

# Geometry: 6.4-6.5 Notes

NAME \_\_\_\_\_

## 6.4 Use triangle midsegment theorem

Date: \_\_\_\_\_

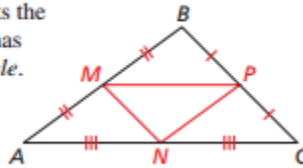
### Define Vocabulary:

midsegment of a triangle

### Using the Midsegment of a Triangle

A **midsegment of a triangle** is a segment that connects the midpoints of two sides of the triangle. Every triangle has three midsegments, which form the *midsegment triangle*.

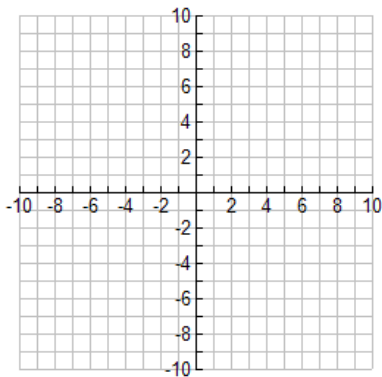
The midsegments of  $\triangle ABC$  at the right are  $\overline{MP}$ ,  $\overline{MN}$ , and  $\overline{NP}$ . The *midsegment triangle* is  $\triangle MNP$ .



**Examples:** Given the vertices of the triangle. What are the vertices of the midsegment triangle?

1. **WE DO**

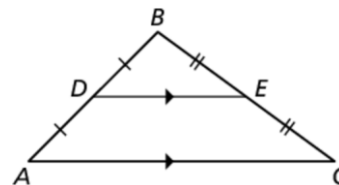
$A(-5, 6)$ ,  $B(3, 8)$ , and  $C(1, -4)$ .



### Theorem 6.8 Triangle Midsegment Theorem

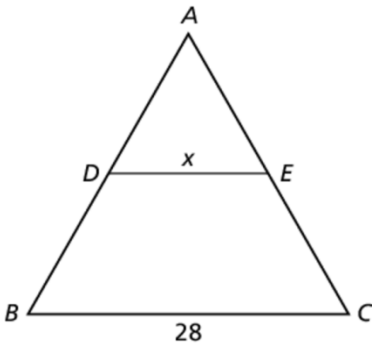
The segment connecting the midpoints of two sides of a triangle is parallel to the third side and is half as long as that side.

$\overline{DE}$  is a midsegment of  $\triangle ABC$ ,  $\overline{DE} \parallel \overline{AC}$ , and  $DE = \frac{1}{2}AC$ .

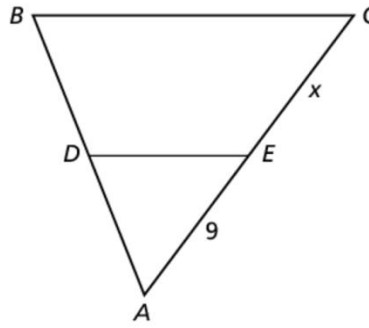


Examples:  $DE$  is a midsegment of  $\triangle ABC$ . Find the value of  $x$ .

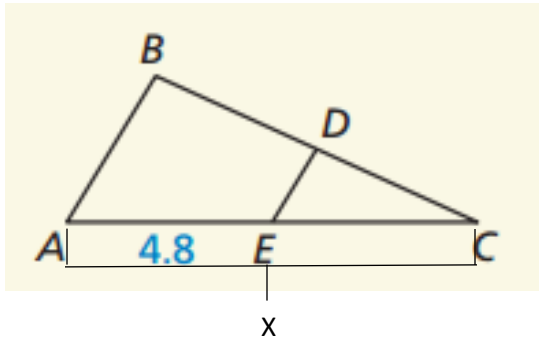
2. WE DO



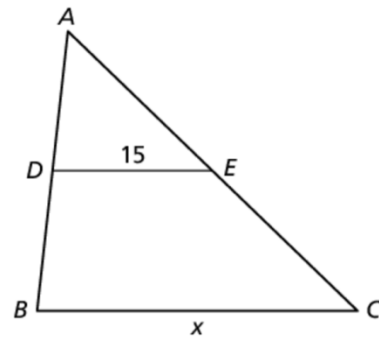
3.



4. YOU DO

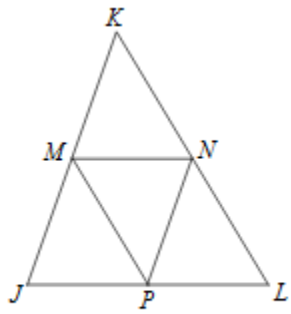


5.



