Englewood Public School District
Geometry
Second Marking Period

Unit 2: Polygons, Triangles, and Quadrilaterals

Overview: During this unit, students will learn how to prove two triangles are congruent, relationships between angle measures and side lengths within a triangle, and about different types of quadrilaterals.

Time Frame: 43 to 47 Days

Enduring Understandings:
- *Congruent triangles can be visualized by placing one on top of the other.*
- *Corresponding sides and angles can be marked using tic marks and angle marks.*
- *Theorems can be used to prove triangles congruent.*
- *The definitions of isosceles and equilateral triangles can be used to classify a triangle.*
- *The Midpoint Formula can be used to find the midsegment of a triangle.*
- *The Distance Formula can be used to examine relationships in triangles.*
- *Side lengths of triangles have a relationship.*
- *The negation statement can be proved and used to show a counterexample.*
- *The diagonals of a polygon can be used to derive the formula for the angle measures of the polygon.*
- *The properties of parallel and perpendicular lines can be used to classify quadrilaterals.*
- *Coordinate geometry can be used to classify special parallelograms.*
- *Slope and the distance formula can be used to prove relationships in the coordinate plane.*

Essential Questions:
- *How do you identify corresponding parts of congruent triangles?*
- *How do you show that two triangles are congruent?*
- *How can you tell if a triangle is isosceles or equilateral?*
- *How do you use coordinate geometry to find relationships within triangles?*
- *How do you solve problems that involve measurements of triangles?*
- *How do you write indirect proofs?*
- *How can you find the sum of the measures of the angles of a polygon?*
- *How can you classify quadrilaterals?*
- *How can you use coordinate geometry to prove general relationships?*

Standards	Topics and Objectives	Activities	Resources	Assessments
MP1, MP3, MP4, MP5, MP6, MP7, MP8 **G-CO.C.9** Prove theorems about lines and angles. **G-CO.C.10** Prove theorems about triangles. **G-CO.C.11** Prove theorems about parallelograms. **G-CO.D.12** Make formal geometric constructions with a variety of tools and methods **G-CO.D.13** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. **G-SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **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-GPE.B.4** Use coordinates to prove simple geometric theorems algebraically. **G-GPE.B.7** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles,	**Topics** Congruence, Corresponding parts of congruent figures, triangle congruence theorems, isosceles and equilateral triangles, midsegments of triangles, altitudes and medians of triangles, perpendicular and angle bisectors, inequalities in triangles, quadrilaterals, parallelograms, rectangles, rhombi, squares, trapezoids, kites, and quadrilaterals in the coordinate plane Twenty-First Century Themes and Skills includes: • Creativity and Innovation • Critical Thinking and Problem Solving • Communication and Collaboration **Objectives** Students will • recognize congruent figures and their corresponding parts • prove two triangles congruent using the SSS, SAS, ASA, AAS, HL • use triangle congruence	Standards Solution Common Core Geometry Lessons: • Determining Congruence: The Case Study of a Triangle • Proving Parallelogram Theorems • Proving Triangle Theorems Is this a Rectangle? https://www.illustrativemathematics.org/content-standards/HSG/CO/B/tasks/1302 Are the Triangles Congruent? https://www.illustrativemathematics.org/content-standards/HSG/CO/B/tasks/33 Properties of Congruent Triangles https://www.illustrativemathematics.org/content-standards/HSG/CO/B/7/tasks/1637 SSS Congruence Criteria https://www.illustrativemathematics.org/content-standards/HSG/CO/B/8/tasks/1930	Pearson Realize Chapters 4, 5, and 6 Standards Solution Common Core Lessons Illustrative Mathematics https://www.illustrativemathematics.org/ National Library of Virtual Manipulatives http://nlvm.usu.edu/ Alabama Learning Exchange http://alex.state.al.us/search.php?fa_submit=ALLPLANS Arizona Math Flipbook http://www.azed.gov/azcommoncore/files/2012/11/high-school-ccss-flip-book-usd-259-2012.pdf NYC Department of Education http://schools.nyc.gov/default.htm Mathematics Assessment Project http://map.mathshell.org/ Texas Instruments https://education.ti.com/en/u	**Formative Assessments:** Textbook Pages 243, 277, 278, 316, 345, 346, 398, 425, 426 Math journal (NJSLSA.R1, NJSLSA.W2, NJSLSA.L1, SL.9-10.4, NJSLSA.L6) **Summative Assessments:** Multiple choice / short answer assessments (CRP2, CRP4, CRP8) Chapter quizzes/tests • Pearson Realize • MathXL **Benchmark Assessment:** Midterm Assessment **Alternative Assessments:** Learning centers: each learning center focuses on a different type of problem (9.3.ST.2, 9.3.ST-ET.5) Create posters illustrating the main

| e.g., using the distance formula. | and corresponding parts of congruent triangles to prove that parts of two triangles are congruent

