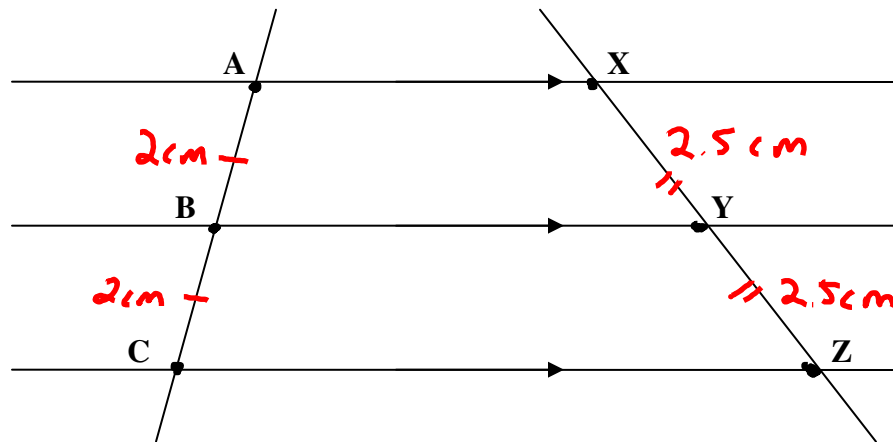# Notes for Lesson 5-3: Theorems Involving Parallel Lines

<u>Theorem 5-8</u>: If two lines are parallel, then all points on one line are equidistant from the other line.
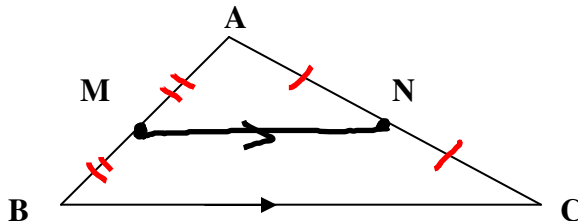
Use your ruler to measure the length of AB, BC, XY, and YZ below.

<u>Theorem 5-9</u>: If three parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

Use your ruler to find the midpoint of AB then draw a line through that point and parallel to BC, then measure the length of AN, NC, BC, and MN.

<u>Theorem 5-10</u>: A line that contains the midpoint of one side of a triangle and is parallel to another side, passes through the midpoint of the third side.

<u>Theorem 5-11</u>: The segment that joins the midpoints of two sides of a triangle is 1) parallel to the third side and 2) half as long as the third side

Example 1: M, N, and T are the midpoints of the sides of ΔXYZ.

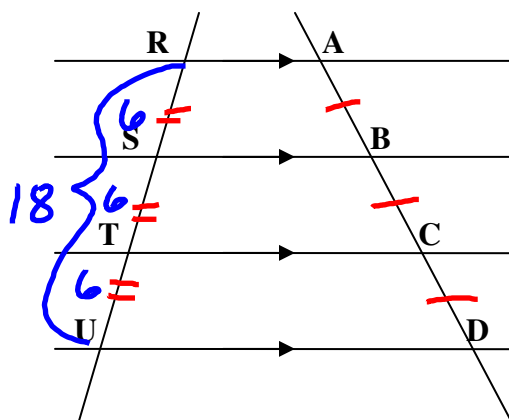$2(3x+5) = 12x-8$
$6x+10 = 12x-8$
$18 = 6x$
$x = 3$

$4y+2 = 7y-7$
$9 = 3y$
$y = 3$
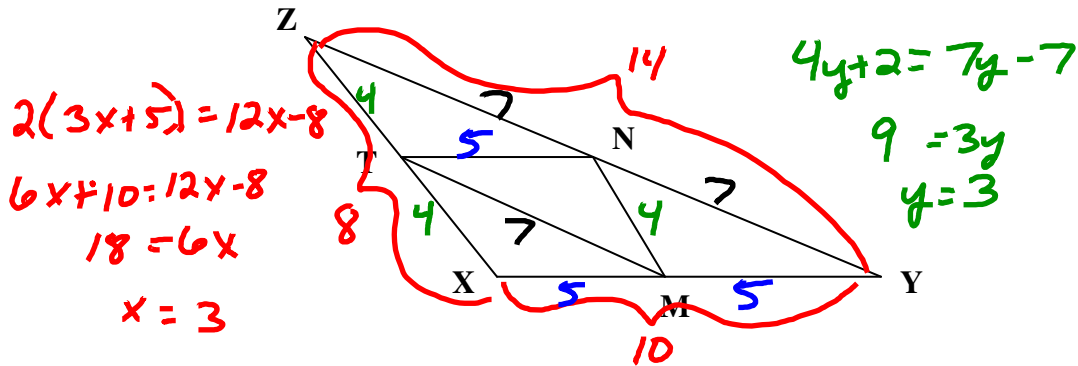
A) If XZ = 10, then MN = __5__

C) If ZN = 4y + 2 and NY = 7y – 7, then y = __3__

B) If TN = 7, then XY = __14__

D) If NM = 3x + 5 and ZX = 12x – 8, then x = __3__

Suppose XY = 10, YZ = 14, and XZ = 8. What are the lengths of the three sides of

A) ΔTNZ?
TN = 5
NZ = 7
TZ = 4

B) ΔNTM?
NT = 5
TM = 7
NM = 4

Example 2: Given that AB = BC = CD

A) If RS = 6, then SU = __12__

B) If RT = 6x + 2 and TU = 10, then x = __3__

C) If RU = 18, then RT = __12__

$6x+2 = 20$
$6x = 18$
$x = 3$