# Unit 5 Day 7L: Inequalities in One Triangle

AGENDA:

-Check & Review 5-6 Midsegment Homework

-Notes & Guided Practice

Homework - Day 8

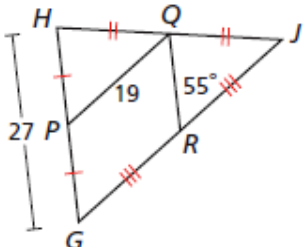
- pg 336-37: #18,19,20, 21, 26, 32, 33, 34

- Continue to work on Constructions Project and lesson summaries both due test day

## Day 6 HW Answers: p. 324-25: #11-16,18-20, 24,26

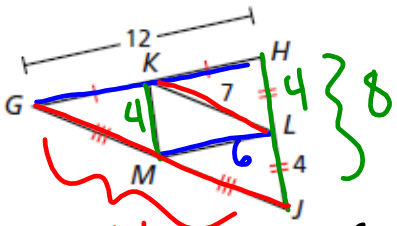
Find each measure.

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°



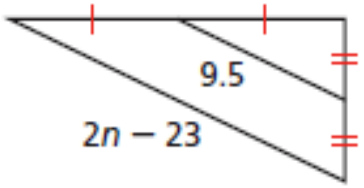

$\triangle KLM$ is the midsegment triangle of $\triangle GHJ$.

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 $\triangle KLM$.

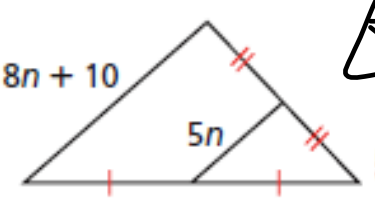



14 28

24. 9.5, $2n - 23$ = 21

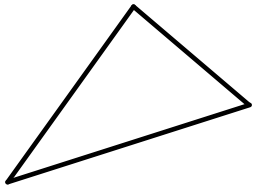


26. $8n + 10$, $5n$ = 5

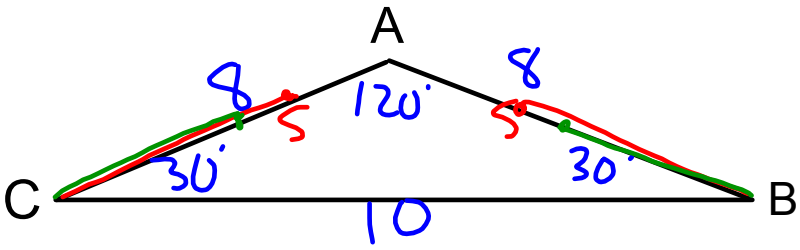


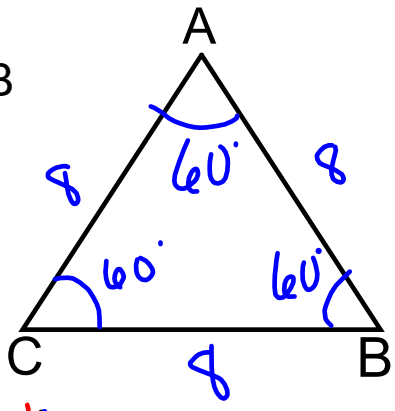
1. Between you and your desk pair, draw the following using your UAM and a ruler:
   > an isosceles obtuse triangle labeled ABC with the obtuse angle labeled A.
   > an equiangular triangle labeled ABC.
   > a scalene right triangle labeled ABC with the right angle labeled A.

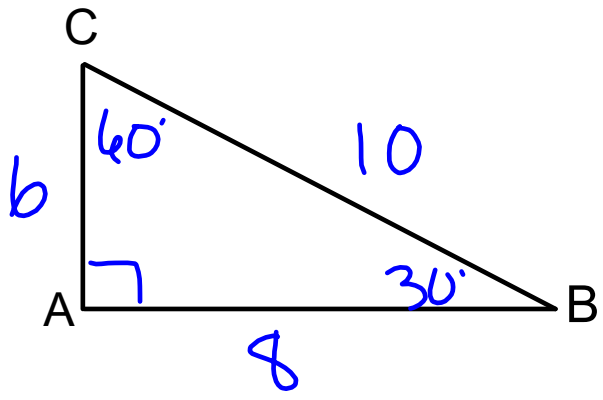
2. Using your triangles with your desk pair, measure and record the lengths of the sides of the triangle.

