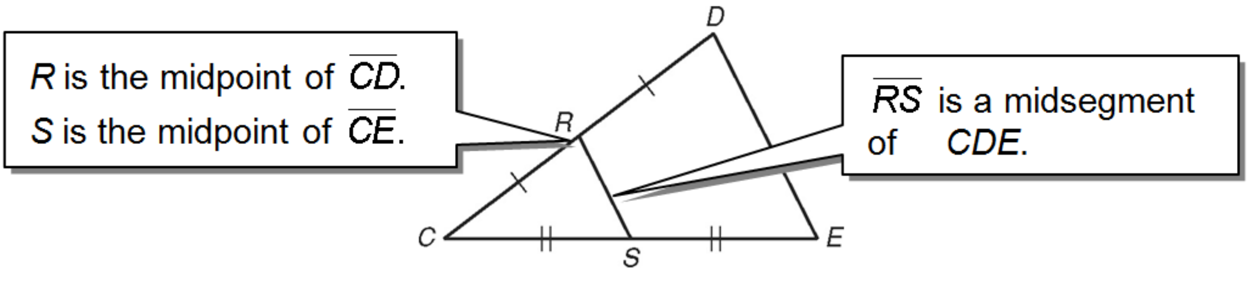
Objective

Prove and use properties of triangle midsegments.

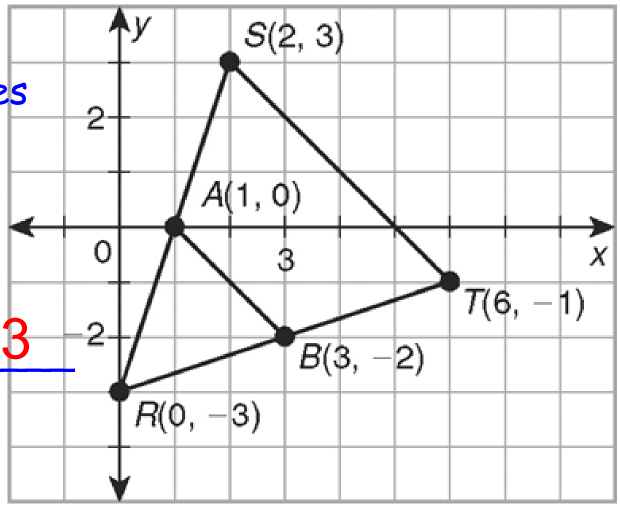
A **midsegment of a triangle** is a segment that joins the midpoints of two sides of the triangle.

Every triangle has three midsegments, which form the *midsegment triangle*.



Investigation

1. Find the slope of AB __-1__ and the slope of ST __-1__



2. What do you notice? What does that tell us about AB and ST?

__$\overline{AB} \parallel \overline{ST}$__ The lines are parallel

3. Find the distance of AB__2.83__ and RT __5.66__.

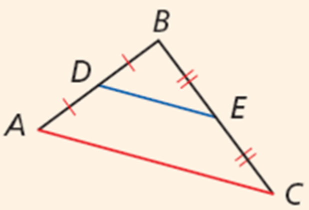
4. What do you notice about the lengths of the segments AB and ST? __ST = 2*AB__

The relationship shown in the previous example is true for the three midsegments of every triangle.

Theorem 5-4-1 **Triangle Midsegment Theorem**

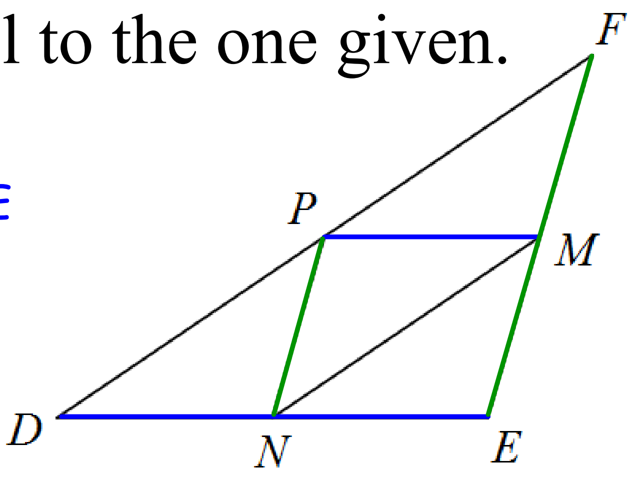
A midsegment of a triangle is parallel to a side of the triangle, and its length is half the length of that side.

