Geometry

Ch. 5 Handout 5.5

Inequalities in Triangles

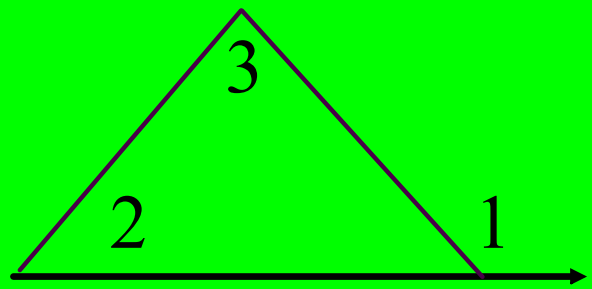
Corollary to the Triangle Exterior Angle Theorem

The measure of an exterior angle of a triangle is greater than the measure of each of its remote interior angles.

$m\angle 1 > m\angle 2$

and

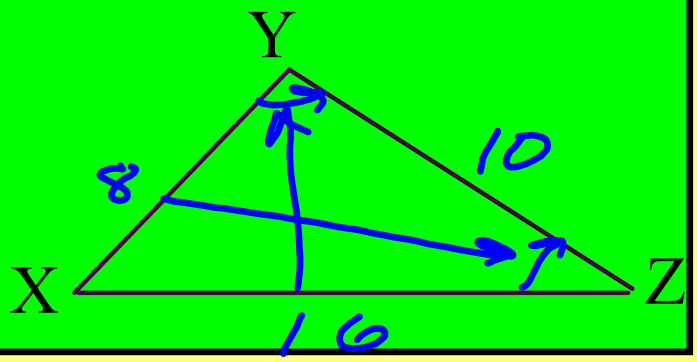
$m\angle 1 > m\angle 3$



Theorem 5.10

If two sides of a triangle are not congruent, then the larger angle lies opposite the longer side.

If XZ > XY, then $m\angle Y > m\angle Z$



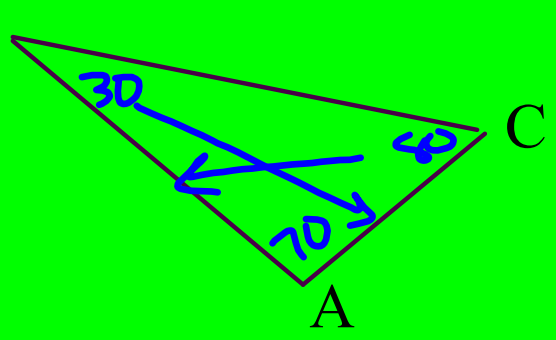
Largest ∠ = ∠Y

Smallest ∠ = ∠Z

Theorem 5.11

If two angles of a triangle are not congruent, then the longer side lies opposite the larger angle.

If $m\angle A > m\angle B$, then BC > AC



Longest side — $\overline{AB}$

Shortest side — $\overline{AC}$

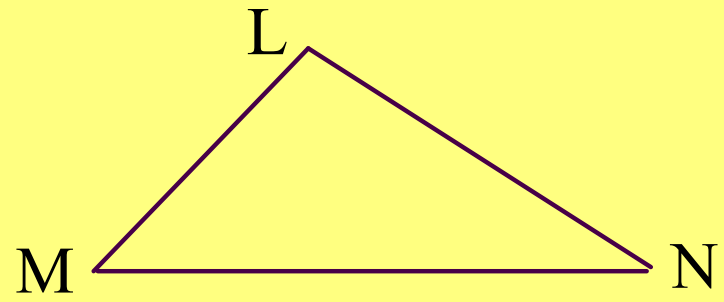
Theorem 5.12 Triangle Inequality Theorem

