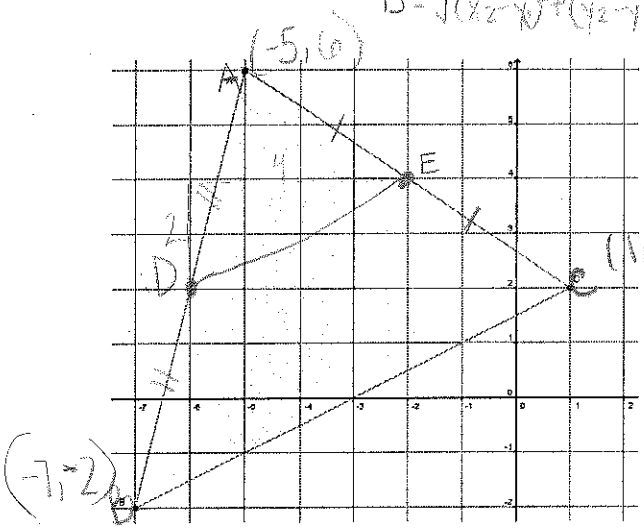
Notes 5-4: Triangle Midsegment Theorem **Ch. 5:** ***Properties and Attributes of Triangles***

Objectives: *Prove and use properties of triangle midsegments.*

- Use the MIDPOINT FORMULA: $M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ to find the midpoints of *AB* and *AC*.
- Label them *D* and *E*, and draw *DE*. This is called a midsegment.
- Use the slope formula to find the slope of *DE* and *BC*. What do you notice? Same slope → parallel
- Use the distance formula to find the length of *DE* and *BC*. What do you notice? $DE = \frac{1}{2}$ of BC

$D = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ (distance)

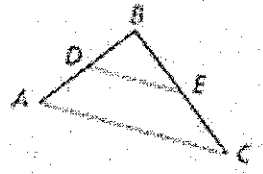


midpoint of *AB*	slope of *DE*	length of *DE*
$\left(\frac{-5+-7}{2}, \frac{6+-2}{2}\right)$ → $\left(\frac{-12}{2}, \frac{4}{2}\right)$ → $D(-6, 2)$	$\frac{\text{rise}}{\text{run}} = \frac{2}{4}$ → $DE = \frac{1}{2}$	$DE = \sqrt{(-6-2)^2+(2-4)^2}$ → $\sqrt{(-4)^2+(-2)^2}$ → $\sqrt{16+4}$ → $\sqrt{20} = 4.47$
midpoint of *AC*	**slope of *BC***	**length of *BC***
$\left(\frac{-5+1}{2}, \frac{6+-2}{2}\right)$ → $\left(\frac{-4}{2}, \frac{8}{2}\right)$ → $E(-2, 4)$	$\frac{\text{rise}}{\text{run}} = \frac{4}{8}$ → $BC = \frac{1}{2}$	$BC = \sqrt{(-7-1)^2+(-2-2)^2}$ → $\sqrt{(-8)^2+(-4)^2}$ → $\sqrt{64+16}$ → $\sqrt{80} = 8.94$

Midsegment of a Triangle: a segment which joins the midpoints of two sides of a triangle.

Midsegment Theorem: the *midsegment* is parallel to a side, and is $\frac{1}{2}$ the length of it.

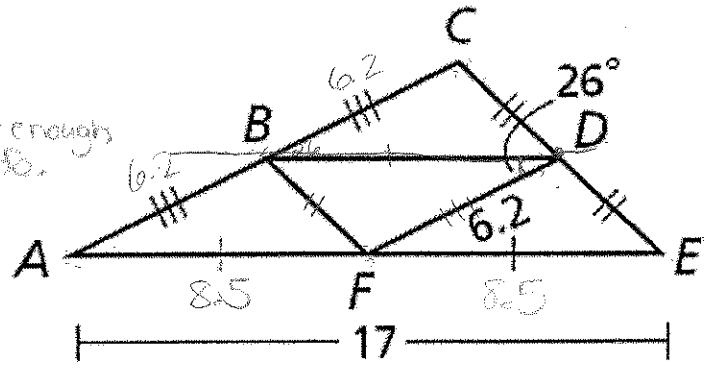
- Every triangle has 3 *midsegments*.
- The midsegments of a triangle form a *midsegment* triangle.
  - $\overline{AC} \parallel \overline{DE}$
  - $DE = \frac{1}{2}$ of AC



EX 1: Find each measure.

$\overline{BD} = 8.5$
$\overline{AF} = 8.5$
$\overline{BC} = 6.2$
$\overline{AC} = 12.4$

$\angle CBD = 26°$
$\angle CDB \cong \angle BEA$ ~~$\angle DBF$~~ not enough info.
$\angle DBF \cong \angle$
$\angle A \cong \angle B$



EX 2: Use the midpoint formula to find and draw the *midsegment triangle* in the diagram.

A(-4,7) B(-4,-3)