Triangle Midsegments

Student Activity

Name _____

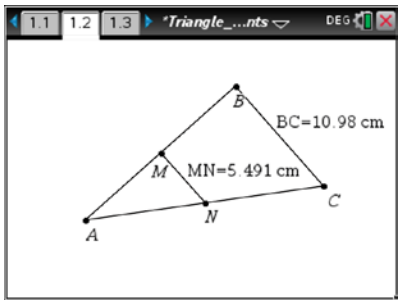
Class _____

Open or create the TI-Nspire document *Triangle_Midsegments.tns.*

In this activity, you will collect length and area data from a triangle and one of its midsegments. You will investigate relationships for the measurement data with a spreadsheet.

Move to page 1.2.

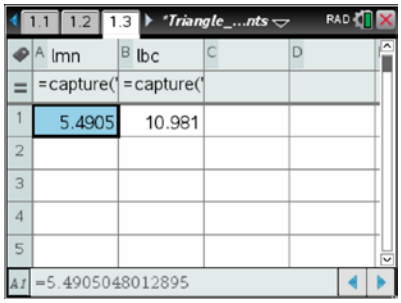
Part 1—Finding the ratio of the side to the segment



A ***midsegment*** is a segment connecting the midpoints of two sides of a triangle.

Page 1.2 shows ΔABC with midsegment $\overline{MN}$ parallel to side $\overline{BC}$. *MN* and *BC* have been defined as variables.

1. What can you say about the relationship between ΔABC and ΔAMN? How do you know?



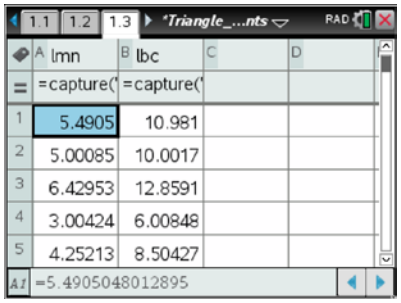
You will capture these segment measurements into the spreadsheet on page 1.3. Drag point *B* or point *C* to form a new triangle. Press ctrl . . This captures the current lengths for $\overline{MN}$ and $\overline{BC}$.

Press ctrl ▶ to look at the spreadsheet. The measurements appear in rows.

Return to page 1.2. Drag point *B* or point *C* to form another triangle. Press ctrl . . Repeat four more times.

Return to page 1.3. Examine the data in Columns A and B.

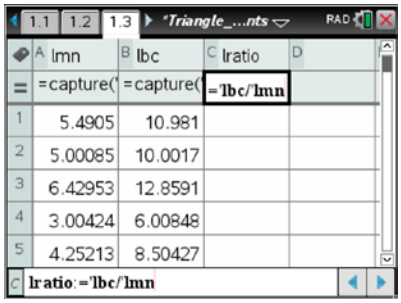
2. What comparison can you make between the two columns?



Move your cursor to the top of Column C (above the diamond row). Name this column *lratio* and press enter.

In the diamond row, enter a formula using the column names for Columns A and B. To do this, move your cursor to the diamond row of Column C and press ▼. Press var and select *lbc* from the list. Press ÷. Press var and select *lmn* from the list. Press enter.

Press enter again.

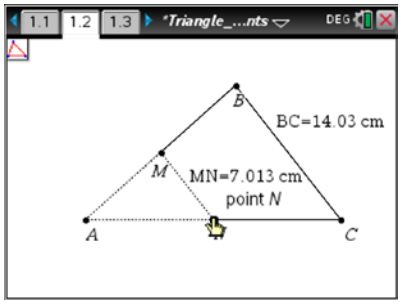


3. What does the formula mean?

4. What does the result of the formula tell you about side $\overline{BC}$ and the midsegment $\overline{MN}$?

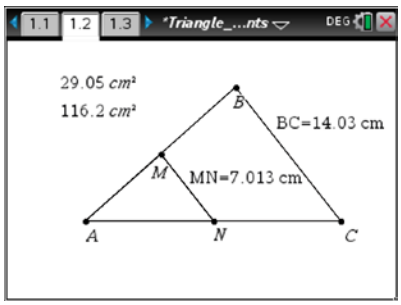
Part 2—Finding the ratio of the areas

Draw Δ*AMN*. To do this, return to page 1.2. Press **Menu > Shapes > Triangle**. Click on each of the points *A, M,* and *N*. Press esc to exit the **Triangle** tool.

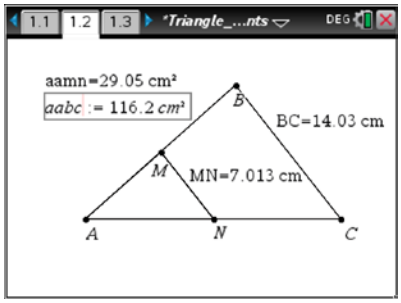


5. What do you predict the ratio of the areas of Δ*ABC* and Δ*AMN* to be?

Measure the areas of Δ*AMN* and Δ*ABC*. To do this, press **Menu > Measurement > Area**. Click on Δ*AMN* by hovering over $\overline{MN}$. Move the measurement to a clear area of the screen and click to drop it. Repeat to measure Δ*ABC*. Press esc to exit.

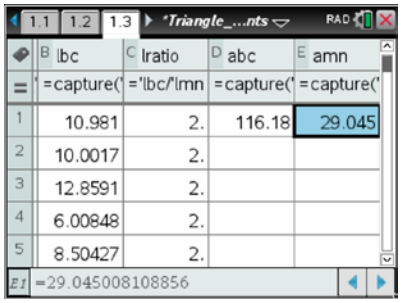


Define each area measure as a variable. To do this, move your cursor to the measurement for ΔABC. Click once. Press ctrl var. Then type **aabc** and press enter. Repeat for ΔAMN, naming the variable *aamn*.



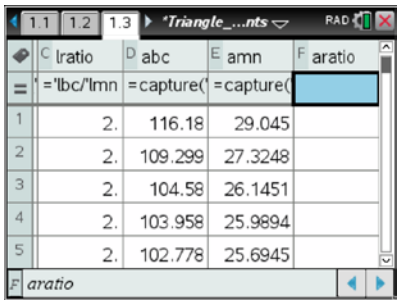
To analyze the ratio of the areas, capture some of the areas to the spreadsheet. To do this, move to page 1.3. Move your cursor to the top of Column D and name the column *abc*. Name Column E *amn*.

Move your cursor to the diamond row of Column D. Press **Menu > Data > Data Capture > Automated Data Capture**. Enter the variable *aabc* (by typing or by using the var key as in column C). Press enter. Repeat to define Column E to capture the area of ΔAMN.



Return to page 1.2. Drag point *B* or point *C* for a few seconds. The spreadsheet is rapidly capturing data as you drag.

Return to page 1.3. Use Column F to determine the ratios of the areas. Name Column F *aratio* using a procedure similar *to lratio.*



6. Give and explain a ratio that describes the relationships between the areas of ΔABC and ΔAMN.

7. What is the ratio of the perimeters of the two triangles? How do you know?