Unit 05 - Relationships Within Triangles

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 2**
Length: **1-2 weeks**
Status: **Published**

Brief Summary of Unit

In this unit, students will be using the deductive reasoning from previous units to explore special relationships within triangles. These include perpendicular bisectors, angle bisectors, medians, altitudes, and midsegments. Some of these relationships will continue to pop up throughout the remaining units within other shapes. The timing of this chapter does not need to be exactly here, and can be adjusted for the class's needs.

Revision Date: July 2024

Standards

ELA.L.KL.9–10.2.A	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.
MATH.9-12.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.
MATH.9-12.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.
ELA.SL.PE.11–12.1.A	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
WRK.9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.

Essential Questions

- How does a triangle's midsegment relate to the triangle?
- What does a altitude do in a triangle?
- What does a median do in a triangle?
- What does a perpendicular bisector do in a triangle?
- What does an angle bisector do in a triangle?

- What is the name of the point where each special segment meets?

Enduring Understandings

- Find and use medians and altitudes of triangles to solve various geometric problems.
- Find and use midsegments of triangles to solve various geometric problems.
- Use bisectors of triangles to solve various geometric problems.
- Use theorems about perpendicular and angle bisectors to solve various geometric problems.

Students Will Know

- How to find distances using the Triangle Midsegment Theorem.
- How to identify and use perpendicular and angle bisectors of triangles.
- How to use medians and altitudes of triangles to solve problems.

Students Will Be Skilled At

- Drawing medians and altitudes of triangles.
- Finding the centroid of a triangle.
- Finding the circumcenter of a triangle.
- Finding the incenter of a triangle.
- Finding the orthocenter of a triangle.
- Identifying a perpendicular bisector and an angle bisector.
- Solving real-life problems involving midsegments.
- Using midsegments of triangles in the coordinate plane to solve problems.
- Using theorems about bisectors to find measures in figures.
- Writing equations of perpendicular bisectors.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or Albert/AP Classroom assessments
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Albert/AP Classroom and/or Big Ideas Math unit assessments
- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from Big Ideas Math

- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks in Khan Academy, DeltaMath, and IXL

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

The following list is meant to create a day-to-day plan. Teachers are encouraged to slow down or condense days as appropriate to the student population in the class. Assessment(s) should be given when appropriate. Please discuss this unit with other teachers of this course to agree if the timing of this unit is appropriate at this time.

- Begin by breaking down the title "perpendicular bisector" into two parts and have students develop its definition. Build into the Perpendicular Bisector Theorem and its converse. Have the same conversation about an "angle bisector." Then, build into the Angle Bisector Theorem and its converse.
- Give the endpoints of a segment and ask students to find the equation of the line to represent the perpendicular bisector. You may need to quickly review the midpoint formula and the slope formula in the coordinate plane, as well as writing the equation of a line.
- Students will likely need additional time to practice using/solving perpendicular bisectors and angle bisectors. Use both algebraic problems and proofs to emphasize this information.
- Define a median and altitude in triangles, pulling from prior knowledge. Identify how to draw all three of each segment type in a triangle. Use these segment types in proofs and algebraic problems.
- Take a day to draw and construct the circumcenter, incenter, centroid, and orthocenter. Use algebraic problems and proofs to apply these points.
- Clarify the difference between a midsegment and a median, illustrating both. Introduce how to find the endpoints of the midsegment in a coordinate plane, and the Triangle Midsegment Theorem.
- Students will likely need additional time to practice the information about a triangle's midsegment. Use algebraic problems and proofs, and pull in concepts from previous units like Unit 3 regarding parallel lines.

Materials

Core instructional materials: Core Book List including Big Ideas Math Common Core Geometry

Supplemental materials: Khan Academy, Edia, DeltaMath

- District approved textbook
- Khan Academy
- Teacher created activiites
- Teacher created notes
- Whiteboard tables

Suggested Strategies for Modifications

Possible accommodations/modification for Geometry