## Lesson 5: Splitting Triangle Sides with Dilation, Part 1

* Let’s draw segments connecting midpoints of the sides of triangles.

### 5.1: Notice and Wonder: Midpoints

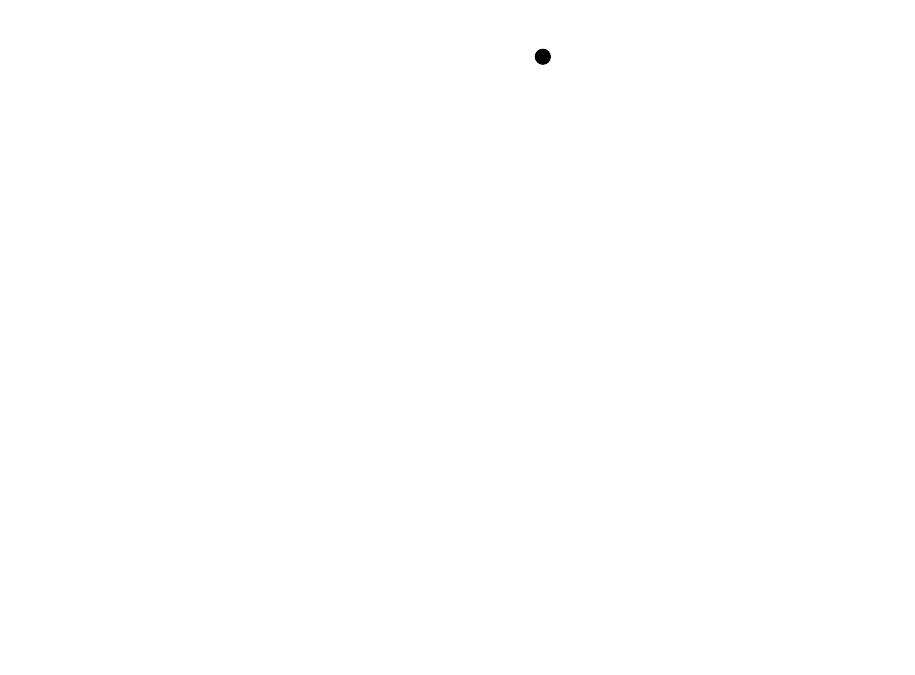
Here’s a triangle with midpoints , and .



What do you notice? What do you wonder?

### 5.2: Dilation or Violation?

Here’s a triangle . Points  and  are the midpoints of 2 sides.



1. Convince yourself triangle is a dilation of triangle . What is the center of the dilation? What is the scale factor?
2. Convince your partner that triangle is a dilation of triangle , with the center and scale factor you found.
3. With your partner, check the definition of dilation on your reference chart and make sure both of you could convince a skeptic that definitely fits the definition of dilation.
4. Convince your partner that segment is twice as long as segment .
5. Prove that . Convince a skeptic.

### 5.3: A Little Bit Farther Now

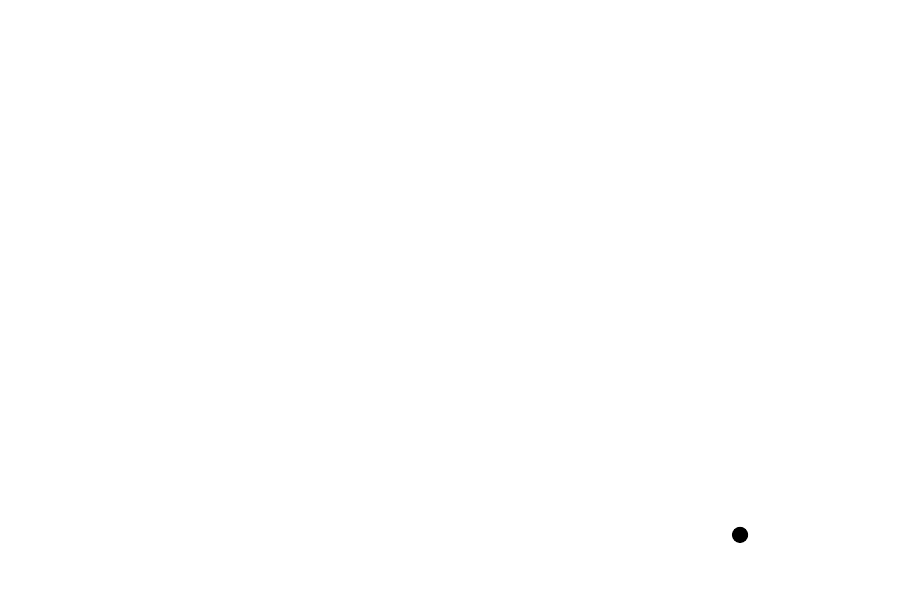
Here’s a triangle . is of the way from to . is of the way from to .