$\overline{DE} \parallel \overline{AC}$, $DE = \frac{1}{2}AC$ AC = 2DE



Example 1

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

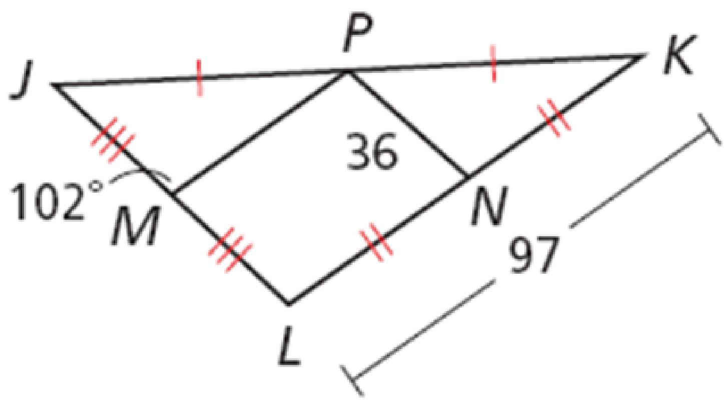


MP is parallel to DE

FE is parallel to PN

Example 2

Find each measure.



JL is twice as big as it's midsegment PN.

JL = 72

PM is a midsegment and is half the size of the side it is parallel to LK.

MP = 48.5

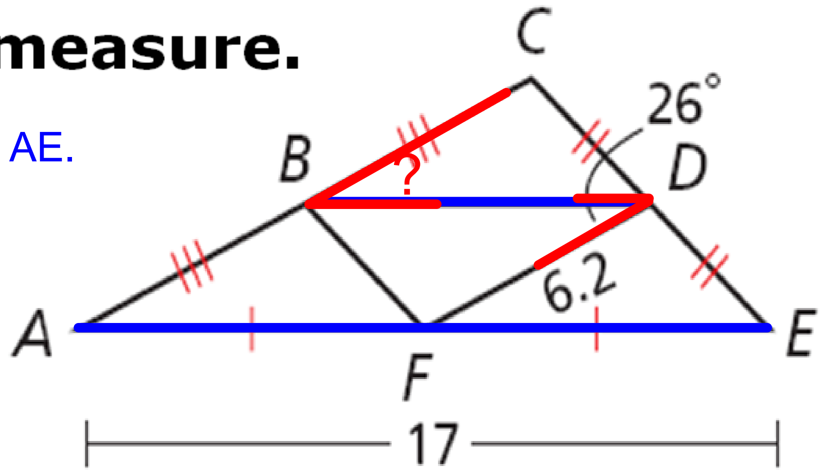
m∠MLK is corrresponding to ∠JMP. Corresponding angles are congruent so the m ∠MLK is 102°

Example 3

Find each measure.

BD BD is half of AE.

BD = 8.5



m∠*CBD* = 26°. Alternate interier angles are congruent.

Example 4

Find x and the GH.

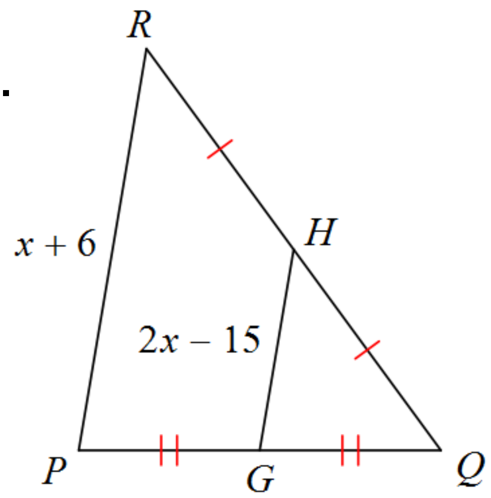
RP = 2GH

x + 6 = 2(2x - 15)

x + 6 = 4x - 30

36 = 3x

x = 12



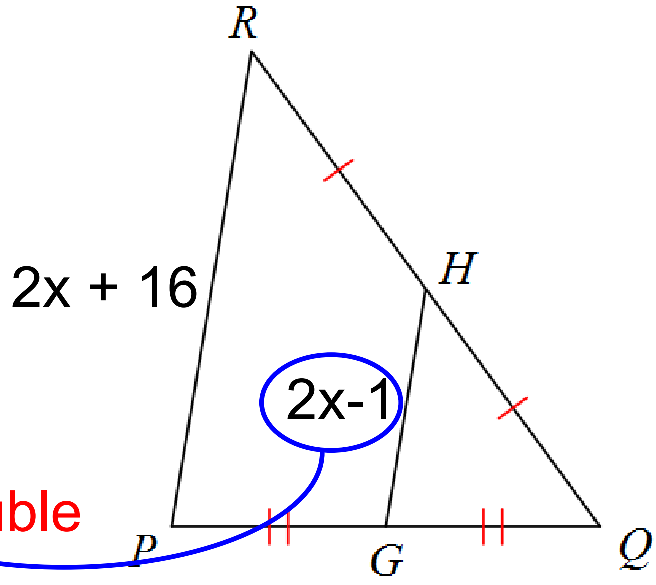
Substitute 12 in for x.

RP = 12 + 6
RP = 18

GH = 2*12 - 15
GH = 9

Example 5

Find x and *RP*.



Double the short (HG) and set it equal to the long (RP).

$2x + 16 = 4x - 2$

double

$x = 9$

$RP = 2*9 + 16$

$RP = 34$