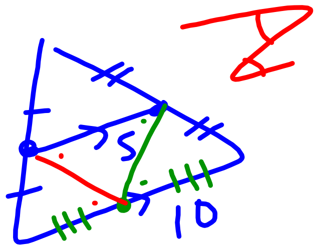
Unit 5 Day 8: Inequalities and Midsegments

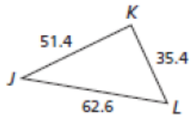
AGENDA:
-Check & Review 5-7 Homework
-Notes & Guided Practice
- Quiz 3



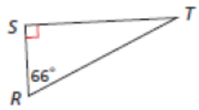
Homework - Day 8
- Proofs E and F + 5.8 Worksheet in Packet
- Continue to work on Constructions Project and lesson summaries
- Test and Project Due WED

Day 7 HW Answers: p. 336-337: # 18, 19, 20,21,26, 32-33, 34

18. Write the angles in order from smallest to largest. $\angle J$, $\angle L$, $\angle K$



19. Write the sides in order from shortest to longest. $\overline{RS}$, $\overline{ST}$, $\overline{RT}$

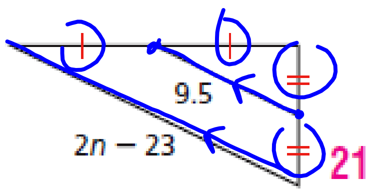


Tell whether a triangle can have sides with the given lengths. Ex

20. 6, 10, 15 **21.** 14, 18, 32

Answers
20. Yes; the sum of each pair of 2 lengths is greater than the third length.
21. No; 14 + 18 = 32, which is not greater than the third side length.

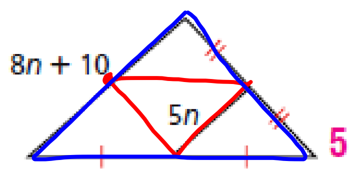
24.



$\text{mid} = \frac{1}{2}\, 3^{rd}$

$9.5 = \frac{1}{2}(2n-23)$

26.

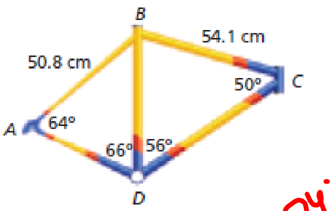


$2\,\text{mid} = 3^{rd}$

$2(9.5) = 2n-23$

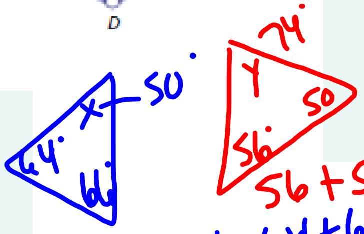
32. Bicycles The five steel tubes of this mountain bike frame form two triangles. List the five tubes in order from shortest to longest. Explain your answer.

33. Critical Thinking The length of the base of an isosceles triangle is 15. What is the range of possible lengths for each leg? Explain.



32. $\overline{AD}$, $\overline{BD}$, $\overline{AB}$, $\overline{BC}$, $\overline{CD}$; possible answer: in $\triangle ABD$, $m\angle ABD = 50°$. In $\triangle BCD$, $m\angle DBC = 74°$. In $\triangle ABD$, the order of the tubes from shortest to longest is $\overline{AD}$, $\overline{BD}$, $\overline{AB}$. In $\triangle BCD$, the order of the tubes from shortest to longest is $\overline{BD}$, $\overline{BC}$, $\overline{CD}$. So $AD < BD < AB$, and $BD < BC < CD$. Since $AB = 50.8$ and $BC = 54.1$, it is also true that $AB < BC$. So $\overline{AD} < \overline{BD} < \overline{AB} < \overline{BC} < \overline{CD}$.

33. $a > 7.5$, where a is the length of a leg. Possible answer: By the $\triangle$ Inequal. Thm., $a + a > 15$ and $a + 15 > a$. The solution of the first inequality is $a > 7.5$. The second inequality simplifies to $15 > 0$, which is always a true statement.



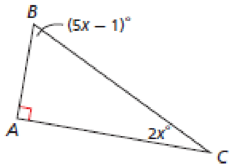
$56 + 50 + y = 180°$ $y = 74$

Δ Sum: $64 + 66° + x = 180°$

$50° = x$

List the sides of each triangle in order from shortest

34.



$\overline{AB}$, $\overline{AC}$, $\overline{BC}$

35.

(4.5

AD − BD − AB

BD − BC − DC

$\overline{AD}$ − $\overline{BD}$ − $\overline{AB}$ − $\overline{BC}$ − $\overline{DC}$

Triangle Inequalities in the Coordinate Plane

List the angles in order from smallest to largest for ΔHAT with H(0,5), A(7,8), T(7,-2)?

