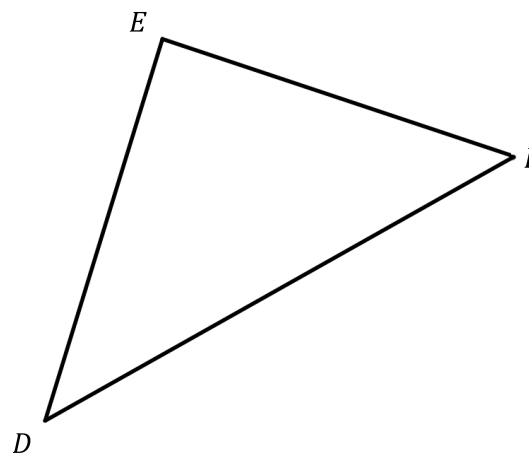


**Section 7 – Topic 3**  
**Triangle Midsegment Theorem – Part 1**

If the midpoint of a segment is the halfway point or the middle, then what is the midsegment of a triangle?

Construct the midsegment of triangle  $DEF$  below and label the midsegment  $\overline{MP}$ .



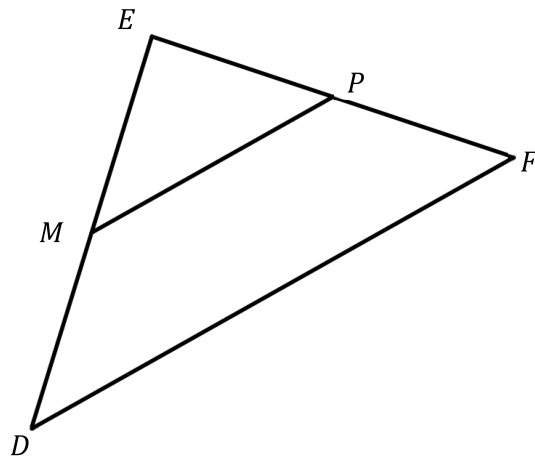
**TAKE NOTE!**  
Postulates &  
Theorems

**Triangle Midsegment Theorem**

The midsegment of a triangle joins the midpoints of two sides of a triangle such that its length is half the length of the third side of the triangle and it is parallel to the third side of the triangle.



Consider triangle  $DEF$  with midsegment  $\overline{MP}$  below.



Describe the relationship between  $\overline{MP}$  and  $\overline{DF}$ .

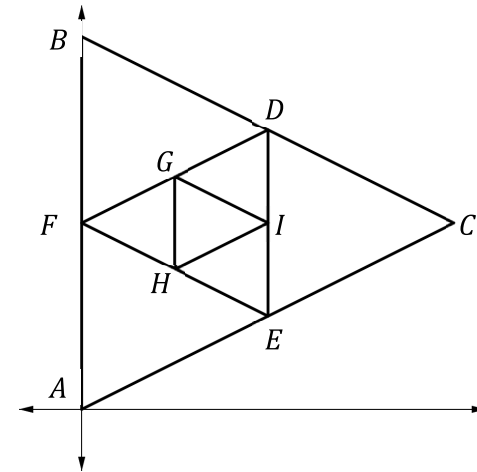
Describe the relationship between  $\overline{DM}$  and  $\overline{ME}$ .

Describe the relationship between  $\overline{FP}$  and  $\overline{PE}$ .

The area of the triangle  $MPE$  is what part of the area of the triangle  $DFE$ ?

**Let's Practice!**

- In the diagram below,  $A$  is located at the origin,  $G$  is located at  $(6, 15)$ ,  $H$  is located at  $(6, 9)$  and  $I$  is located at  $(12, 12)$ . Assume that  $D, E, F, G, H,$  and  $I$  are midpoints.



- Complete the following table.

Vertices	$B$	$C$	$D$	$E$	$F$
Coordinates					

b. Which of the following statements are correct about the previous diagram? Select all that apply.

- Triangles  $ABC$  and  $GHI$  are isosceles.
- Triangle  $DEF$  is equilateral.
- $\overline{GH} \cong \overline{HI} \cong \overline{GI}$
- The area of triangle  $ABC$  is 16 times larger than the area of triangle  $GHI$ .
- The area of triangle  $GHI$  is one half the area of triangle  $DEF$ .
- $\overline{FE} > \overline{DE}$
- If triangle  $ABC$  is dilated by a scale factor of  $\frac{1}{4}$  centered at  $C$ , then  $\triangle A'B'C' \cong \triangle CDE$ .

