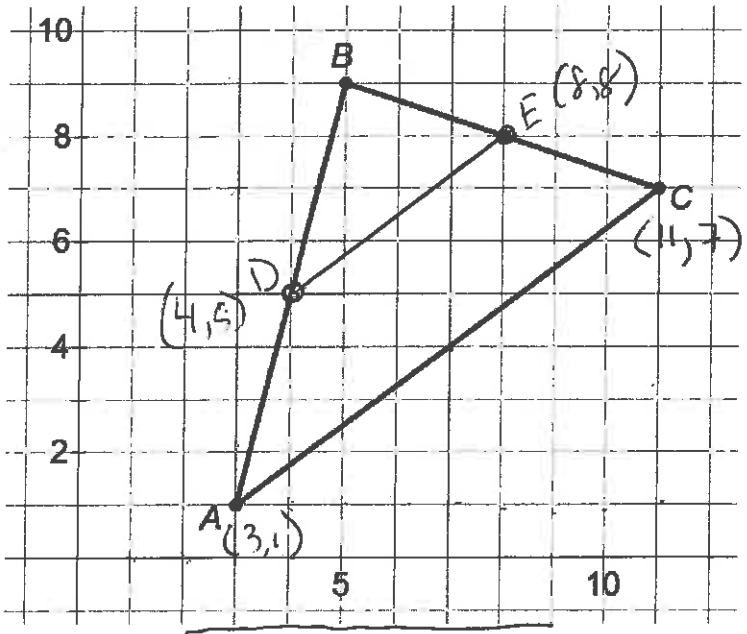
Geometry – Mr. Bo
Unit 6 – Day 4 Notes

Name Notes.
Date

Midsegments & Triangle Inequalities

Midsegment of a Triangle: A segment that connects the midpoints of two sides of a triangle.



Distance: $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Slope: $\frac{y_2-y_1}{x_2-x_1}$

midpt: $\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$

1. Find the midpoints of sides $\overline{AB}$ and $\overline{BC}$ and label the points D and E respectively. Draw Midsegment $\overline{DE}$ of ΔABC.

D(4,5) E(8,8)

2. Find AC and DE. How do the lengths compare to each other?

$AC = \sqrt{(11-3)^2+(7-1)^2}$
$= \sqrt{8^2+6^2}$
$= \sqrt{100}$
$= 10$

$DE = \sqrt{(8-4)^2+(8-5)^2}$
$= \sqrt{4^2+3^2}$
$= \sqrt{25}$
$= 5$

AC is twice DE.

3. Find the slopes of $\overline{AC}$ and $\overline{DE}$. How do the measures of the slopes compare?

Slope $\overline{AC} = \frac{7-1}{11-3} = \frac{6}{8} = \frac{3}{4}$

Slope $\overline{DE} = \frac{8-5}{8-4} = \frac{3}{4}$

} Slopes are =

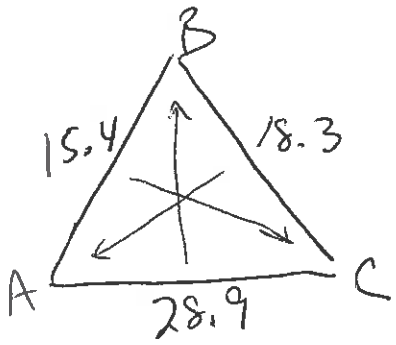
4. Using your results from 2 & 3 above, make a conjecture about the relationship between the Midsegment of a triangle ($\overline{DE}$) and the 3rd side of the triangle (side $\overline{AB}$).

Midsegment Theorem:

a) The midsegment of a triangle is ½ the length of the 3rd side of the Δ.

b) The midsegment of a triangle is parallel to the 3rd side of the Δ.

Inequalities in Triangles:



THEOREM: In a triangle, the larger angle lies opposite the larger side.

Example: In Triangle ABC, BC = 18.3 cm, AB = 15.4 cm, AC = 28.9 cm.

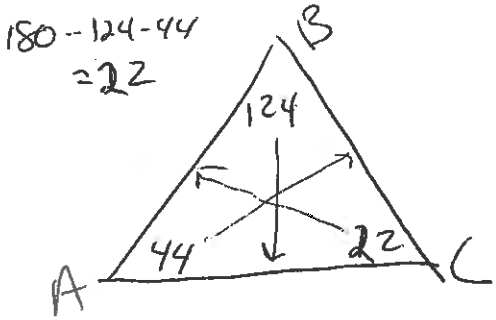
Which **angle** is the:

Smallest? $\angle C$

Midsize? $\angle A$

Largest? $\angle B$

CONVERSE: In a triangle, the larger side lies opposite the larger angle.



Example: In Triangle ABC, m<A = 44 and m<B = 124.

Which **side** is the:

Smallest? $\overline{AB}$

Midsize? $\overline{BC}$

Largest? $\overline{AC}$

The Triangle Inequality Theorem

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

Example 1: Which of the following can represent the sides of a triangle?

a) {2,3,6}

no

because

$2+3<6$

b) {10,6,12}

yes

$10+6>12$ ✓

$6+12>10$ ✓

$10+12>6$ ✓

c) {7,3,10}

no

because

$7+3$ is

not greater

than 10.

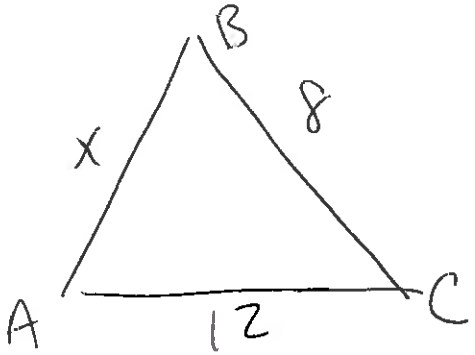
d) {9,9,14}

yes

$9+9>14$ ✓

$9+14>9$ ✓

Example 2: ΔABC has sides of lengths 8, 12, and x. Find all the possible values of x?



$8+12>x$ and $8+x>12$

$20>x$ $\quad x>4$

the last side of ΔABC can be any value x, such that $4<x<20$