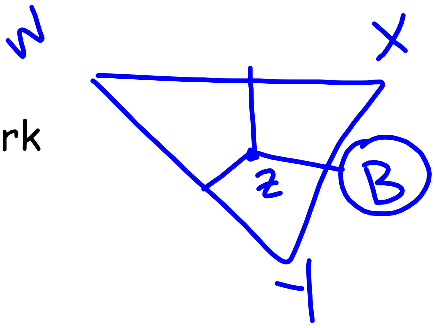
Unit 5 Day 7: Inequalities in One Triangle



AGENDA:
-Check & Review 5-6 Midsegment Homework
-Notes & Guided Practice

#3

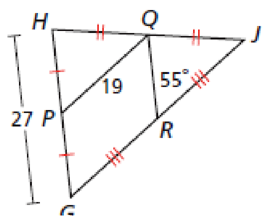
Homework - Day 8
- pg 336-37: #18,19,20, 21, 26, 32, 33, 34, 54 (in packet or use graph paper)
- Continue to work on Constructions Project and lesson summaries both due test day

REVIEW PACKET

Day 6 HW Answers: p. 324-25: #11-16,18-20, 24,26 + Proofs E & F

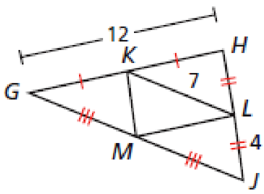
Find each measure.

11. GJ 38
12. RQ 13.5
13. RJ 19
14. $m\angle PQR$ 55°
15. $m\angle HGJ$ 55°
16. $m\angle GPQ$ 125°

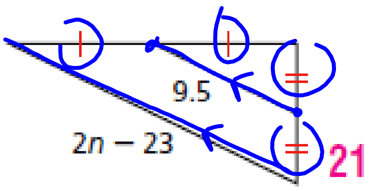


$\triangle KLM$ is the midsegment triangle of $\triangle GHJ$.

18. What is the perimeter of $\triangle GHJ$? 34
19. What is the perimeter of $\triangle KLM$? 17
20. What is the relationship between the perimeter of $\triangle GHJ$ and the perimeter of $\triangle KLM$?
The perimeter of $\triangle GHJ$ is twice the perimeter of $\triangle KLM$.



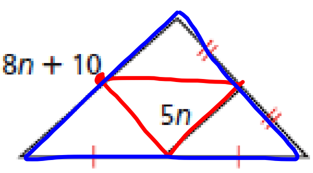
24.



21

mID = ½ 3RD
9.5 = ½ (2n-23)

26.



5

2 mID = 3RD
2(9.5) = 2n-23

Midsegment Theorem Proofs in the Coordinate Plane:

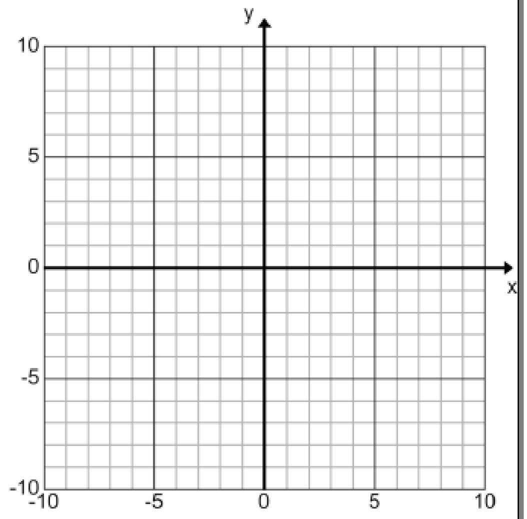
Proof E (Day 6)

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

from notes

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

Plan:



Proof F (Day 6)

