Unit 5: Quadrilaterals

Content Area: **Mathematics**
Course(s): **English I, Geometry, Honors Geometry**
Time Period: **November**
Length: **3 weeks**
Status: **Published**

Unit Overview

- Apply the definitions and identify the properties of a trapezoid and an isosceles trapezoid.
- Calculate lengths of segments and triangle sides using theorems involving parallel lines.
- Define parallelogram and use its properties in proofs.
- Determine whether a parallelogram is a rectangle, rhombus or square using their properties.
- Prove that a quadrilateral is a parallelogram using valid methods.
- Use the properties of special quadrilaterals in proofs.

Enduring Understandings

- Coordinate geometry can be used to represent and verify geometric/algebraic relationships
- Geometric language can be used to describe spatial relationships in day-to-day life.
- Reasoning proofs can be used to verify or refute conjectures or theorems in geometry

Essential Questions

- How can we best represent and verify geometric/algebraic relationships?
- What real life situations can be described using geometric language?

Lesson Titles/Objectives

- Apply the definitions and identify the special properties of a rectangle, a rhombus, and a square
- To apply the definitions and identify properties of a trapezoid and an isosceles trapezoid
- To apply theorems about parallel lines and the segment that joins the midpoints of two sides of a triangle
- To appy the definition of a parallelogram and the theorems about properties of a parallelogram
- To determine when a parallelogram is a rectangle, rhombus, or square
- To prove that certain quadrilaterals are parallelograms

Standards

MA.G-CO.B	Understand congruence in terms of rigid motions
	Mathematically proficient students can apply the mathematics they know to solve

	problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MA.G-CO.C	Prove geometric theorems
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MA.G-GPE.B	Use coordinates to prove simple geometric theorems algebraically
MA.G-MG	Modeling with Geometry

Indicators

MA.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.
MA.G-CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
MA.G-CO.C.11	Prove theorems about parallelograms.
MA.G-GPE.B.4	Use coordinates to prove simple geometric theorems algebraically.
MA.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).
MA.G-GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
MA.G-MG.A.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

21st Century Skills and Career Ready Practices

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

Inter-Disciplinary Connections

LA.RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
LA.L.11-12.6	Acquire and use accurately 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 considering a word or phrase important to comprehension or expression.
ARCH.9-12.9.4.12.B.4	Perform math operations, such as estimating and distributing materials and supplies, to complete classroom/workplace tasks.

Instructional Strategies. Learning Activities. and Levels of Blooms/DOK:

- Have students summarize the five ways to prove a quadrilateral is a parallelogram
- Intro. applying properties of isosceles trapezoids
- Intro. Applying properties of parallelograms in proofs
- Intro. applying properties of trapezoids
- Intro. diagonals of a rhombus
- Intro. diagonals of rectangles
- Intro. finding missing measures of parallelograms by applying properties of parallelograms
- Intro. isosceles trapezoids
- Intro. median of a trapezoid
- Intro. Midpoint of hypotenuse of a right triangle

- Intro. properties of a square
- Intro. Properties of parallelograms
- Intro. Quadrilateral family tree
- Intro. segments joining midpoints of triangles
- Intro. theorems involving parallel lines
- Intro. trapezoids
- Intro. ways to prove that a quadrilateral is a parallelogram
- Partner activity: students will complete a chart of properties of quadrilaterals
- Review anticipatory Set
- Review Homework
- Review HSPA warmup
- Review Quiz
- Students will take a quiz on 5.1-5.3
- Students will take a quiz on 5.4-5.5
- Students will take a test on chapter 5

Modifications:

ELLs Modifications

- 1:1 testing
- Offer alternate/or modify assessments
- Use graphic organizer
- Utilize explicit learning strategies that are well planned in advance (intentional planning)

IEP &504 Modifications

- teaching the main ideas/concepts (limiting not needed details)to be taught and repeating them in several different ways over several different days (goal is 7 different ways same concept for students with learning disabilities)
- direct teaching and/or assistance for organization, social skills/peer interactions
- math tests could have formula's available on the test and/or sample problems

G&T Modifications

- Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
- Math- provide additional rigorous challenge problems for advanced students

- Modeling

Formative Assessment

- closure finding number of sides and angle measures of polygons
- closure prove quadrilaterals are parallelograms
- journal write
- pass out of class
- think-pair-share
- warm up interior and exterior angles of polygons
- warm up using properties of parallelograms

Summative Assessment

- Test special parallelograms
- Test sum of interior and exterior angles of polygons
- Test using parallelograms and proving parallelograms

Resources & Technology

Resources and Materials

- Geometry Text Book- McDougal – Littell
- Manipulatives
- Protractors
- Ruler
- Study Guide and Practice Sheet – Glencoe/McGraw Hil
- Teacher Created worksheets
- Teacher Generated worksheets

Technology

- Mathxl
- Geometer sketchpad
- Smart Board
- Ti-84 calculator
- Videos

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.