**Try It!**

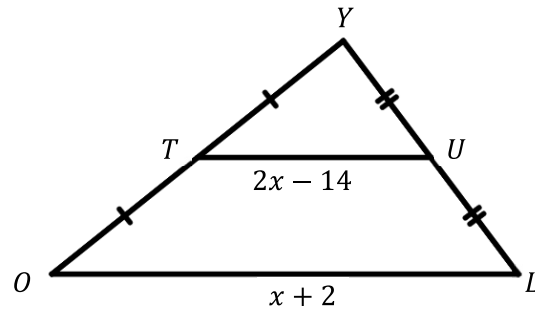
2. If the midsegment of an isosceles triangle is 5 feet and each of the congruent sides of the triangle are 6 feet, what is the measure of the side parallel to the midsegment?
  
  
  
  
  
  
  
  
  
  
3. The Michigan Triangle is a region located in the middle of Lake Michigan. The triangle is bounded by Benton Harbor, MI; Ludington, MI; and Manitowoc, WI. If you draw their midsegments into the Michigan Triangle, how does the perimeter of the midsegment triangle compare to the perimeter of the Michigan Triangle?



**Section 7 – Topic 4**  
**Triangle Midsegment Theorem – Part 2**

**Let's Practice!**

1. Consider the diagram below.



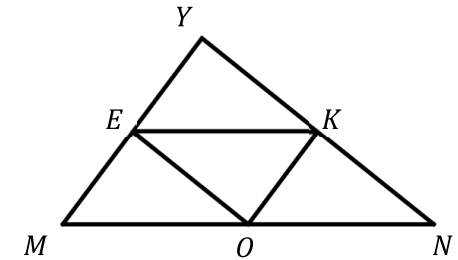
Find the sum of  $TU$  and  $OL$ .

**Try It!**

2. Consider the diagram below.

**Given:**  $\overline{EK}$ ,  $\overline{KO}$ , and  $\overline{OE}$  are midsegments of  $\triangle MNY$ .

**Prove:** The perimeter of  $\triangle EKO = \frac{1}{2}(MN + NY + YM)$ .

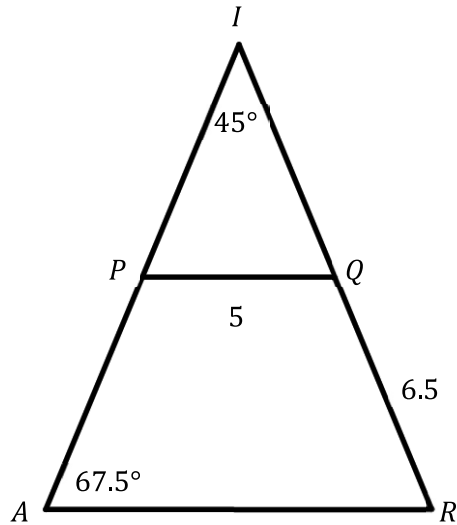


Based on the above figure and the information below, complete the following two-column proof.

Statements	Reasons
1. $\overline{EK}$ , $\overline{KO}$ , and $\overline{OE}$ are midsegments of $\triangle MNY$ .	1. Given
2.	2. Triangle Midsegment Theorem
3. The perimeter of $\triangle EKO = (EK + KO + OE)$ .	3.
4.	4. Substitution
5. The perimeter of $\triangle EKO = \frac{1}{2}(MN + NY + YM)$ .	5.

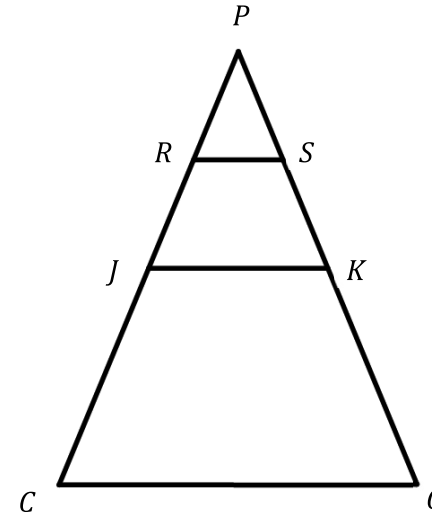
**BEAT THE TEST!**

1. Consider the figure below.



$P$  and  $Q$  are the midpoints of  $\overline{AI}$  and  $\overline{RI}$ , respectively. Use the properties of midsegments to find the perimeter of  $\triangle AIR$ .

2. In the following figure,  $\overline{JK}$  is a midsegment of  $\triangle COP$ ,  $\overline{RS}$  is a midsegment of  $\triangle PJK$ , and  $\overline{OK} \cong \overline{CJ}$ .



Part A: What can you conclude about  $\angle C$  and  $\angle O$ ? Justify your answer.

Part B: What is the relationship of the lengths  $\overline{RS}$  and  $\overline{CO}$ ?

