Triangle Inequality Theorem

- The sum of the lengths any two sides of a triangle is _____ than the length of the third side.

In order to determine whether three given measures could form a triangle, all we have to do is to _____ the smaller numbers. If the sum is _____ than the third number, then the measures could work.

Example 1: Determine if the given measures can be the lengths of the sides of a triangle.

- 3, 4, 6 _____ 6, 9, 15 _____
- 8, 8, 8 _____ 4, 8, 16 _____

Practice 1: Determine if the given measures can be lengths of the sides of a triangle.

A) 5, 12, 13 _____ C) 15, 30, 40 _____ E) 2, 2, 4 _____

B) 1, 2, 3 _____ D) 17, 18, 19 _____ F) 2,4, 5 _____

If we are given two measures, and we need to find the possible measure of the third side of a triangle, we could find the range by _____ and _____both numbers. The _____ is the minimum possible measure, and the _____ is the maximum possible measure. Those numbers, however, are not part of the solution. In other words, the range would look like $d < x < s$.

Example 2: Determine the range for the measure of the third side given the measures of two sides of a triangle.

- 8 and 14 _____ 12 and 18 _____
- 1.5 and 5.5 _____ 80 and 8 _____

Practice 2: Determine the range for the measure of the third side given the following measures.

A) 7 and 12 _____ D) 100 and 200 _____

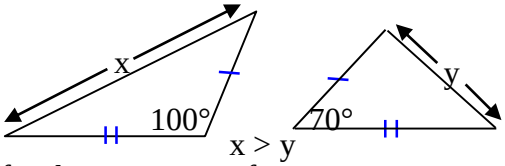
B) 9 and 14 _____ E) 19 and 35 _____

C) 1 and 2 _____ F) 40 and 41 _____

Inequalities involving two triangles

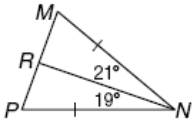
SAS Inequality Theorem (Hinge Theorem)

If 2 sides of one triangle are ≅ to 2 sides of another triangle, and the included angle of the first triangle is larger than the included angle of the 2nd triangle, then the 3rd side of the first triangle is longer than the 3rd side of the second triangle.

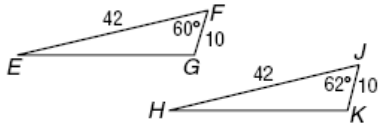


x > y

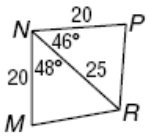
Example 3: Write an inequality for the given pair of segment measures.



MR, RP



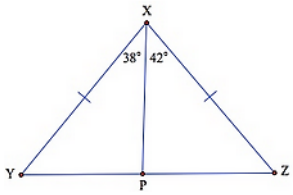
EG, HK



MR, PR

Practice 3: Write an inequality for the given pairs of segment measures.

A)

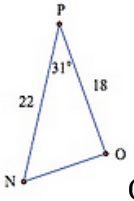


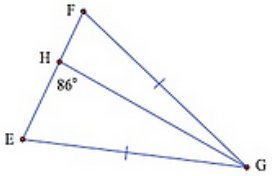
YP ____ PZ

B)

LM _____ NO

C)

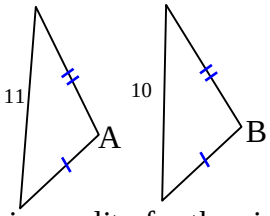




EH _____ HF

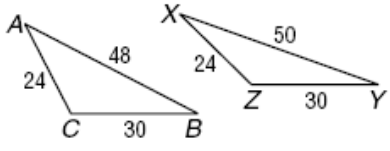
SSS Inequality Theorem (Converse Hinge Theorem)

If 2 sides of one triangle are ≅ to 2 sides of another triangle, and the 3rd side of the first triangle is longer than the 3rd side of the 2nd triangle, then the included angle of the 1st triangle is larger than the included angle of the 2nd triangle.

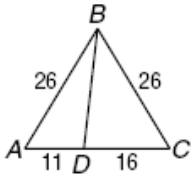


$m\angle A > m\angle B$

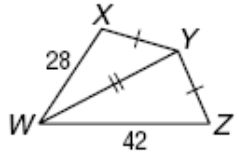
Example 4: Write an inequality for the given pair of angle measures.



$m\angle C, m\angle Z$



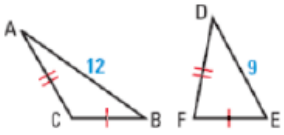
$m\angle ABD, m\angle CBD$



$m\angle XYW, m\angle WYZ$

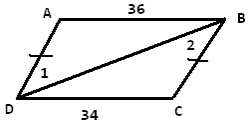
Practice 4: Write an inequality to describe the possible values of x.

A)



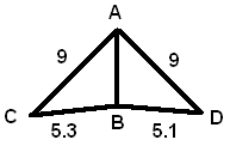
m∠F _____m∠C

B)



m∠1 ___m∠2

C)



m∠CAB ____ m∠BAD