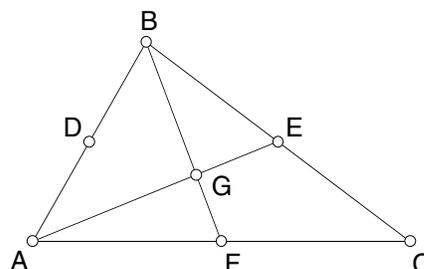## Medians in a Triangle

Name(s): _____

A median in a triangle connects a vertex with the midpoint of the opposite side. In previous investigations, you may have discovered properties of angle bisectors, perpendicular bisectors, and altitudes in a triangle. Would you care to make a guess about medians? You may see what's coming, but there are new things to discover about medians, too.

Sketch and Investigate

1. Construct triangle *ABC*.

2. Construct the midpoints of the three sides.

3. Construct two of the three medians, each connecting a vertex with the midpoint of its opposite side.

*If you've already constructed three medians, select two of them. Then, in the Construct menu, choose **Intersection**.*

4. Construct the point of intersection of the two medians.

5. Construct the third median.

Q1 What do you notice about this third median? Drag a vertex of the triangle to confirm that this conjecture holds for any triangle.

*Using the **Text** tool, click once on the point to show its label. Double-click the label to change it.*

6. The point where the medians intersect is called the *centroid*. Show its label and change it to *Ce* for centroid.

*To measure the distance between two points, select them; then, in the Measure menu, choose **Distance**.*

7. Measure the distance from *B* to *Ce* and the distance from *Ce* to the midpoint *F*.
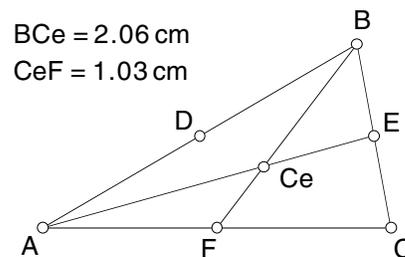
8. Drag vertices of △*ABC* and look for a relationship between *BCe* and *CeF*.

BCe = 2.06 cm
CeF = 1.03 cm

BCe	CeF
2.17 cm	1.08 cm
1.00 cm	0.50 cm
3.24 cm	1.62 cm
2.06 cm	1.03 cm

*Select the two measurements; then, in the Graph menu, choose **Tabulate**.*

9. Make a table with these two measures.

10. Change the triangle and double-click the table values to add another entry.

11. Keep changing the triangle and adding entries to your table until you can see a relationship between the distances *BCe* and *CeF*.

Medians in a Triangle (continued)

→12. Based on what you notice about the table entries, use the Calculator to make an expression with the measures that will remain constant even as the measures change.

Q2 Write the expression you calculated in step 12.

Q3 Write a conjecture about the way the centroid divides each median in a triangle.

13. Plot the table data on a piece of graph paper or using the **Plot Points** command in the Graph menu. You should get a graph with several collinear points.

14. Draw or construct a line through any two of the data points and measure its slope.

Q4 Explain the significance of the slope of the line through the data points.

Explore More

1. Make a custom tool that constructs the centroid of a triangle. Save your sketch in the **Tool Folder** (next to the Sketchpad application itself on your hard drive) so that the tool will be available for future investigations of triangle centers.