• use and apply properties of isosceles and equilateral triangles
• use properties of midsegments to solve problems
• identify and use properties of perpendicular bisectors and angle bisectors
• identify properties of medians and altitudes of a triangle
• use indirect reasoning to write proofs
• use and apply inequalities involving angles and sides of triangles
• find the sum of the measures of interior and exterior angles of polygons
• use relationships among sides, angles, and diagonals of parallelograms
• determine if a quadrilateral is a parallelogram
• define and classify special types of parallelograms
• use the properties of diagonals of | When does SSA work for Triangle Congruence?
https://www.illustrativemathematics.org/content-standards/HSG/CO/B/8/tasks/340

Why does ASA work?
https://www.illustrativemathematics.org/content-standards/HSG/CO/B/8/tasks/339

Why does SAS work?
https://www.illustrativemathematics.org/content-standards/HSG/CO/B/8/tasks/109

Why does SSS work?
https://www.illustrativemathematics.org/content-standards/HSG/CO/B/8/tasks/110

Congruent Angles in Isosceles Triangles
https://www.illustrativemathematics.org/content-standards/HSG/CO/C/10/tasks/1921

Midpoints of Triangle Sides
https://www.illustrativemathematics.org/content-standards/HSG/CO/C/10/tasks/1872 | s/home

Desmos
https://teacher.desmos.com/

Worksheets for every topic:
http://kutasoftware.com/free.html
(CRP2, CRP4, CRP8, 9.3.ST.2, 9.3.ST-ET.5)

Algebra assessments, interactive, videos, games, lessons, homework:
https://www.opened.com/search?area=mathematics&grade=9&offset=0&resource_type=interactive-assessment
(CRP2, CRP4, CRP8, 9.3.ST.2, 9.3.ST-ET.5, 8.1.12.A.3)

Algebra common core worksheets:
https://www.ixl.com/math/algebra-1
(CRP2, CRP4, CRP8, 9.3.ST.2, 9.3.ST-ET.5)

Khan Academy – videos, lessons, assessments
www.khanacademy.org
(CRP2, CRP4, CRP8, CRP11, 9.3.ST.2, 9.3.ST-ET.5, 8.1.12.A.3)

Worksheets / assessment items for all topics based on standards:
http://jmap.org/JMAP_RES | objectives of the unit (CRP6) |

quadrilaterals
- verify and use properties of trapezoids and kites
- classify polygons in the coordinate plane
- use properties to name coordinates of special figures
- prove theorems using figures in the coordinate plane

Is this a Parallelogram?
https://www.illustrativemathematics.org/content-standards/HSG/CO/C/11/tasks/1321

Midpoints of the Sides of a Parallelogram
https://www.illustrativemathematics.org/content-standards/HSG/CO/C/11/tasks/35

What do you know about the Bermuda Triangle?
http://alex.state.al.us/lesson_view.php?id=33167

Characteristics of Quadrilaterals
http://alex.state.al.us/lesson_view.php?id=29675

What do we have in common? Discover the Properties of Diagonals in Quadrilaterals
http://alex.state.al.us/lesson_view.php?id=26352

Geometrica Fights Back!
http://alex.state.al.us/lesson_view.php?id=3009

Triangle Midsegments
https://education.ti.com/en/us/activity/detail?id=BD840BAD7E754B7BB0B5A2ECB79A2107&ref=/en/us/activity/search/advanced

OURCES_BY_TOPIC.htm#AI
(CRP2, CRP4, CRP8, 9.3.ST.2, 9.3.ST-ET.5)

Exterior and Remote Interior Angles
https://education.ti.com/en/us/activity/detail?id=A0F8CB43E61B430B8882100C56D8AA09&ref=/en/us/activity/search/advanced

Properties of Parallelograms
https://education.ti.com/en/us/activity/detail?id=5CDF181BDFBE42BB8FC107063B5EBA08&ref=/en/us/activity/search/advanced

Triangle Sides and Angles
https://education.ti.com/en/us/activity/detail?id=64E71D93C94F43C0968730A6624B30BF&ref=/en/us/activity/search/advanced

Properties of Special Quadrilaterals
https://education.ti.com/en/us/activity/detail?id=3EFECCEBAFA04B6990D369A41FA4F83F&ref=/en/us/activity/search/advanced