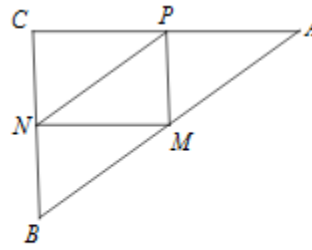
Examples: In each triangle M, N, and P are midpoints of the sides. Name a segment parallel to the one given.

6. **WE DO**



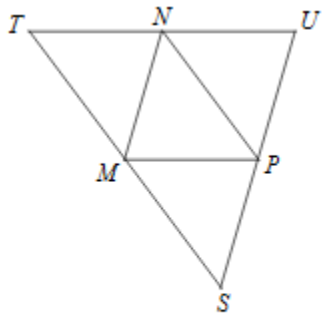
\_\_\_  $\parallel$   $\overline{JK}$

7.



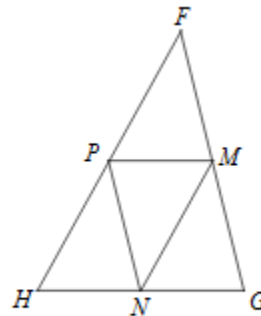
\_\_\_  $\parallel$   $\overline{AC}$

8. **YOU DO**



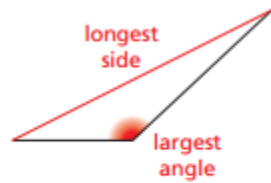
$\overline{MN} \parallel$  \_\_\_

9.

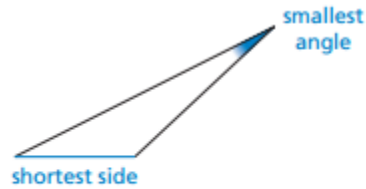


$\overline{MP} \parallel$  \_\_\_

Assignment	
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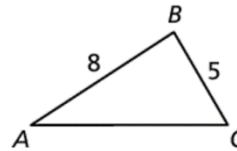
The longest side and largest angle are opposite each other.



The shortest side and smallest angle are opposite each other.

### Theorem 6.9 Triangle Longer Side Theorem

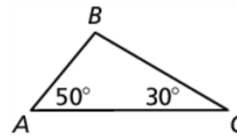
If one side of a triangle is longer than another side, then the angle opposite the longer side is larger than the angle opposite the shorter side.



$AB > BC$ , so  $m\angle C > m\angle A$ .

### Theorem 6.10 Triangle Larger Angle Theorem

If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.

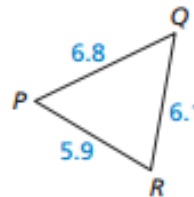
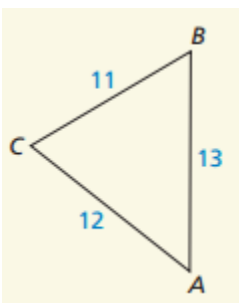


$m\angle A > m\angle C$ , so  $BC > AB$ .

**Examples:** List the angles of the triangle in order from smallest to largest.

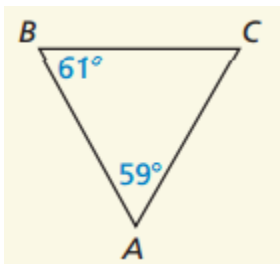
1. WE DO

2. YOU DO

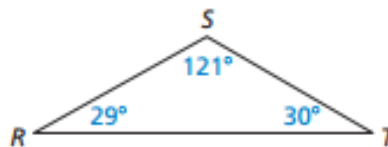


**Examples: List the sides of the triangle in order from shortest to longest.**

3. **WE DO**



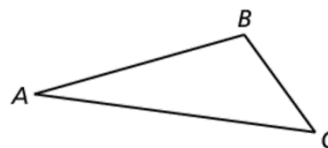
4. **YOU DO**



### Theorem 6.11 Triangle Inequality Theorem

The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

$$AB + BC > AC \quad AC + BC > AB \quad AB + AC > BC$$



**Examples: Finding possible side lengths.**

5. **WE DO**

A triangle has one side of length 6 and another side of length 15. Describe the possible lengths for the third side.

6. **YOU DO**

A triangle has one side of length 12 inches and another side of length 20 inches. Describe the possible lengths for the third side.

**Examples: Decide whether it is possible to construct a triangle with the given side lengths. Explain your reasoning.**

7. **WE DO**

**4 ft, 9 ft, 10 ft**

8. **YOU DO**

**8 m, 9 m, 18m**

9. **5 cm, 7 cm, 12 cm**

Assignment	
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