Medians in a Triangle

Description: Students construct a triangle and its medians. They observe the concurrence of the medians, measure distances to observe how the centroid divides each median, and make a custom tool for constructing the centroid of a given triangle.

Technology Strength: The dynamic model provides convincing evidence that the observations are true for every triangle. Students see that relationships stay the same as the triangle changes.

Objectives: Observe the concurrence of medians in a triangle; discover how the centroid divides each median in a triangle

Prerequisites: Understanding of the terms midpoint and median; preferably, understanding of triangle classification

Suggested Grade Level: 9 to 10

Sketchpad Level: Intermediate

Suggested Duration: 30 minutes

Suggested Classroom Setting: Whole Class, Student Pairs. This activity, designed for use by student pairs, can be easily modified for whole-class use.

Preparation: Review the Activity Notes. Work through the steps on the worksheet and make a copy of the worksheet for each student. See the presentation sketch for an example of completed student work. The presentation sketch also contains the custom tool **Centroid,** which constructs the centroid of a triangle given three points (the vertices); it can be used for a demonstration.

Materials: None

Student Worksheet(s): Medians in a Triangle

Student Sketch: None

Presentation Sketch: Medians Present.gsp

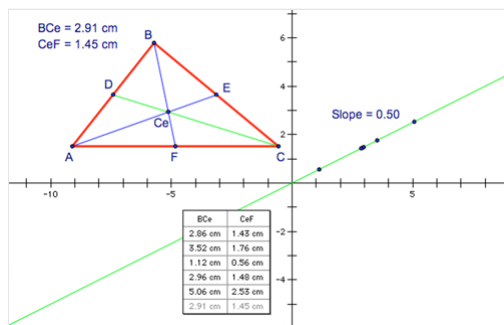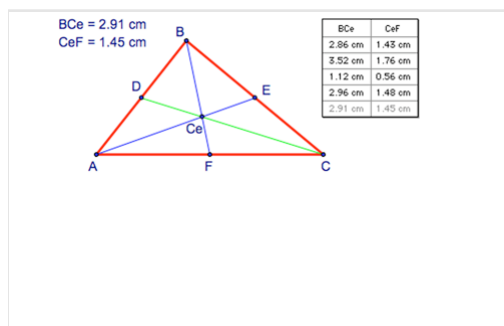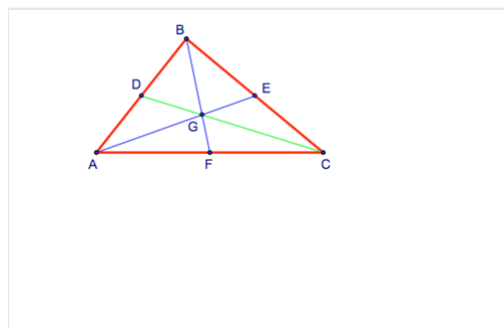**Vocabulary:** Median, centroid, concurrence

Sketchpad Version: GSP5

Using the Sketch:

Students construct an arbitrary triangle, labeled *ABC,* and construct the midpoint of each side. They construct two of the three medians and the point of intersection, and then construct the third median and observe the concurrence of the medians. They drag the vertices of the original triangle and make a conjecture about the three medians.

Next, students choose one of the medians and measure the distance along the median from the vertex to the centroid and from the centroid to the midpoint. They drag the vertices again and observe how the centroid divides this median. Students use their measurements to make a table, record their observations, and to find a relationship between the two distances. Once they have made a conjecture about the distances, they plot the table data in a coordinate plane, construct a line through the data, measure the slope of the line, and explain the significance of this slope.

Students can use their sketch to make a custom tool for constructing the centroid of a given triangle.

Sketch Tips:
Sketch Tips show skills needed in this activity, and the step at which the skill is first used.

Sketch Tip	Tip Sheet or Tip Video
Step 2: Construct a midpoint using **Construct | Midpoint**	Constructing Points
Step 4: Construct an intersection using **Construct | Intersection**	Constructing Points
Step 7: Measure a distance using **Measure | Distance**	Measuring Length and Distance
Step 9: Create a table using **Number | Tabulate**	Working with Tables
Step 10: Add a row to a table by double-clicking with the **Arrow** tool	Working with Tables
Step 12: Click a value in the sketch to enter it into the Calculator	Using the Calculator
Step 13: Plot data points using **Graph | Plot Table Data**	Working with Tables
Step 14: Measure the slope of a line using **Measure | Slope**	Measuring Slopes and Equations
Explore More 1: Create a custom tool by pressing the **Custom** tool icon and choosing **Create New Tool**	Creating Custom Tool