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

$LM + MN > LN$

$MN + LN > ML$

$LN + LM > MN$



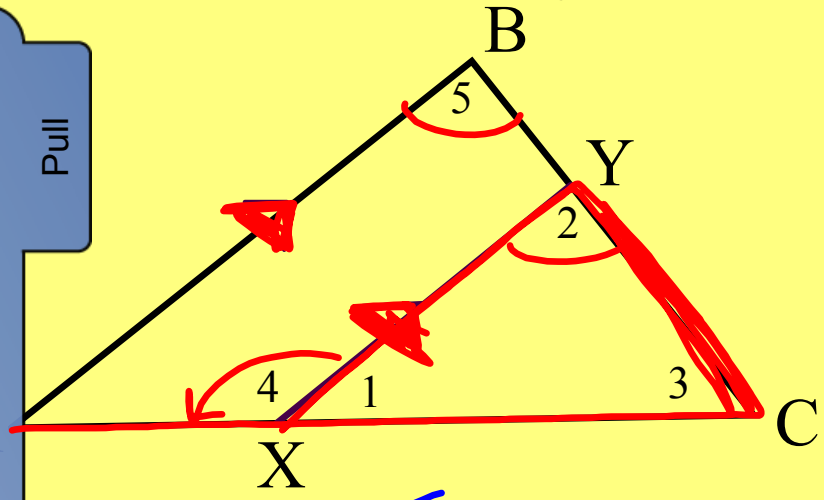
1. Is $m\angle 4 > m\angle 5$ and explain why?

$\angle 5 \cong \angle 2$ because || lines the corresponding angles are congruent.

$\angle 4 > \angle 2$ measure of an exterior angle of a triangle is greater than the remote interior angle.

$\angle 4 > \angle 5$ substitution

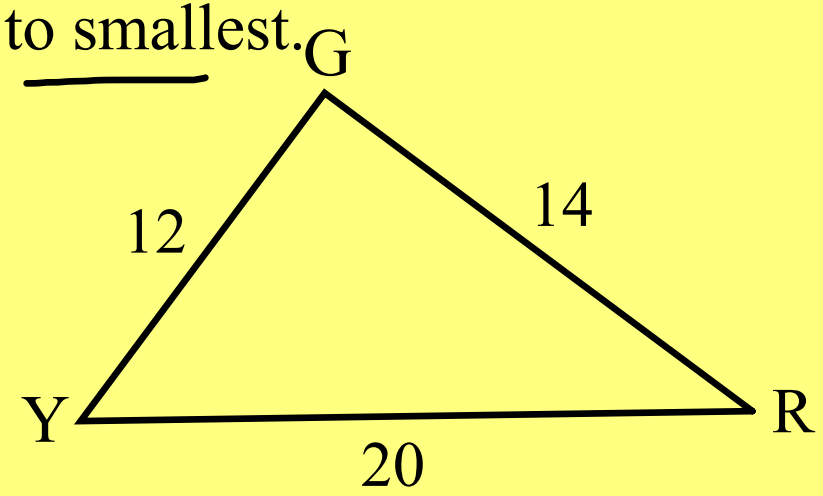
Pull



$m\angle 4 > m\angle 5$

$m\angle 2 = m\angle 5$

2. In ΔRGY, RG = 14, GY = 12, and RY = 20.
List the angles from largest to smallest.



∠G , ∠Y , ∠R

Pull

3. Can a triangle have sides with the given lengths?
   a. 2 cm, 2 cm, 4cm b. 8 in., 15 in., 12 in.

$2 + 2 \not> 4$

Not a Δ

$8 + 15 > 12$

$8 + 12 > 15$ yes, a Δ.