$\sqrt{34}$

$2\sqrt{34}$

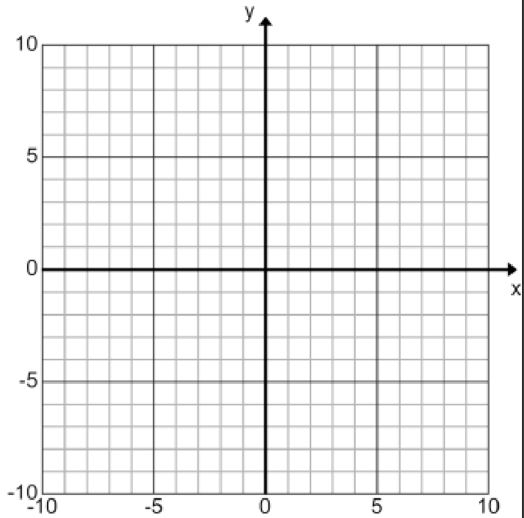
$\sqrt{136}$

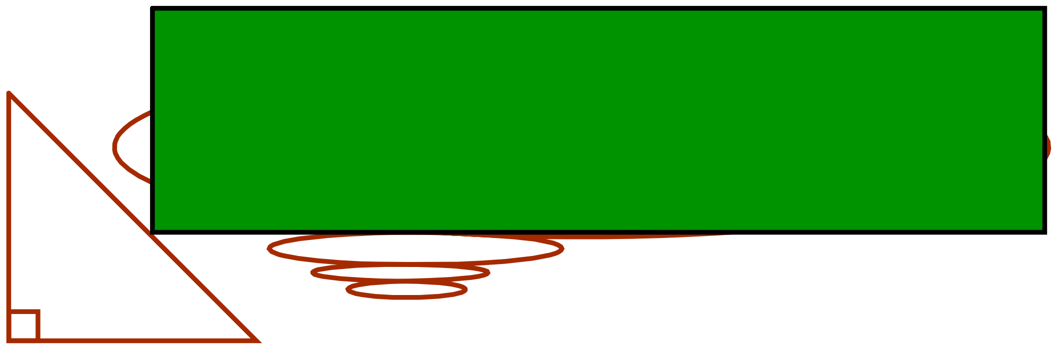
Given: X(-1,8), Y(9,2), Z(3,-4)
M is the midpoint of $\overline{XZ}$.
N is the midpoint of $\overline{ZY}$.

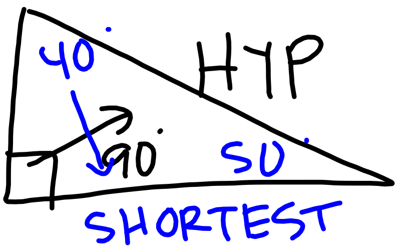
from notes

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

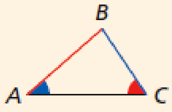
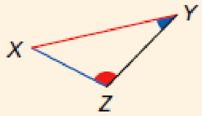
Plan:



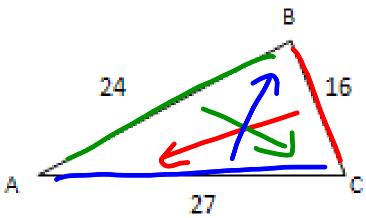



40°
HYP
90°
50°
SHORTEST

Theorems Angle-Side Relationships in Triangles

THEOREM	HYPOTHESIS	CONCLUSION
5-5-1 If two sides of a triangle are not congruent, then the larger angle is opposite the longer side. (In △, larger ∠ is opp. longer side.)	 $AB > BC$	$m\angle C > m\angle A$
5-5-2 If two angles of a triangle are not congruent, then the longer side is opposite the larger angle. (In △, longer side is opp. larger ∠.)	 $m\angle Z > m\angle Y$	$XY > XZ$

1) List the Angles in Order from Smallest to Largest:

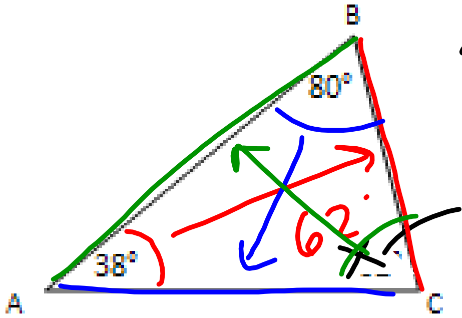


SIDES

SHORTEST → LONGEST

16	24	27
$\overline{BC}$	$\overline{AB}$	$\overline{AC}$
∡A,	∡C,	∡B

2) List the Sides in Order from Smallest to Largest:



∆ sum

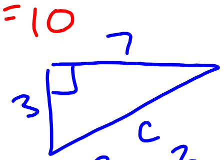
∡'s SMALLEST → BIGGEST

38°	62°	80°
∡A	∡C	∡B
$\overline{BC}$	$\overline{AB}$	$\overline{AC}$

3) Which is the largest angle in ΔHAT with H(0,5), A(7,8), T(7,-2)?

AT = 10

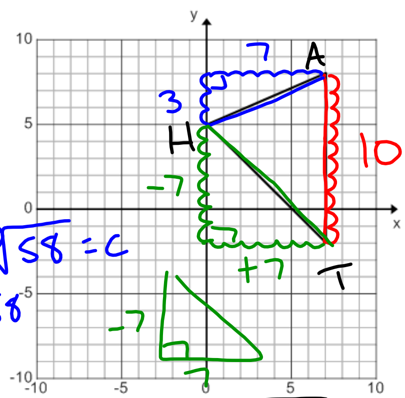
HA



$3^2 + 7^2 = c^2$

$9 + 49 = c^2$ $\pm\sqrt{58} = c$

HA ≈ 7.6158



$(0,5)\ (7,-2)$ $= \sqrt{(7-0)^2 + (-2-5)^2}$

$= \sqrt{7^2 + (-7)^2} = \sqrt{49+49}$

$= \sqrt{98} = 7\sqrt{2} \approx 9.8995$

7.6	9.9	10
HA	HT	AT
∡T	∡A	∡H

∡H LARGEST

Try this:

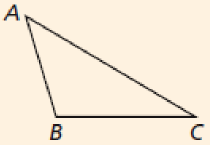
Build a scalene triangle with side lengths of 2 inches, 3 inches, and 6 inches.