AH: $3^2 + 7^2 = h^2$

$\sqrt{58} = h$

7.6157

$AT = 10 = \sqrt{100}$

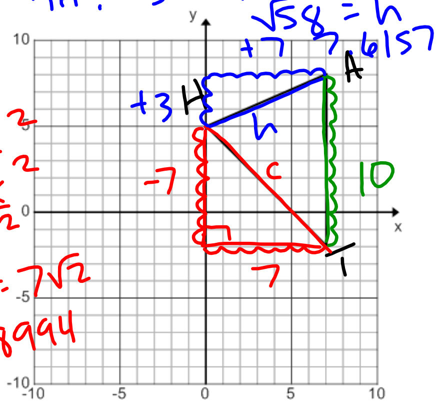
$HT = (-7)^2 + (7^2) = c^2$

$49 + 49 = c^2$

$\pm\sqrt{98} = \sqrt{c^2}$

$= \sqrt{98} = 7\sqrt{2}$

≈ 9.8994



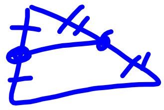
AH	HT	AT
7.6	9.9	10
∡T	∡A	∡H

Summarize the technique:

To compare sides of triangles in the coordinate plane, calculate their lengths using the DISTANCE formula*: $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Then compare ∡'s based on side lengths.

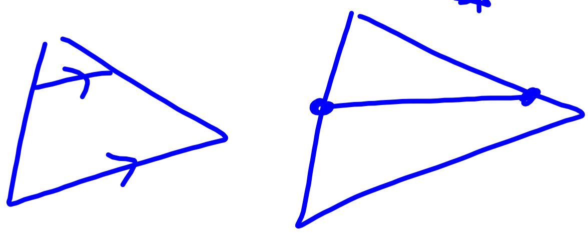
*(*Or Pythagorean Theorem)*

Triangle Midsegment Proofs in the Coordinate Plane



You may prove a segment is a midsegment by one of two methods:

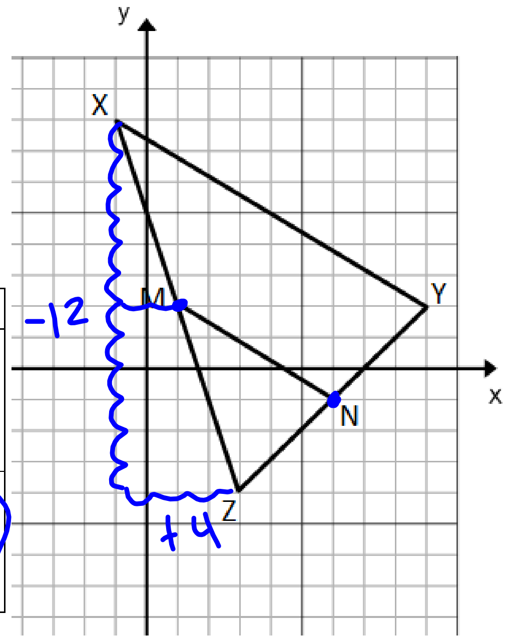
- **Definition:** Prove the endpoints are midpoints of the triangle's sides.
- **Properties:** Prove the segment is **half (using distance formula) the length** of the triangle side that it is **parallel** to (slope = → parallel). This is a conjunction.



Ex: Given: X(-1,8), Y(9,2), Z(3,-4)
M(1,2) and N(6,-1)

Prove: $\overline{MN}$ is a midsegment of ΔXYZ

Calculations:



	Midpoint
$\overline{XZ}$	MIDPOINT (1,2) BY COUNTING
$\overline{ZY}$	$\left(\frac{9+3}{2}, \frac{2+-4}{2}\right) = (6,-1)$

Statements:

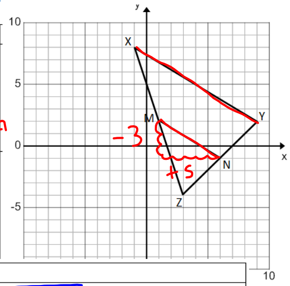
- Defn: Since the midpoint of $\overline{XZ}$ is (1,2) and M is given as (1,2) then M is the midpoint of $\overline{XZ}$. Since the midpoint of $\overline{ZY}$ is (6,-1) and N is given as (6,-1) then N is the midpoint of $\overline{ZY}$. Since the segment $\overline{MN}$ joins the midpoints M and N, then $\overline{MN}$ is a midsegment of ΔJKL by DEFN OF MIDSEGMENT.

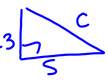
Given: X(-1,8), Y(9,2), Z(3,-4)
M(1,2) and N(6,-1)

Calculations:

Prove: $\overline{MN}$ is a midsegment of ΔXYZ

	Slope
$\overline{MN}$	$\frac{\Delta y}{\Delta x} = \frac{-3}{5}$ BY COUNTING
$\overline{XY}$	$\frac{2-8}{9-(-1)} = \frac{-6}{10} = -\frac{3}{5}$



Length (distance)
XY: $\sqrt{(9-(-1))^2+(2-8)^2}$ $= \sqrt{10^2+(-6)^2}$ $= \sqrt{100+36} = \sqrt{136} = \sqrt{4}\sqrt{34} = 2\sqrt{34}$
MN  $(-3)^2+(5)^2=c^2$ $9+25=c^2$ $34=c^2$ $\pm\sqrt{34}$

Statements:

- **Properties:** Since the slopes $m\overline{MN} = -\frac{3}{5} = m\overline{XY}$, then $\overline{MN} \parallel \overline{XY}$. Since MN= $\sqrt{34}$ and XY= $2\sqrt{34}$ then $MN = \frac{1}{2}XY$ Since $\overline{MN}$ is **half the length** of the segment it is **parallel to**, then $\overline{MN}$ is midsegment of ΔXYZ.