situation: audience, context, purpose, subject, and writer. Representatives from the academic disciplines must share their domain-specific writing praxes with each other, identify intersections, and determine how to address perceived gaps that limit student learning.

Students must experience writing situations that help them learn how to think creatively and critically and communicate effectively in the academic disciplines. Writing instruction, regardless of the academic discipline, must always reinforce student understanding of the writing situation. When students experience writing situations, they must study examples of domain-specific writing in order to understand how writers communicate in discipline-related contexts. This does not mean information embedded in textbooks. Domain-specific writing is writing that is used to inform and influence readers as it draws them into an established circle of discourse. Students must use these non-fiction texts to develop the close reading skills that will shape their own writing. Focused engagement with domain-specific writing should not be limited to basic reading comprehension and topical understanding. It must also include the analysis of the writing situation that is represented in the text: audience, context, purpose, subject, and writer. The close reading of well-written texts—regardless of the domain—will show students the importance of writing mechanics, diction, and syntax. The development of close reading skills will also help the students grow in terms of their ability to construct and advance independent and original claims that are well-supported by evidence. Domain-specific writing is grounded in positioning of claims and the effective use of evidence.

The final written product is important; nevertheless, the learning that results in this production must not be devalued. The writing process is not limited to the basic steps of planning, drafting, revising, and editing/proofreading. It is a complex sequence of critical and creative thinking and writing that leads to the production of a text that provides evidence of learning and understanding. Students must ultimately develop the ability to self-assess the effectiveness of their writing as a representation of the writing situation. Without the use of models that evidence learning and understanding, students will not develop the ability to self-assess their own work—the true outcome of the writing process.

What types of writing situations should RFH students engage in?

RFH students should engage in writing situations across the curriculum that require them to:
- write to improve mechanical proficiency, diction usage, and syntactical sophistication
- write to narrate, describe, and reflect
- write to summarize and report
- write to classify and define
- write to explain how process leads to an outcome
- write to compare, contrast and evaluate
- write to speculate on cause and effect
- write to propose solutions and solve problems
- write to analyze

These writing situations should be positioned in a coordinated, developmental sequence that extends across the academic disciplines.

Upon Completion of Grade 12, RFH students must be ready to transition to the following writing situations:
- write to analyze
- write to persuade (argument)

The core focus of first-year college writing courses are analysis and argument. These courses orient the students to the demands and expectations of writing for the academic culture of college. At colleges/universities with carefully coordinated writing programs, students must demonstrate proficiency in analysis and argument before they transition to upper level courses that require them to engage in the following writing situation:
- write to investigate (research)