Midsegments of Triangles

Student Activity

Name _____

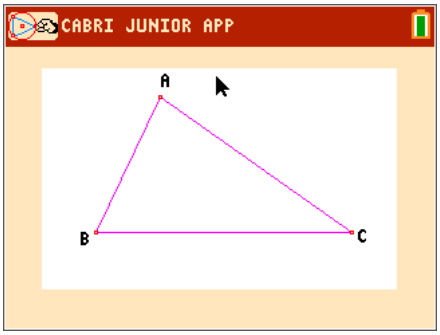
Class _____

Problem 1 – One Midsegment

Open a new *Cabri*^{TM} *Jr.* file. Construct a triangle using the **Triangle** tool.

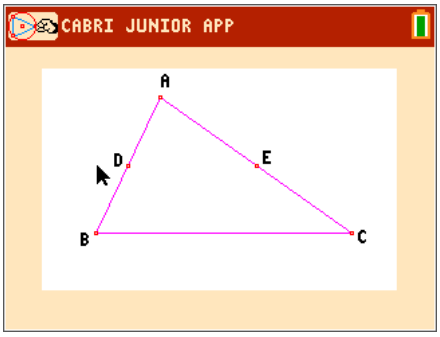
Select the **Alph-Num** tool to label the vertices *A*, *B*, and *C* as shown.

Note: Press enter to start the label, and then press enter again when you are ready to end the label.

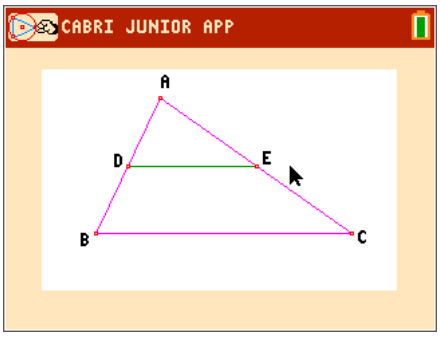


Construct the midpoints of two sides of the triangle using the **Midpoint** tool. Label the midpoints *D* and *E*.

Save this file as *MIDSEG*. This setup will be used again in Problem 2.



Select the **Segment** tool and construct $\overline{DE}$.



1. Use the **D. & Length**, **Angle**, and **Slope** tools in the **Measure** menu to explore the properties of the midsegment. Fill in the blanks below.

Length of _____ = _____ Length of _____ = _____

Measure of ∠ _____ = _____ Measure of ∠ _____ = _____

Slope of _____ = _____ Slope of _____ = _____

2. What conjectures can you make about the midsegment $\overline{DE}$ and its relationship to △*ABC*? Be sure to drag the vertices of △*ABC* around the screen to confirm your conjectures.

Use the **Calculate** tool to find the ratio of the lengths of sides *BC* and *DE*. Select the measurement of *BC*, then press the division symbol, and then select the measurement of *DE*. Move the ratio to an open space on the screen and press enter.

3. Drag a vertex of △*ABC* and observe the results.

Length of $\overline{BC}$ = _____ Length of $\overline{BC}$ = _____

Length of $\overline{DE}$ = _____ Length of $\overline{DE}$ = _____

Ratio = _____ Ratio = _____

4. Complete the conjectures.

The length of the midsegment is _____.

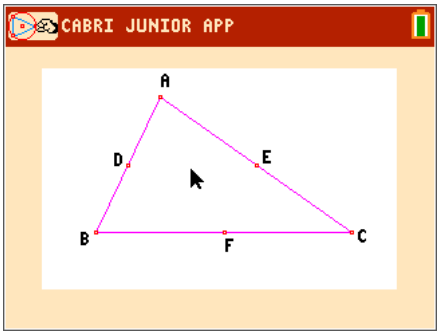
The slope of the midsegment is _____.

5. What is the relationship between △*ADE* and △*ABC*? How would you prove it?

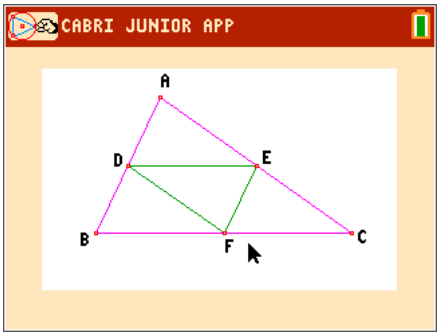
Problem 2 – Three Midsegments

Open the Cabri Jr. file *MIDSEG* created in Problem 1.

Create the midpoint of the third side of the triangle and label it *F*.



Construct △*DEF* using the **Triangle** tool.

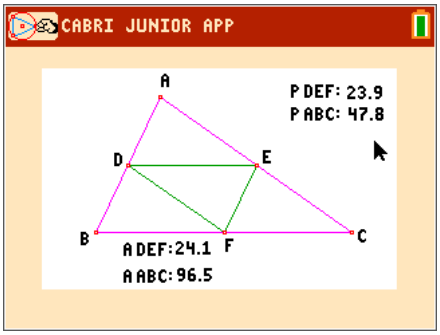


6. Use the **D. & Length** and **Area** tools in the **Measure** menu to measure the perimeter and area of △*DEF* and △*ABC*.

Perimeter of △ABC = _____ Area of △ABC = _____

Perimeter of △DEF = _____ Area of △DEF = _____

Use the **Calculate** tool to find the ratio of the perimeters and areas. Take the larger value and divide by the smaller value.



7. Drag a vertex of △*ABC* and observe the results.

Ratio of Perimeters = _____

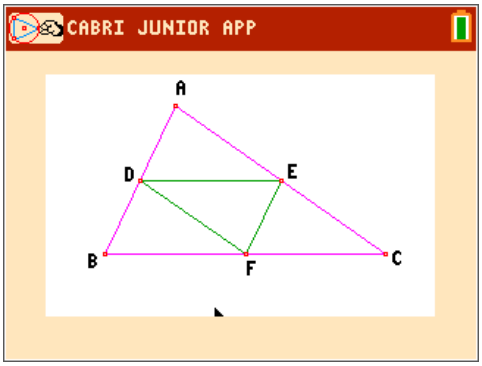
Ratio of Areas = _____

8. What is the relationship between △*DEF* and △*ABC*? How would you prove it?

9. What is the relationship between △*DEF* and △*ADE*? How would you prove it?

Apply the Math

Use this diagram for each exercise. *D*, *E*, and *F* are all midpoints.



10. If *DE* = 6.2 inches, and *AB* = 11.4 inches, find the lengths of $\overline{BC}$ and $\overline{EF}$.

11. If the perimeter of △*ABC* is 32 cm, find the perimeter of △*DEF*.

12. If the area of △*DEF* is 8.6 cm^2, find the areas of △*ABC*, △*ADE* and △*BDF*.

13. If $m\angle AED = 27°$ and $m\angle A = 64°$, find as many other angle measures as possible.