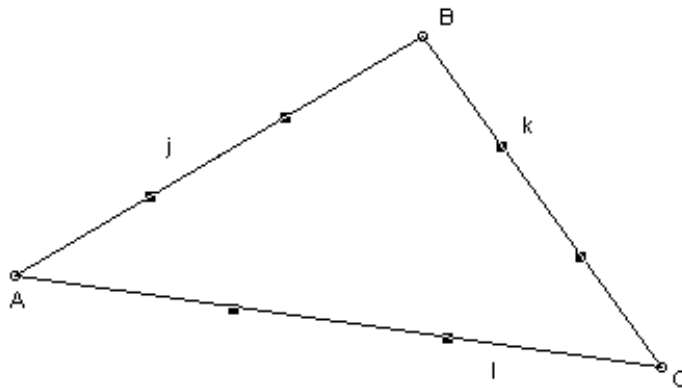


## Investigation: The Midsegment Theorem

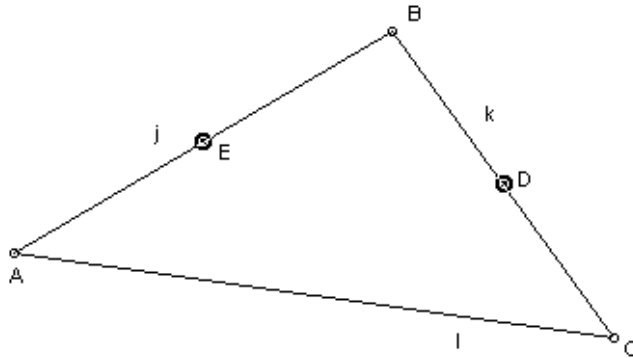
In this investigation you will construct a segment connecting the midpoints of two sides of a triangle. You will then find the relationship between the segment you just constructed and the third side of the triangle. This is called the Midsegment Theorem.

### Sketching and Investigating

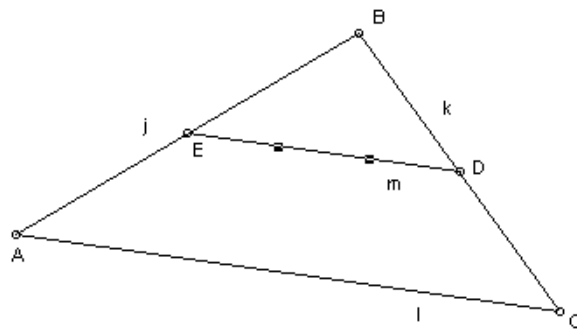
1. Be sure labels are on (If you do not know how to do this, read the directions in the Overview)
2. Choose the point tool
3. In the sketch plane, draw 3 non-collinear points
4. Select all three points (If you do not know how to do this, read the directions in the Overview)
5. Click the “**Construct**” menu
6. Choose “**Segment**”  
This should form  $\triangle ABC$



7. Deselect  $l$  by holding down shift and clicking that side
8. Click the “**Construct**” menu
9. Choose “**Point at Midpoint**”  
This will construct Midpoint D and Midpoint E



10. Click the “**Construct**” menu
11. Choose “**Segment**”  
This should form  $m$



12. Select  $l$  (the side without a midpoint constructed)
13. Click the “**Measure**” menu
14. Choose “**Slope**”  
This will display the slope of  $l$  in the upper left corner
15. Select  $m$
16. Click the “**Measure**” menu
17. Choose “**Slope**”  
This will display the slope of  $m$  in the upper left corner

**What is the relationship of the slopes of these two segments ( $l$  and  $m$ )?**

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18. Select a vertex of the triangle, hold the mouse button down, drag the point around, and then release the mouse button. Complete the table. Repeat 2 more times.


	Slope of $l$	Slope of $m$
Trial 1		
Trial 2		
Trial 3		

**As you change the shape of the triangle, compare the slopes of the two segments. Does the relationship of these slopes change? If yes, how?**

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**Lines or segments with this relationship are \_\_\_\_\_ .**

19. Select  $l$  (the side without a midpoint constructed)
20. Click the “**Measure**” menu
21. Choose “**Length**”  
This will display the length of  $l$  in the upper left corner
22. Select  $m$
23. Click the “**Measure**” menu
24. Choose “**Length**”  
This will display the length of  $m$  in the upper left corner
25. Click the “**Measure**” menu
26. Choose “**Calculate...**”  
A calculator will be displayed
27. Choose the arrow tool
28. Select the measure of  $m$  ( $m = \underline{\quad}$ ) in the upper left corner  
This should be displayed on the calculator
29. Click the slash in the keypad diagram on the calculator to indicate division
30. Select the measure of  $l$  ( $l = \underline{\quad}$ ) in the upper left corner  
This should be displayed on the calculator

31. Click 

The calculator will disappear, and the result will appear beneath the other measurements in the upper left corner

32. Complete the table below for trial 1.

**What is the answer to this division problem showing the relationship between the lengths of these two segments?**

33. Select a vertex of the triangle, hold the mouse button down, drag the point around, and then release the mouse button. Complete the table for trial 2. Repeat 2 more times.

	$m =$	$l =$	$\frac{m}{l}$
Trial 1			
Trial 2			
Trial 3			
Trial 4			

**As you change the shape of the triangle, compare the lengths of the two segments. Does the relationship of these lengths change? If yes, how?**

\_\_\_\_\_

**The segment connecting the midpoints of two sides of a triangle is**

\_\_\_\_\_ **as long as the third side.**

**The Midsegment Theorem:**

**The segment connecting the midpoints of two sides of a triangle is**

\_\_\_\_\_ **to the third side and is \_\_\_\_\_ as long.**