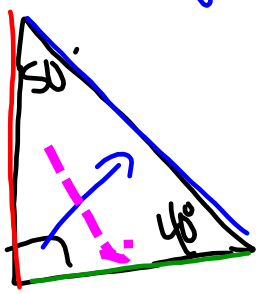


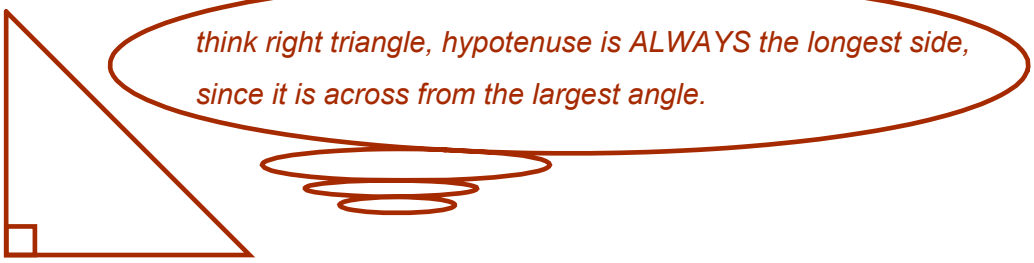
- What do you notice about the sides and angles?
- What do you notice about any combinations of sides?



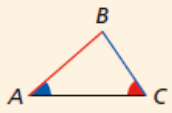



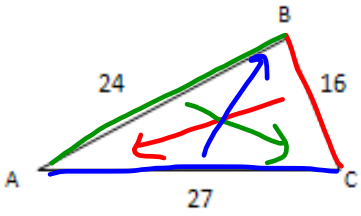






**Theorems** Angle-Side Relationships in Triangles

| 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

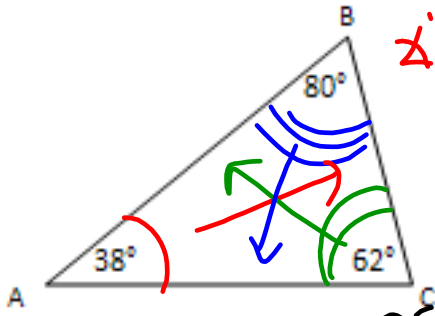
16 24 27

BC AB AC

∠'S SMALLEST → LARGEST

∠A ∠C ∠B

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




∠'S SMALLEST → LARGEST

38° 62° 80°

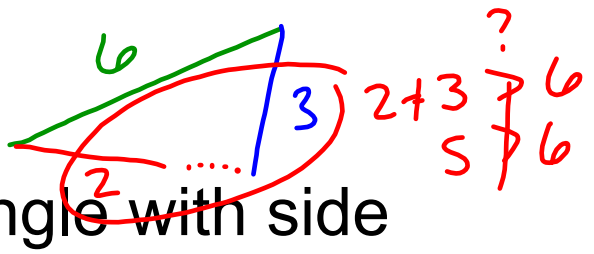
∠A ∠C ∠B

SIDES SHORTEST → LARGEST

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

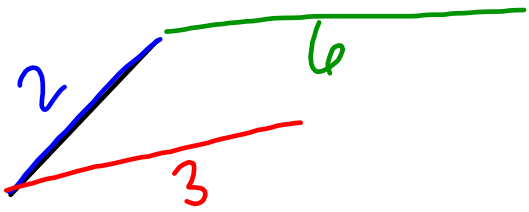
Oops - out of order;
we'll come back to
Regents Question #3

Try this:




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

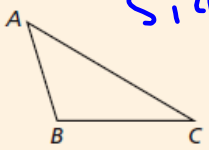
What happened?



**Theorem 5-5-3** Triangle Inequality Theorem

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

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




sum 2 sides > 3rd alone

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?

