Course: Geometry **Unit 3 - Quadrilaterals & Other Polygons**	**Year of Implementation:** 2021-2022

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Stage One - Desired Results

Link(s) to New Jersey Student Learning Standards for this course:
https://www.state.nj.us/education/cccs/2020/

Unit Standards:
G-CO.C.11, G-MG.A.1, G-GPE.B.4, G-GPE.B.7, G-SRT.B.5

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities

Transfer Goal: Students will be able to independently use their learning to apply and transfer basic geometric concepts and problem-solving techniques to unfamiliar, varied and real-world situations.

As aligned with LRHSD Long Term Learning Goal(s):
Problem-Solving: apply and transfer autonomously and collaboratively mathematical concepts and problem-solving techniques to unfamiliar, varied and real-world situations
Reasoning: reason abstractly and quantitatively by applying mathematical representations, symbols and estimation techniques when engaging in problem-solving
Critical Thinking: construct and effectively communicate valid conclusions and critique the reasoning of others
Modeling: demonstrate mastery of concepts by evaluating models that others have constructed or by creating appropriate models of their own
Tools: identify the correct tools to solve problems, if applicable
Precision: determine an answer's appropriateness as a means of determining its validity, while using proper mathematical notation and units
Structure: use multiple representations, critical thinking skills, and prior knowledge to solve problems in new situations
Habits of Mind: approach new situations with curiosity, persistence, resourcefulness, and confidence; take risks, monitor their progress, accept and learn from setbacks, make adjustments, and reflect on their performance

Enduring Understandings Students will understand that. . . *EU 1* classifying helps to develop connections among mathematical ideas. *EU 2* properties of geometric figures can be proven. *EU 3* coordinate geometry can be used to prove general relationships and to classify polygons. *EU 4* measurement helps you understand the space around you.	*Essential Questions* *EU 1, 2, 3* ● How can geometric properties be used to prove relationships between the angles and sides of geometric figures? ● How can the coordinate plane be used to verify the properties of polygons? *EU 1* ● Why is it important to classify geometric objects? *EU 2* ● What are some different strategies that can be used to find area and perimeter? ● What is the difference between area and perimeter?
Knowledge Students will know . . . *EU 1* ● The sum of interior and exterior angles of a polygon are determined by the number of sides of the polygon. (G-SRT.B.5) *EU 1, 2* ● the interior angle sum of any polygon can be found by breaking the polygon into triangles and using calculations based on 180 degrees. (G-SRT.B.5) *EU 1* ● special quadrilaterals are related by their properties. (G-CO.C.11)	*Skills* Students will be able to. . . *EU 1* ● calculate the interior and exterior angle sum of a given polygon. ● calculate each interior and exterior angle measure of a regular polygon. (G-SRT.B.5) *EU 1, 2* ● identify a polygon based on the number of sides. (G-CO.C.11 ; G-MG.A.1) *EU 2* ● use properties of algebra and geometry to solve for angle measures and lengths of sides of quadrilaterals.

EU 3 ● formulas for midpoint, length, and slope can be used to verify specific relationships in the coordinate plane. (G-GPE.B.4) *EU 4* ● what information is necessary to find the area of different quadrilaterals. (G-GPE.B.7)	(G-CO.C.11) *EU 2* ● apply the special properties of parallelograms. (G-CO.C.11) *EU 1, 2, 3* ● use given information to determine the type of quadrilateral. (G-CO.C.11) *EU 2, 3* ● apply the midpoint, distance and slope formulas to prove conditions regarding quadrilaterals. (G-CO.C.11)

Stage Two - Assessment

Other Evidence:

- Tests and quizzes to include: identifying types of polygons to find interior and exterior angle measures and lengths of sides in polygons; coordinate proofs with quadrilaterals
- Assessed Elements from the Performance Task
- Other Teacher-graded evaluations
- Warm-Ups/Exit Ticket

Stage Three - Instruction

Learning Plan: **Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.**

- Desmos Complete the Quadrilateral Activity and find the area (M, EU 3, 4)

https://teacher.desmos.com/activitybuilder/custom/580e244f612b5fdb051becc9

- Mathematical Modeling in 3 Acts: The Mystery Sides (A/M, EU 1, 4)
  https://www.savvasrealize.com/community/program/3162d61e-4b73-3fad-87e7-0a9e0f539531/42/tier/924203a0-8981-3136-b076-76def7133415/44/lesson/86c5576c-7df1-3e2d-a805-d3cd8fdc6f50/42

- Quadrilaterals Desmos Activity - Comparing & contrasting characteristics of quadrilaterals (A/M, EU 1, 2, 3)
  https://teacher.desmos.com/activitybuilder/custom/5882830698b6994705d8fac2

- Have students create their own kites (M/T, EU 2)

- Polygon Interior Angle Sum Discovery (A/M, EU 1, 2)
  https://teacher.desmos.com/activitybuilder/custom/5b75d8d696a0ad0aefe7f3ff

- Polygon Exterior Angle Sum Discovery (A/M, EU 1, 2)
  https://teacher.desmos.com/activitybuilder/custom/5b86e3104da06f0a475f38bc

- Polygons: Exterior Angle Sum Visual (A/M, EU 2)
  https://www.geogebra.org/m/VafUetHY#material/mKzJCf5p

The following is the suggested sequence of learning activities.

Approximate timeline: 20 days

- Polygon angle-sum theorems
- Recognize and apply the properties of a parallelogram
- Area of a parallelogram
- Complete proofs with parallelograms
- Coordinate proofs of parallelograms
- Recognize and apply properties of special parallelograms (rectangles, rhombuses, squares)
- Coordinate proofs of special parallelograms
- Area of special parallelograms
- Recognize and apply properties of trapezoids and kites
- Area of trapezoids and kites