What can you say about segment , compared to segment ? Provide a reason for each of your conjectures.

#### Are you ready for more?

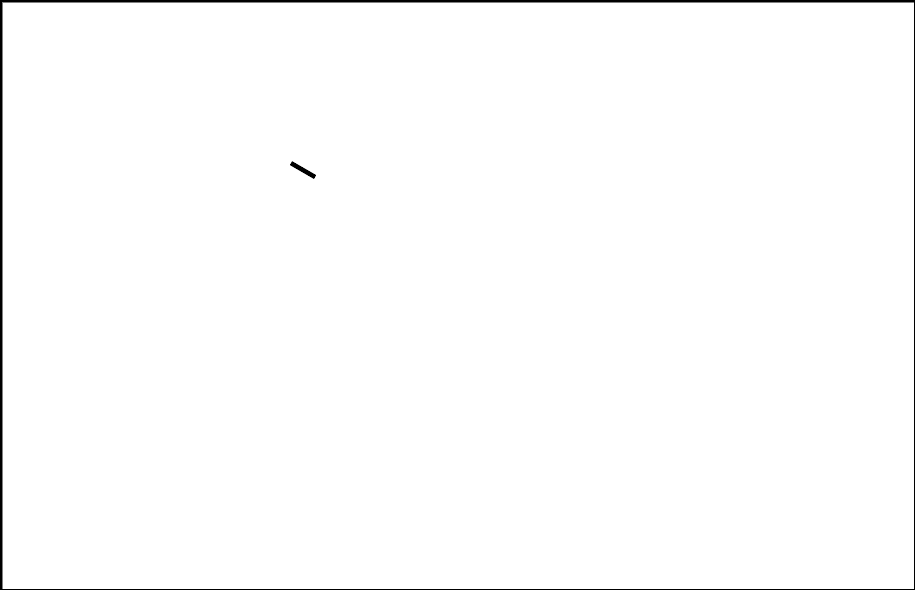
1. Dilate triangle using a scale factor of -1 and center .
2. How does compare to ?
3. Are , , and  collinear? Explain or show your reasoning.



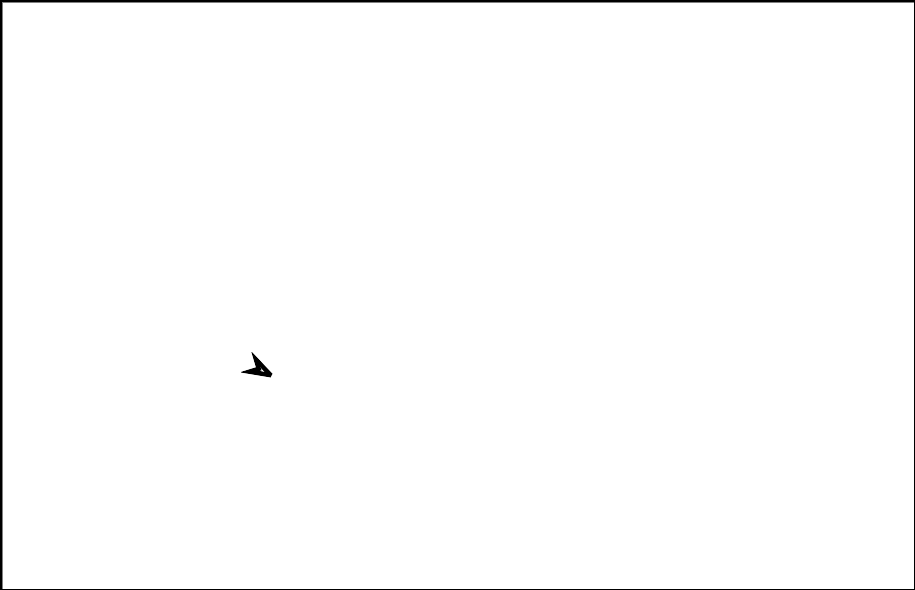
### Lesson 5 Summary

Let's examine a segment whose endpoints are the midpoints of 2 sides of the triangle. If is the midpoint of segment and is the midpoint of segment , then what can we say about  and triangle ?

Segment  is parallel to the third side of the triangle and half the length of the third side of the triangle. For example, if , then . This happens because the entire triangle is a dilation of triangle with a scale factor of .



In triangle , segment divides segments and proportionally. In other words, =. Again, there is a dilation that takes triangle to triangle , so  is parallel to  and we can calculate its length using the same scale factor.





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