Creating a Parallelogram
https://education.ti.com/en/us/activity/detail?id=CA353F7DA7034A878EDA5997128351B2&ref=/en/us/activity/search/advanced

Properties of Trapezoids

and Kites
https://education.ti.com/en/us/activity/detail?id=F33C9C7C2E8842BEB300C5827F081E93&ref=/en/us/activity/search/advanced

Congruent or Not?
https://education.ti.com/en/us/activity/detail?id=E08796D0158C40B2A507501D0B66E8A7&ref=/en/us/activity/search/advanced

Rhombi, Kites, and Trapezoids
https://education.ti.com/en/us/activity/detail?id=8CC629DAF55548EF83831A8242DB4AD5&ref=/en/us/activity/search/advanced

SSA Ambiguity
https://education.ti.com/en/us/activity/detail?id=6AB9AE39801340BA9B6354D91819176F&ref=/en/us/activity/search/advanced

Everything you need to know about math journals:
https://thecornerstoneforteachers.com/math-journals/
(NJSLSA.R1, NJSLSA.W2, NJSLSA.L1, SL.9-10.4, NJSLSA.L6)

Additional texts:
www.newsela.com

Key Vocabulary:

Base angle of an isosceles triangle, base of an isosceles triangle, congruent polygons, corollary, hypotenuse, legs of an isosceles triangle, legs of a right triangle, vertex angle of an isosceles triangle, altitude of a triangle, centroid, circumcenter, equidistant, incenter, indirect proof, median, midsegment of a triangle, orthocenter, coordinate proof, equiangular polygon, equilateral polygon, isosceles trapezoid, kite, midsegment of a trapezoid, parallelogram, rectangle, regular polygon, rhombus, trapezoid

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered. Additional staff should be included so all students can fully participate in the standards associated with this curriculum.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure. Student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges.

English Language Learners:	Special Education:	At-Risk:	Gifted and Talented:
- Teaching modeling - Peer modeling - Word walls - Give directions in small steps and in as few words as possible - Provide visual aids - Group similar problems together - Repeat directions when necessary	- Utilize modifications & accommodations delineated in the students' IEP - Work with paraprofessional - Work with a partner - Shorten assignments to focus on mastery or key concepts - Maintain adequate space between desks - Keep workspaces clear of	- Use visual demonstrations, illustrations and models - Give directions / instructions verbally and in simple written format - Peer support - Increased one – on – one time - Teachers may modify instructions by modeling what the student is expected	- Inquiry based instruction - Independent study - Higher order thinking skills - Adjusting the pace of the lessons - Real world scenarios - Student driven instruction - Allow students to complete an independent project as an alternative

• Provide a vocabulary list with definitions • Use of alge-tiles when needed • Use of number line when needed	unrelated materials • Provide fewer problems to attain passing grades • Tape a number line to the student's desk • Create a math journal that they can use during class, on assignments and (if teacher allows) on assessments • Provide extra time to complete a task when needed • Provide definitions of different graphs / charts with illustrations • Allow tests to be taken in a separate room • Allow students to use a calculator when appropriate • Divide test into small sections of similar questions or problems • Use of alge-tiles when needed • Use of number line when needed	to do • Instructions may be printed out in large print and hung up for the students to see during the time of the lesson • Review behavior expectations and make adjustments • Create a math journal that they can use during class, on assignments and (if teacher allows) on assessments • Allow students to complete an independent project as an alternative test • Use of alge-tiles when needed • Use of number line when needed	test

Interdisciplinary Connections: ELA

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content

NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

SL.9-10.4: Present information, findings and supporting evidence clearly, concisely and logically. The content, organization, development and style are appropriate to task, purpose and audience.

NJSLSA.L6: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an

unknown term important to comprehension or expression.

21st Century Standards

9.2.12.C.1: Review career goals and determine steps necessary for attainment.
9.2.12.C.2: Modify Personalized Student Learning Plans to support declared career goals.
9.3.ST.2: Use technology to acquire, manipulate, analyze and report data.
9.3.ST-ET.5: Apply the knowledge learned in STEM to solve problems.

Career Ready Practices:

CRP2: Apply appropriate academic and technical skills
CRP4: Communicate clearly and effectively and with reason
CRP6: Demonstrate creativity and innovation
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them
CRP11: Use technology to enhance productivity

Technology Standards:

8.1.12.A.3: Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.

Major **Supporting** **Additional** (Identified by PARCC Model Content Frameworks)