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

$12 \not> 12$

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

FALSE ONE COUNTEREX

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

TRUE - ALL 3 CASES MUST WORK

$2+6 \stackrel{?}{>} 7$ $\quad 8 > 7$ ✓

$2+7 \stackrel{?}{>} 6$ $\quad 9 > 6$ ✓

$7+6 \stackrel{?}{>} 2$ $\quad 13 > 2$ ✓

YES

B/C THE SUM OF 2 SIDES IS ALWAYS > 3RD ALONE.

All three cases must be true or find one counterexample for false. Hint: try adding the two SMALLER sides.

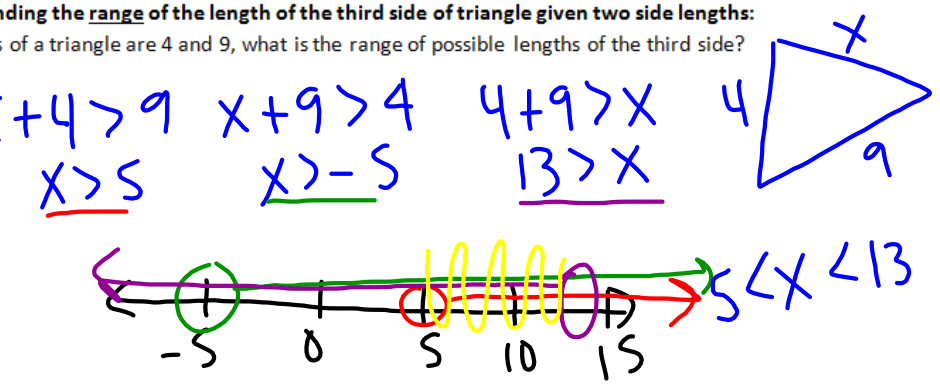
**Examples of finding the range of the length of the third side of triangle given two side lengths:**

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

To find min and max
Min > side 1 - side 2
Max < side 1 + side 2
min < 3rd side < max

$x+4>9$ $x+9>4$ $4+9>x$

$x>5$ $x>-5$ $13>x$



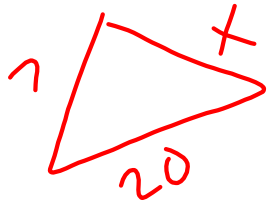




**What did you discover about the range of the sides of a triangle? Discover a shortcut:**

$9-4<x<9+4$ |DIFF|<x<SUM

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




|DIFF|<x<SUM

$20-7<x<20+7$

$13<x<27$

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?

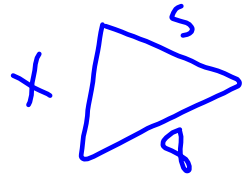
1) 6
2) 9
3) 3
4) 13

DIFF<x<SUM

$8-5<x<8+5$

$3<x<13$

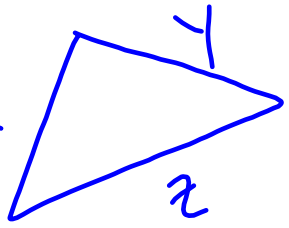
4, 5, 6, 7, 8, 9, 10, 11, 12




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

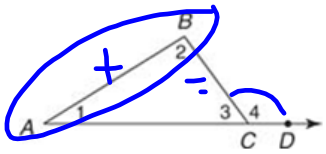
NOT SCALENE




SUM 2 SIDES > 3RD?

## If time allows...

**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∠1 + m∠2 = m∠4 EXT∠ THM

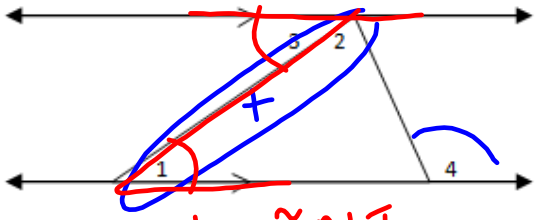
30 + 50 = 80

20 + 70 = 90

20 + 100 = 120

**EXAMPLE:**

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




l1 → ≅ ALT INT

m∠4 > m∠1

m∠4 > m∠3 SUBST.

COOR PROOFS

RIGID MOTIONS

TRIANGLE PROOFS USING CRITERIA + CPCTC