What happened?

Theorem 5-5-3 Triangle Inequality Theorem

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

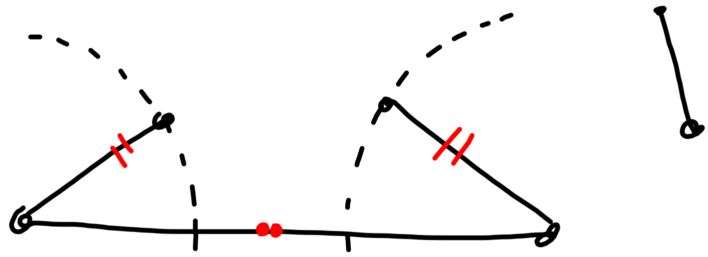
$AB + BC > AC$
$BC + AC > AB$
$AC + AB > BC$



Sum of two smaller sides

must be **greater than** 3rd side.

Side 1 + Side 2 > Side 3



Examples of determining if three sides can be the sides of a triangle:

1) Can 5, 7, 12 be the sides of a triangle?

$5+7 \overset{?}{>} 12$

$12 \not> 12$

NO, THE SUM OF 2 SIDES IS NOT ALWAYS GREATER THAN THE 3RD SIDE ALONE

2) Can 2,6,7 be the sides of a triangle?

3 CASES:

1. $2+6 \overset{?}{>} 7$

   $8>7$ ✓

2. $6+7 \overset{?}{>} 2$

   $13>2$ ✓

3. $2+7 > 6$

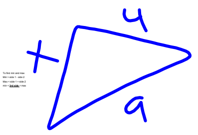
   $9>6$ ✓

YES

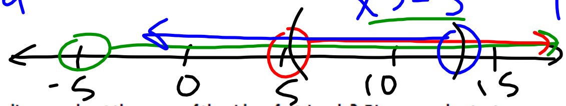
Examples of finding the range of the length of the third side of triangle given two side lengths:

3) If two sides of a triangle are 4 and 9, what is the range of possible lengths of the third side?

$5 < x < 13$



① $x+4>9$, $x>5$ ② $x+9>4$, $x>-5$ ③ $4+9>x$, $13>x$



What did you discover about the range of the sides of a triangle? Discover a shortcut:

$|DIFF| < x < SUM$

4) If 2 sides of a triangle are 7 and 20, what is the range of values for the 3rd side?

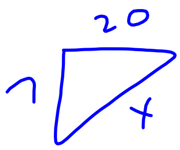
$13 < x < 27$

$20-7 < x < 20+7$

WHICH COULD BE SIDES OF A Δ?

ISOS

1. 1, 4, 9
2. 9, 9, 10 ✓ ✓
3. 2, 3, 4 ✓
4. 20, 41, 30 ✓



$13 < x < 27$

14, 15, …, 26

5) (Regents Question) How many integer values of *x* are there so that *x*, 5, and 8 could be the lengths of the sides of a triangle?

1) 6
2) 9
3) 3
4) 13

$8-5 < x < 5+8$

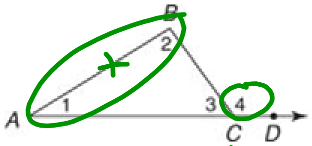
$3 < x < 13$

4, 5, …. 12

3) (Regents Question) Phil is cutting a triangular piece of tile. If the triangle is scalene, which set of numbers could represent the lengths of the sides?

1) ~~{2, 4, 7}~~ $6 \not> 7$
2) {4, 5, 6}
3) ~~{3, 5, 8}~~ $3+5 \not> 8$, $4 \not> 8$
4) ~~{5, 5, 8}~~

Exterior Angle Inequality Theorem: The measure of an exterior angle of a triangle is greater than the measure of each of its remote interior angles.



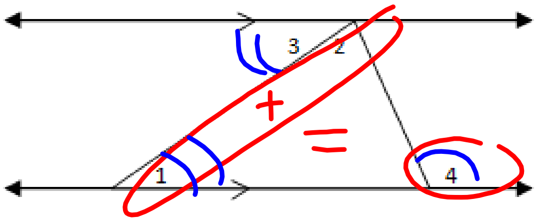
$m\angle 4 > m\angle 1$ and $m\angle 4 > m\angle 2$

$m\measuredangle 4 = m\measuredangle 1 + m\measuredangle 2$

$100 = 100 + \emptyset$

EXAMPLE:

Explain why $m\measuredangle 4 > m\measuredangle 3$.



EXT $\measuredangle$ THM:

$m\measuredangle 4 = m\measuredangle 1 + m\measuredangle 2$

$m\measuredangle 4 > m\measuredangle 1$

$m\measuredangle 4 > m\measuredangle 2$

$m\measuredangle 1 = m\measuredangle 3$

$\parallel \rightarrow$ ALT INT $\measuredangle$'s $\cong$

$m\measuredangle 4 > m\measuredangle 3$

BY SUBSTITUTION