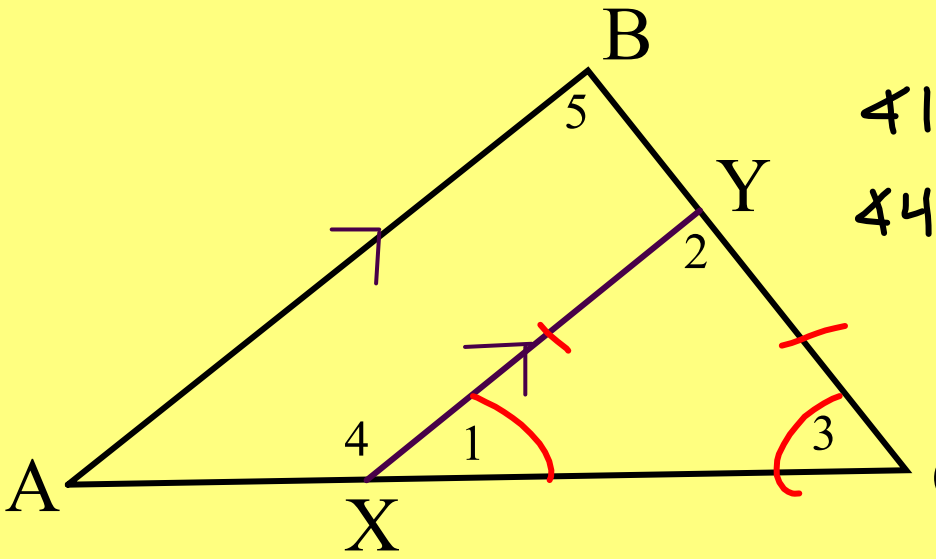
$15 + 12 > 8$

4. In ΔFGH, FG = 9 m and GH = 17 m. Describe the possible lengths of FH

$17 - 9$ $17 + 9$

$8 < FH < 26$

5. If $\overline{CY} \cong \overline{XY}$, explain why $m\angle 4 > m\angle 1$.



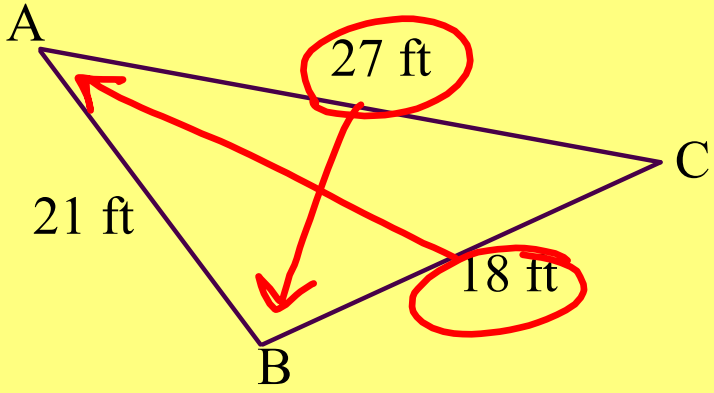
$\angle 1 \cong \angle 3$ If $\triangle$ then $\triangle$

$\angle 4 > \angle 3$

$\angle 4 > \angle 1$

Pull

6. List the angles of ΔABC in order from smallest to largest.



∠A , ∠C , ∠B

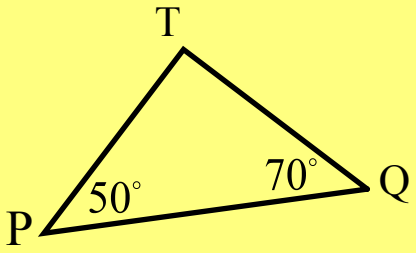
7. Can a triangle have sides with the given lengths? Explain.

a) 2 m, 7 m, and 9 m b. 4 yd, 6 yd, and 9 yd

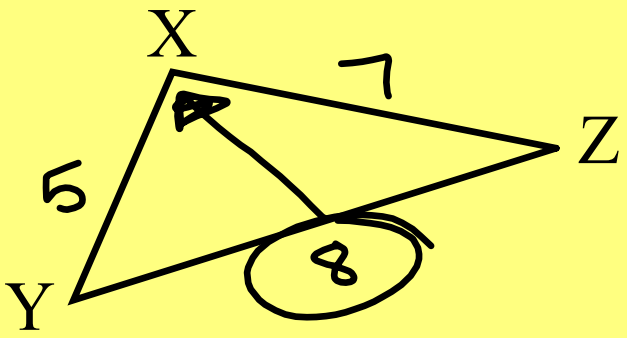
8. A triangle has sides of lengths 3 in. and 12 in. Describe the possible lengths of the third side.

12 - 3 12 + 3

$9 < X < 15$

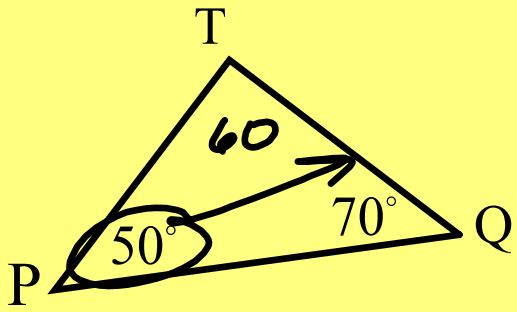


9. In ΔXYZ, XY = 5, YZ = 8, and XZ = 7. Which angle is largest?



largest ∠ = ∠X

10. In ΔPQT, $m\angle P = 50$ and $m\angle T = 70$. Which side is shortest?



Shortest side = $\overline{TQ}$

Assignment:

pg 293 4-14 evens, 16-27, 32,35,36