



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.

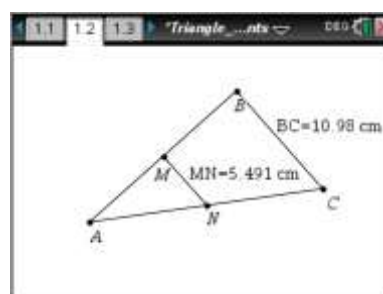
Part 1—Finding the ratio of the side to the segment

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

Page 1.2 shows $\triangle ABC$ 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 $\triangle ABC$ and $\triangle AMN$? 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.

	A: lmn	B: lbc	C	D
	=capture()	=capture()		
1	5.4905	10.981		
2				
3				
4				
5				
A1	=5.4905048012895			



Triangle Midsegments

Student Activity

Name _____
Class _____

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 **capture**. 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} ?

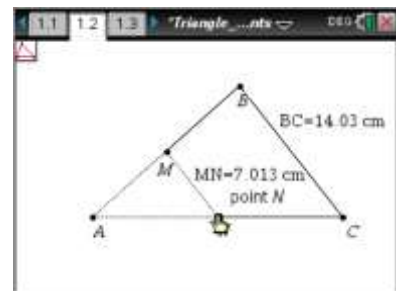
	lmn	lbc
1	5.4905	10.981
2	5.0085	10.0017
3	6.42953	12.8591
4	3.00424	6.00848
5	4.25213	8.50427

	lmn	lbc	lratio
1	5.4905	10.981	
2	5.0085	10.0017	
3	6.42953	12.8591	
4	3.00424	6.00848	
5	4.25213	8.50427	

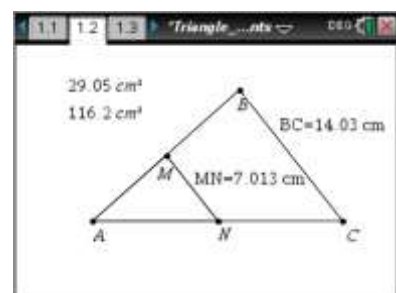
Part 2—Finding the ratio of the areas

Draw $\triangle AMN$. 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 $\triangle ABC$ and $\triangle AMN$ to be?



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





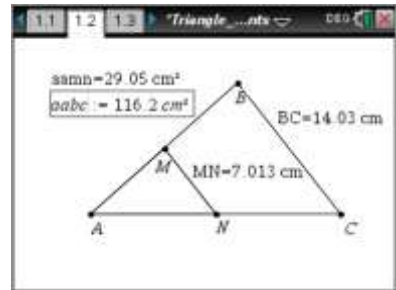
Triangle Midsegments

Student Activity

Name _____

Class _____

Define each area measure as a variable. To do this, move your cursor to the measurement for $\triangle ABC$. Click once. Press **ctrl** **var**. Then type **aabc** and press **enter**. Repeat for $\triangle AMN$, 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**.

	B lbc	C lratio	D abc	E amn
	=capture()	=lbc/lmn	=capture()	=capture()
1	10.981	2.	116.18	29.045
2	10.0017	2.		
3	12.8591	2.		
4	6.00848	2.		
5	8.50427	2.		
Σ	29.045008108856			

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 $\triangle AMN$.

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**.

	C lratio	D abc	E amn	F aratio
	=lbc/lmn	=capture()	=capture()	
1	2.	116.18	29.045	
2	2.	109.299	27.3248	
3	2.	104.58	26.1451	
4	2.	103.958	25.9894	
5	2.	102.778	25.6945	
Σ				

6. Give and explain a ratio that describes the relationships between the areas of $\triangle ABC$ and $\triangle AMN$.

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